المجلد (38) – عدد خاص – 2026

مجلة التربية الرياضية



مجلة علمية فصلية مُحكمة متخصصة

بعلوم الرياضة تصدر عن

كلية التربية البدنية وعلوم الرياضة

جامعة بغداد

http://jcope.uobaghdad.edu.iq
DOI: https://doi.org/10.37359/JOPE.V38(Special Issue)2026
P-ISSN: 2073-6452
E-ISSN: 2707-5729

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة بغداد
كلية التربية البدنية وعلوم الرياضة

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المجلد الثامن والثلاثون
عدد خاص
السنة 2026

DOI: https://doi.org/10.37359/JOPE.V38(Special Issue)2026

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تأسست عام (1990)

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الموقع الالكتروني: www.jcope.uobaghdad.edu.iq

رقم الإيداع في دار الكتب والوثائق العراقية (597) لسنة (1990)

(P-ISSN: 2073-6452) ***(E-ISSN: 2707-5729)***

تصميم الغلاف: د. ياسر وجيه قدوري

تعليمات النشر في مجلة التربية الرياضية

أولاً: تعليمات عامة:

- مجلة علمية رياضية فصلية غير ربحية، متخصصة بنشر البحوث العلمية الخاصة بعلوم الرياضة، لأغراض النشر العلمي، تصدرها كلية التربية البدنية وعلوم الرياضة / جامعة بغداد.
- تعتمد المجلة سياسة التحكيم السري المزدوج والوصول الحر للبحوث دون قيد او شرط.
- يتم استخدام الأسماء وعناوين البريد الإلكتروني والهواتف في قاعدة بيانات المجلة للأغراض العلمية فقط الخاصة بالمجلة ولن تكون متاحة للجميع أو تستعمل لغرض آخر.
- تعتد مجلة التربية الرياضية الرخصة (CC BY 4.0) 
(a Creative Commons Attribution 4.0 International license) وهي بذلك تحفظ حقوق الملكية الفكرية للباحثين الناشرين فيها، وفي الوقت نفسه تتيح للاخرين بتحميل ومشاركة وإعادة اسخدام وتوزيع البحث في نطاق واسع. للمزيد من المعلومات، انقر على الرابط ادناه:
https://creativecommons.org/licenses/by/4.0/
- تتم إجراءات المراجعة الأولية للبحث المرسل من قبل هيئة التحرير واجراء الاستلال الاليكتوني، ويتم اعلام الباحث بأي مشكلة خلال الأسبوع الاول من استلام البحث.
- يتم إحالة البحث للتحكيم العلمي من قبل هيئة التحرير لمحكمين أثنين معتمدين من قبل المجلة وبشكل سري.
- تتم عملية التحكيم خلال مدة (3) اسابيع وفق تعليمات المجلة (ارشادات المحكمين).
- بالاعتماد على توصية المحكمين، يتم قبول البحث كما هو او قبولة بعد اجراء التعديلات او رفضه، ويتم اعلام الباحث بذلك.
- بعد الانتهاء من التحكيم، يتم طلب دفع رسوم النشر البالغة (120000) الف دينار عراقي. علماً إن المجلة غير ربحية والنفقات أعلاه لتغطية أجور التحكيم والنشر والترجمة فقط.
- يكون النشر للباحثين من خارج العراق مجاني وبشكل كامل ولحد نهاية سنة (2021).
- كل إجراءات تحكيم البحوث تكون الكترونياً اعتماداً على نظام المجلات المفتوحة (OJS).

ثانياً: شروط كتابة البحث:

تتبع مجلة التربية الرياضية (JOPE) طريقة (IMRAD) في كتابة البحوث وهي ترمز الى الحروف الأولى لكلمات: المقدمة (Introduction). الطريقة والأدوات (Materials and Methods). النتائج (Results) و (And). المناقشة (Discussion).

ورقة واجهة البحث: ويجب أن تتضمن الاتي:

- **عنوان البحث (Research Title):** يعد عنوان البحث الجزء المميز منه الذي يقرأه عدد كبير من الباحثين ويحتوي العنوان ايضا اسم الباحث (الباحثين) وعنواوينهم (طرائق التواصل معهم).
- **شروط عنوان البحث:**
  - ✓ يحوي على عدد قليل من الكلمات كلما امكن ذلك، و بما لا يزيد عن (12) كلمة.
  - ✓ يكون واضح وسهل الفهم ولا يحتوي على المختصرات.
  - ✓ يشرح محتويات البحث بدقة وبشكل محدد.
  - ✓ ان لا يكون بصيغة استفهامية كما في المقالات الصحفية.
  - ✓ يشير الى موضوع البحث وليس النتائج.
- **اسم المؤلف (المؤلفون)(Authors):** مؤلف البحث هو الشخص او الأشخاص الذين أسهموا بشكل فعلي في تخطيط وتنفيذ البحث. ويتم تثبيت أسماء المؤلفين بتسلسل منطقي نسبة الى أهمية مشاركتهم في البحث، اذ يُعد الاسم الأول بالبحث هو كبير معدي البحث وبكلام اخر المؤلف الأول (Senior Author) في حين يتم ترتيب باقي المؤلفين نسبة الى أهمية وقدر مشاركتهم في إتمام البحث. يكون طالب الدراسات العليا المؤلف الاول في اطروحته او رسالته يليه المشرف الرئيس بوصفه المؤلف الثاني وهكذا، علماً ان المجلة تعتمد تسلسل الباحثين حسب ما هو مثبت في البحث المرسل للمجلة. يجب ادراج هامش يشير الى المعلومات الخاصة عن المؤلفين كافة للاتصال بهم بهدف التعاون او الاستيضاح او اي شأن يخص البحث ومجال الاختصاص، ويجب ملاحظة ان يكتب الأسم الثلاثي واللقب للمؤلفين مع ذكر عنوان العمل و وسيله الاتصال (البريد الالكتروني- رقم الهاتف) وباللغتين العربية والانكليزية.
- **مستخلص البحث (Abstract):** ينقل الملخص معلومات البحث القائم فعلا مع مراعاة عدم استعمال عبارات الوعود (سوف يقدم، سوف يعرض.... وغيرها)، ويكون ملخص البحث بمعدل (150-250) كلمة ويكتب في فقرة واحدة باللغتين الإنكليزية والعربية. يبدأ الملخص بترتيب متسلسل بعرض الاهداف ثم توضيح الإجراءات المستعملة واهم النتائج المتضمنة حقائق جديدة

تتعلق بتحقيق الأهداف، وأخيرا الاستنتاجات الرئيسة ومستوى دلالتها (Sig). وتكتب افعال جمل عرض الأهداف والمقدمة ومناقشة النتائج والاستنتاجات في الزمن المضارع، في حين تكتب الإجراءات والأختبارات والنتائج في الزمن الماضي. يجب ان لا يحتوي ملخص البحث على الاتي:

- ✓ الاختصارات (الاحرف المختصرة) الا اذا كانت معيارية او معروفة مسبقا مثل (Vo2Max).
- ✓ الإشارة الى الجداول او الاشكال في متن البحث والاستشهاد بالمصادر.
- ✓ أي معلومات او استنتاج غير موجود في متن البحث والجمل العامة والجمل المطولة او المعقدة او الملتوية (المراوغة).
- ✓ تجنب ذكر البيانات الكمية بشكل مفصل وكذلك المعالجات الاحصائية والمصطلحات الطويلة جدا.
- ✓ ذكر المتوسط الحسابي والانحراف المعياري لاعمار وأوزان وأطوال عينة البحث. مثال: (متوسط الطول) متر (± الانحراف المعياري).

- **الكلمات المفتاحية (Key Words):** يجب ان يتضمن البحث كلمات مفتاحية بعدد لا يتجاوز (6) كلمات، ويجب ان تكون محددة بالدراسة وغير الكلمات الموجودة في عنوان البحث، وعلى ان تكتب في نهاية ملخص البحث بفقرة منفصلة وباللغتين الإنكليزية والعربية.
- **المقدمة (Introduction):** تكون مقدمة البحث الجيدة قصيرة نسبياً، تشرح أهمية الدراسة وتحديد اهدافها من خلال البحث في الادبيات ذات العلاقة من مراجع ودراسات، ويكون ذلك عن طريق استعراض مختصر لهذه الدراسات والتي تكون ذات علاقة بمشكلة البحث والتي يجب ان لا تقل عن خمسة دراسات حديثة ومناسبة لتعزيز البحث، كما ان المقدمة تُعَرِف بالمصطلحات الخاصة او المختصرات التي سيتضمنها متن البحث لاحقاً، ويفضل أن لا تتجاوز عدد الكلمات في مقدمة البحث عن (500) كلمة وأن لا تتضمن تكرار لعبارات او مفاهيم ذكرت في اي موقع من الملخص، مع مراعاة تجنب العبارات الانشائية والجمل التي لا تضيف للقارئ معلومة مثل إعادة الحقائق والحالات البديهية.
- **الطريقة والادوات (Materials and Methods):** ان الغرض من هذا القسم هو لعرض ما تم عمله، وكيف تم، وأين تم، وذلك بطريقة مباشرة وبسيطة فضلاً عن التعريف بكيفية جمع البيانات وعرضها وتحليلها. اذ يجب ان يوفر هذا القسم من البحث كل المعلومات الضرورية اللازمة للسماح للمؤلفين الآخرين للحكم على الدراسة والإفادة منها، ويجب مراعاة ترتيب

الاجراءات الميدانية زمنياً مع توفير كافة المعلومات الضـــرورية فقط، وعلى وفق ذلك يتطلب ان يتضمن هذا القسم من البحث على الآتي مع أهمية تسلل الفقرات:

- ✓ منهج البحث وتصميمه المستعمل.
- ✓ الوصف الدقيق لعينة البحث من حيث (الجنس والعمر والوزن.... وغيرها).
- ✓ تصـــميم التجربة مع عدد مرات اجراء الاختبار او القياس وإيجاز الإجراءات المســـتعملة لاخذ العينات (إجراءات الاختبارت).
- ✓ ذكر الأجهزة والادوات المستعملة مع مواصـفاتها الفنية الدقيقة وعددها ومصـدرها وطريقة العمل بها (الضرورية منها فقط غير شائعة الاستعمال). ويجب استعمال الأسماء العلمية للأجهزة بدلاً عن اسمائها التجارية مع ذكر أسماء الشركات المصنعة للجهاز واية معلومات تفيد القارئ.
- ✓ وصف التعديلات اذا ما تم اجراءها على القياسات الروتينية (الاختبارات)، اما إذا ما تم استعمال اجراء جديد (اختبار جديد) فيجب ذكره وشرحه بالتفصيل.
- ✓ توضـــيح طريقة اجراءات البحث من تجربة واختبارات ورقية، وعملية، وشـــفوية او على جهاز الحاسوب.
- ✓ الطريقة الإحصائية (او/و) الرياضية المستعملة لتحليل وتلخيص البيانات.
- ✓ يحق للمجلة ان تطلب من المؤلفين تفاصيل او معلومات إضافية عن أي جزء من أجزاء البحث.

وبشـــكل عام يجب ان يضـــع المؤلفين بعين الاعتبار الأمور الآتية عند كتابته لإجراءات البحث:

- ✓ لايجوز استعمال المختصرات (بأي لغة كانت) قبل تعريفها في ملخص البحث او مقدمته.
- ✓ تحديد نظام وحدات القياس الدولية المستخدم في البحث، مثل (المتر، كيلوغرام، الثانية ... الخ)
- ✓ توضـيح جميع المواد المسـتعملة في الدراسـة بحيث يمكن للقارئ اسـتعمالها في بحوث مشـابهة أخرى.
- ✓ وصـف اهداف واجراءات القياس لكل اختبار (اختبار قبلي – اختبار بعدي– اختبار احتفاظ ... وهكذا) .
- ✓ وصـف كل التقنيات والاختبارات المسـتعملة بذكر اسـمها فقط اذا كانت معروفة وقياسـية او ذكر التفاصيل في حالة كونها جديدة او تم اجراء تعديل عليها.
- ✓ لا يجوز اضافة معلومات لا تمت بصلة بالنتائج، والتي يمكن ان تربك القارئ.
- ✓ استخدام الافعال بصيغة الماضي في عرض اجراءات البحث.

- **النتائج (Results):** يُقدم هذا القسم من البحث المعلومات الجديدة التي توصل لها الباحث، لذا يعد على انه أساس (مركز) البحث. ويلاحظ ان مقدمة البحث والإجراءات صُممت للإجابة عن التساؤلات؛ لماذا وكيف وصل الباحث (الباحثين) لهذه النتائج والتي سيتم تفسيرها في قسم المناقشة، لذا فان قيمة البحث تكون بما يتضمنه من نتائج، ويجب ان يتم عرضها بطريقة واضحة جداً ومباشرة وباستعمال العدد الضروري من الكلمات دون اسهاب او اختصار، وعادة ما يكون عرض النتائج اسهل فهماً اذا ما تم ترتيب العرض على وفق تسلسل اهداف البحث التي تم ذكرها في مقدمة البحث.

إرشادات حول عرض نتائج البحث:

- ✓ أعرض نتائج البحث بشكل بسيط وواضح في جداول او اشكال وذلك لتسهيل فهمها ومقارنتها. ملاحظة ان الجداول تعرض أرقاما دقيقة في حين ان الاشكال تظهر الاتجاهات ذات الخصائص ولا يجوز عرض ارقام الجداول نفسها في الاشكال.
- ✓ لا يجوز اعادة النتائج كتابةً بعد عرضها في الجداول أو الاشكال التوضيحية، ويمكن فقط الإشارة الى اهم ما مؤشر في الجداول او الاشكال (أي عدم استعمال العرض الكتابي للجداول).
- ✓ وثق واعرض فقط البيانات الضرورية بدلاً من الاسهاب والتكرار في عرض البيانات ولا تعرض بيانات كثيرة واختصرها بالتحليل الاحصائي ولخصها لعرضها في جداول او اشكال وذلك لتسهيل فهمها ومقارنتها.
- ✓ ضمن نتائج البحث بالنتائج السلبية (ما لم يتحقق) إن كان ذلك مفيدا لتفسير النتائج.
- ✓ عند كتابة النتائج يتم الاشارة الى الجداول أو الاشكال بارقامها (الجدول1) (الشكل1).

المناقشة Discussion: في هذا القسم من البحث يفسر الباحث (الباحثون) مضمون النتائج ودلالاتها والاثار المترتبة عليها. وتُبين المناقشة أهمية وقيمة العمل المنجز كما انها تربط كل أجزاء البحث معا. ان مهارة الباحث (الباحثين) في تفسير النتائج الجديدة، على وفق الحقائق المعروفة باستخدام نتائج البحث هي دليل على التغيرات المبتكرة (الابداعية) للسلوك الملاحظ، ويجب ان تدفع حدود معرفة القارئ (توسع مداركه) وتثير حماسته. وعلى الباحث ان يلتزم بالاتي في مناقشته للنتائج:

- ✓ ناقش على ضوء معنوية النتائج.
- ✓ لا تكرر ما تم ذكره في الدراسات السابقة.

- ✓ تتضمن مناقشة النتائج تفسير اتفاقها او عدمه مع المعلومة او المعرفة في الدراسات المنشورة سابقاً.
- ✓ تدعيم النتائج التي توصلت اليها بأساس نظري علمي (ما هي الأسباب العلمية للنتائج المتحققة).
- ✓ اقترح بحوث مستقبلية مخطط لها اوبحوث بحاجة الى متابعة (دراسة).
- ✓ لا يجوز اضافة معلومات لم يتناولها البحث، وان يتم التعامل مع النتائج الموثقة في الدراسة الحالية فقط.
- ✓ تجنب التعميم والتخمين للنتائج والتي لم تؤكدها الدراسة.
- ✓ تكتب المناقشة بصيغة المضارع والماضي، اذ تكتب المعارف المتوافرة من الادبيات والأبحاث بصيغة المضارع، في حين تكتب مناقشة نتائج البحث الحالي بصيغة الماضي.

الاستنتاجات (Conclusions): الاستنتاجات ليست إعادة صياغة لنتائج البحث، انما هي مستنبطة منها. فالاستنتاجات تشير الى الخطوط العريضة للدراسات المستقبلية استناداً على نتائج الدراسة الحالية. ويمكن تخصص فقرة مستقلة للاستنتاجات.

الشكر والتقدير (Acknowledgments): تسمح المجلة بتضمين كلمات الشكر والتقدير في نهاية البحث ويخصص لشكر المؤسسات والافراد الذين قاموا بمساعدة حقيقية للباحث لاجراء بحثه اذ يُقدم الشكر للشركة، او المؤسسة التي قدمت الأموال لدعم البحث، او المختبرات التي زودت الباحث بالادوات والأجهزة، او الى الأشخاص الذين قدموا للباحث النصيحة والمساعدة في جميع البيانات، او التحليل او أي أمر اخر مهم. كما ان هذا القسم يعد مكاناً لذكر اصل البحث وبكلام اخر اذ كان البحث مستلاً من رسالة ماجستير او أطروحة دكتوراه.

المصادر (References): تتضمن قائمة المصادر كل الاستشهادات المعتمدة في متن البحث فقط وبطرقة (APA) الإصدار السادس حصراً وفق نظام (Microsoft Word 2010) صعوداً أو برنامج (Mendeley) أو (EndNote). ان الاستشهادات النصية في متن البحث يجب ان تتطابق تماما مع قائمة المصادر.

الملاحق (Appendix): يمكن ادراج أي معلومات تخص البحث المهمة منها حصراً ضمن الملاحق، إذ تحتوي الملاحق على تفاصيل المنهاج التدريبي او البيانات او الجداول الكبيرة (الجداول المعيارية) أو اداوات البحث مثل الاستبيانات وبرامج الحاسوب المستعملة او الأجهزة المصنعة والتي يجب عرضها وشرحها لاهميتها والتي لا يمكن ادراجها ضمن متن البحث بسبب كبر حجمها.

جدول توضيحي يلخص طريقة امراد (IMRAD)

ت	القسم	الغرض او الهدف
1	العنوان	عن ماذا البحث.
2	المؤلفون (الباحثون)	أسماء وانتماءات المؤلفين.
3	الكلمات المفتاحية	الكلمات غير الموجودة في العنوان والتي توصف البحث.
4	الملخص	شرح قصير عن ذلك البحث.
5	المقدمة	لماذا هذا البحث؟ والمشكلة وماهو غير المعلوم واهداف البحث؟
6	الأدوات والإجراءات	كيف تم اجراء البحث؟
7	النتائج	ماذا وجدت؟
8	المناقشة	ماذا يعني ذلك؟ وما التالي؟ وتفسير النتائج والتوجه المستقبلي.
9	الاستنتاجات	الاثار المحتمليه (الممكنة)
10	الشكر والتقدير	لمن ساعدوك وكيف؟ وماهو مصدر التمويل؟
11	المصادر	تفاصيل عن استشهادات البحث.
12	الملاحق	المواد التكميلة.

ثالثاً: شروط استلام البحث لغرض النشر في مجلة التربية الرياضية:

- ✓ أنّ لا تزيد عدد كلمات البحث عن (2500–3000) كلمة.
- ✓ أنّ يطبع البحث بنظام (Microsoft Word 2010) صعوداً بحجم خط (12) لمتن البحث و (14) غامق للعناوين الرئيسة وبنوع (Simplified Arabic) للغة العربية و (Times New Roman) للغة الإنكليزية بابعاد الصفحة القياسية (عمودي – 2.54×3.17 سم). وبمسافة منفردة بين الاسطر و (1) بين الفقرات.
- ✓ أنّ يثبت اسم الباحثين الكامل والصحيح باللغتين العربية والإنكليزي اسفل عنوان البحث، في حين تثبت ملعوماتهم (الشهادة، والقابهم العلمية ومكان عملهم ووسيلة الاتصال بهم البريد الاليكتروني ورقم الهاتف مع المفتاح الدولي) في هامش الصفحة الاولى.
- ✓ ترقم صفحات البحث الكترونياً أسفل ووسط الصفحة.
- ✓ تكون أبعاد الصور او الاشكال متناسقة وباسعمال الماسح الضوئي حصراً وبدقة عالية.

- ✓ يكتب رقم الجدول وعنوانه بشكل مختصر ووافي اعلى الجدول في حين يكتب رقم وعنوان الصورة او الشكل في الأسفل وبشكل ومختصر ووافي.
- ✓ ينشـر البحث باللغة الإنكليزية بعد ان يتم ترجمته من قبل المجلة يمكن ارسـال البحوث او يمكن ارساله باللغة الإنكليزية.
- ✓ تطبع الأرقام بالصيغة العربية حصراً (0 1 2 3 4)، وعند استعمال الاقواس لا يتم ترك مسافة بين الاقواس مثل: (2540)، وعدم ترك مسافة قبل علامات الترقيم مثل الفارزة، او النقطتين، او النقطة. مثال: التدريب الرياضي، التعلم الحركي، علم النفس الرياضي.
- ✓ لا يجوز اسـتعمال برامج الترجمة الفورية او مواقع الانترنت للترجمة للغة الانكليزية مثل (google translate) وغيرها.
- ✓ استعمال المصطلحات العلمية المعروفة والمتداولة، وعلى الباحثين المقديمن لبحثهم باللغة العربية ادراج المصطلحات العلمية باللغة الإنكليزية في متن البحث.
- ✓ الاسـتشـهاد بالمصـادر يكون وفق أسـلوب (APA) الإصـدار السـادس حصـراً وفق نظام (Microsoft Word 2010) صعوداً أو برنامج (Mendeley) أو (EndNote).
- ✓ يجب ان تتطابق الاستشهادات النصية في متن البحث تماماً مع قائمة المصادر.
- ✓ لا يقبل الاستشهاد من المواقع الاليكترونية العامة والضعيفة.
- ✓ يقبل الاستشهاد من المواقع العلمية الرصينة الرصينة بالاعتماد على البحوث المنشورة المجلات المُحكمة والكتب العلمية والرسائل والاطاريح الجامعية المحلية او الدولية.
- ✓ يجب أنّ لا تقل الاستشهادات بالمصادر العلمية عن (25) مصدر رصين وبواقع (50%) من البحوث العلمية كحد أدنى، و (50%) كحد أعلى من الكتب العلمية.
- ✓ يجب ان تكون المصادر حديثة (اخر خمس سنوات)، مع وجود بعض الاستثناءات الضرورية.

ثبت المحتويات

ت	اسم المؤلف (المؤلفين)	عنوان البحث	الصفحة
1	Ahmed Jasim Abbas ،Kamal Jalal Naser	The Effect of Special Exercises Using Balls of Various Weights and Elastic Bands on Certain Cognitive Abilities in Indoor Soccer for 15-16 Year	2808-2817
2	Warda Rahumi Hamid ،Baydaa Tariq Abdul-Wahid	Status of Psychological Well-Being for Academic Members of Physical Education and Sports Science at The Universities of Baghdad and Mustansiriyah	2818-2831
3	Alaa Taha Ahmed ،Jinan Naji Zwaen	The Effect of Psychomotor Exercises on Visual Interference and Accuracy of Spike Skill in Junior Volleyball Players	2832-2845
4	Alameer Hayder Hussein ،Dhia Naji Abood ،Wasan Saeed Rasheed	Special Exercises Based on Offensive Play Moment and Their Impact on Two Complex Offensive Skills in Soccer Players Aged 15-16 Years	2846-2862
5	Amwag Mohammed Ali ،Ammar Abbas Atia ،Ali Jalal Obaid	The Impact of Differentiated Teaching With a Graduated Activities Strategy on Some of The Students Psychomotor Skills	2863-2873
6	Aya Dhafer Fawzi ،Mona Talib Al-Badri	The Effect of Dynamic Pilaplank Exercises on Cardiorespiratory Fitness and Core Strength in First-Year Female Students at the College of Physical Education and Sports Sciences for Women Aged 19–22 Years	2874-2887
7	Ibrahim Hashim Thamer ،Hamid Saleh Mahdi ،Ali Maseer Yasien	The Effect of Special Exercises Using a Proposed Magnetic Device on the Development of Certain Motor Abilities in Youth Soccer Players	2888-2901
8	Mahdi Falah Marzok Kadhim	Modeling the Causal Relationship Between Situational Awareness and Some Basic Skills in Futsal Among Students	2902-2916
9	Maram Muthana Naji ،Khuloud Liayth Abd Alkreem ،Mohammed Saleh Faleeh	Building and Codifying Tests According to Complex Kinetic Forms to Assess The Skill of Passing From above in Volleyball for Third Grade Students	2917-2933

2934-2944	Constructing and Standardizing a Mental Stress Scale During Competition for Iraqi Professional Basketball League Players	Mohammed Hussein Suhail Najm ،Fouad Muttib Hussain	10
2945-2956	Identifying classroom control skills in postgraduate teaching staff at the College of Physical Education and Sports Sciences, University of Baghdad	Muna Ali Mohsen ،Tamadur Abdulazeen	11
2957-2967	An Examination of Social Integration Among Physically Disabled Players in Paralympic Volleyball	Mustafa Imad Mohammed ، Wasen Jasim Mohammed	12
2968-2980	Validity and Reliability of Specific Basketball Motor Skill Simulation Protocol for Inducing Fatigue Based on Some Physiological Indicators	Nabaa Ahmed Abdulrahman ، Faris Sami Yousif ،Usama Ahmed Altay	13
2981-2987	The Effect of Super Set Training in Agilitz and Some Attacking Skills of Futsal for Femals	Nadia Fadhil Abdulameer ،Liqaa Abdulla Ali	14
2988-3000	Simple Attack Performance in Relation to Emotional Intelligence in Women’s Foil Fencing	Noor Al-Huda Imad Qadouri	15
3001-3009	The Effect of Specific Exercises Using the Blazepod Device on Developing Some Motor Abilities of Basketball Players Under 18 Years Old	Omar Ibrahim Abdullha ،Luay Sami Rifat ،Shirzad Mohammed Jaro	16
3010-3021	The Effect of Using an Assistive Device in Learning the Walkover backward Skill on the Floor Exercises in Women's Artistic Gymnastics	Rajaa Tuama Jasim ،Bushra Kadhum Abdulridha	17
3022-3035	Construction and Standardization of a Static Balance Test for Body Muscle Strength during the Preparatory Phase in the Shot Put Event for Female Students of the College of Physical Education and Sport Sciences	Sahar Amer Naif ،Warda Ali Abbas	18
3036-3048	The Effect of a Training Approach Using an Anti-Gravity Treadmill on Improving Strength and Balance in Athletes with Medial Ankle Ligament Tears	Sajad Mueen Abdulhussein ، Intisar Rasheed Hamid ،Bidaa Razzaq Jawad	19
3049-3057	The Effect of Guidance Program on the Improvement of Psychological Empowerment In Third Degree Basketball Referees	Sajjad Sattar Jabbar ،Ishraq Ali Mahmoud ،Zina Khalid Jassim	20
3058-3069	Analytical Study of The Physical and Cognitive Skills of Tennis Referees From The Perspective of The Supervising Committee	Shahad Khaled Khalf ،Sundus Mousa Jawad	21

3070-3077	The Effect Of Using Spirulina Supplementation On The Performance Of 400-Meter Runners Under 20 Years Old	Shajan Yassen Taha ،Zaydoun Jawad Muhammad	22
3078-3093	The percentage of contribution of the training process scale for coaches to the explosive power of the high smash skill for advanced volleyball players	Teeba Basim Abd ،Khalil Sattar Mohammed	23
3094-3105	The Effect of Motor Control Exercises on Certain Physical Variables and The Accuracy of Forehand and Backhand Stroke Skills in Table Tennis Players Under 13 Years Old	Widad Mohamed Dawood ،Abeer Dakhil Hatem	24
3106-3115	An Analytical Study Using the Player-Maker Device of Some Physical Variables of Midfielders and Attackers of Al-Karkh Football Club Under (19) Years Old	Zaid Akram Adnan ،Ahmed Sabea Atea	25
3116-3122	The Role of Insulin-Like Growth Factor 1 And Irisin in Muscle Dystrophy: Effect of Age and Comparison Among Patients	Zeena Firas Haider ،Shaima Razaq Ibraheem	26
3123-3136	The Functional Competence of Physical Education Teachers and Instructors from The Perspective of Sports Activity Departments in Iraqi Education	Rija Abd Hussein ،Muhsin Ali Nasif Al-Musawi ،Ali Abdulateef Ali	27
3137-3151	Cross-Training Exercises and Their Effects on Strength-Endurance Performance and Selected Electromyographic (EMG) Indicators in Strongman Competitions among Iraqi National Team Elite Athletes	Mohannad Imad Sadeq ،Muayad Jasim Abbas	28

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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The Effect of Special Exercises Using Balls of Various Weights and Elastic Bands on Certain Cognitive Abilities in Indoor Soccer for 15-16 Year

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DOI:

https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2396

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Article history: Received 15/December/2025; Accepted 19/January/2026; Available online 28/ October/2026

Abstract

This study aimed to identify the effect of special exercises using weighted balls of varying masses and elastic resistance bands in futsal on perceptual abilities specifically the Nelson test of motor response (right and left) and perceptual motor coordination among players of the Baghdad Education (Al-Karkh II) team aged 15–16 years. The study was motivated by the observed weakness in perceptual abilities among players in the inter education directorates league. The researcher adopted an experimental approach using a pre-test/post-test design with two groups (experimental and control). The research population consisted of 60 players from six Baghdad Education Directorates while the study sample included 10 players representing 17% of the total population. The main experiment was conducted at the Al-Bayaa Youth Forum field to the Baghdad Provincial Council from 8/6/2025 to 3/8/2025 with three training units per week . The results indicated statistically significant differences between the pre- and post-tests in favor of the post-test demonstrating the effectiveness of using varied weighted balls and elastic resistance bands and their positive impact on developing perceptual abilities when incorporated into educational or training programs .

Keywords: perceptual abilities, resistance variation, elastic bands.

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Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

In recent years futsal has become one of the fundamental sports within the Iraqi sporting community. This growth has coincided with the development of Iraqi sports infrastructure after 2003 particularly the increase in facilities dedicated to this sport which has attracted a large number of athletes and Iraqi fans. This expansion in interest along with the establishment of leagues at various competitive levels has led to greater emphasis on developing futsal through the use of modern educational and training methods.

Considerable attention has been directed toward improving performance among youth age groups in futsal as this category represents the foundation for building advanced teams at both club and national levels. Such development requires comprehensive enhancement of athletes abilities including perceptual abilities to achieve an optimal level of performance in the game. This progress is attributed to several factors one of the most important being the use of assistive training tools. Assistive tools play a significant role across various sports, including futsal as coaches worldwide continuously seek innovative methods that contribute to improving training effectiveness. These tools vary in purpose with some aimed at physical training and others at learning skill acquisition, and enhancing players' perceptual motor abilities .

Accordingly , diversity in training tools serves specific objectives that researchers aim to achieve based on their area of specialization. It is also essential to distinguish between tools used for training and those used for learning. In this regard it has become necessary in contemporary practice to employ assistive tools and devices in the learning and training of futsal whether within training or educational units (Asaad Lazim & Samer Saad, 2023, p. 150).

Several previous studies support this orientation . The study by Abdul Karim Fadhil Abbas (2000) entitled The Effect of Training with Weapons of Different Weights on the Performance Level of Some Fencing Skills and Physical Fitness Components aimed to identify the effect of training with weapons of varying weights on fencers aged 13–15 years.

Similarly , the study by Adel Abbas Rashid (2023) entitled The Effect of Exercises Using Balls of Different Weights and Sizes on Developing Some Perceptual Motor Abilities and Learning Basic Skills in Futsal for Female Students sought to design ball based exercises to develop certain perceptual motor abilities and basic futsal skills among middle school female students determine the effect of these exercises on the study variables and identify the superior group in post-test measurements.

In addition , the study by Qahtan Jalil Khalil and Radi (2020) entitled The Effect of Using Exercises with Balls of Different Weights and Sizes on Developing Some Basic Football Skills aimed to examine the impact of exercises using balls of varying weights and sizes on developing basic football skills among children aged 9–10 years .

Furthermore , the study by Mohammed Fadhil Anbar Hithal (2024) entitled Predicting Skill Performance Based on Certain Perceptual Abilities among Advanced Volleyball Players in Maysan aimed to identify the effect of perceptual abilities such as perception of space , force and time on the performance of advanced volleyball players as well as to determine the contribution ratios of temporal and spatial perception.

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Finally , the study by Walid Kamal Mahmoud Al-Barzanji (2011) entitled The Effect of a Proposed Educational Curriculum on Developing Some Sensory Motor Perceptual Abilities among Students of Physical Education Institutes aimed to identify the impact of a proposed educational curriculum on developing certain sensory motor perceptual abilities such as spatial relationships and motor coordination among students of physical education institutes.

Methods and Tools

The nature of the research problem determined the appropriate methodology adopted by the researchers. A research method is defined as "the sound approach adopted by the researcher to achieve the intended objective identified at the beginning of the study" (Ibrahim & Amer, 2012, p. 10). Accordingly, the researchers employed an experimental method using a pre-test/post-test design with two groups (experimental and control) as it was deemed suitable for addressing the research problem .

The research population consisted of players from the six Baghdad Education Directorate teams participating in the preparatory school league totaling 60 players. The research sample was drawn from the Baghdad Education Al-Karkh II team comprising players aged 15–16 years with a total of 15 players. Of these , five players were selected for the first and second pilot studies while ten players participated in the main experiment. The sample was selected intentionally based on the following considerations:

1. Full cooperation of the coach and players .
2. Availability of fields and equipment .
3. Facilitation of the researchers' tasks by Baghdad Education Al-Karkh II as one of the researchers is affiliated with this directorate .
4. Availability of an assisting research team .

The following instruments , devices and data collection tools were used : Arabic and foreign references ; questionnaires administered to experts ; personal interviews ; the World Wide Web ; observation and experimentation ; an assisting research team ; data recording forms ; an indoor hall in Al-Saydiyah ; the sports forum field in Al-Bayaa ; small-sized goals designed by the researchers ; regulation goals ; balls of varying weights (36 balls) ; ropes (15) ; elastic bands (10) ; a sample of players (15) ; regulation futsal court areas ; cones , markers , adhesive tapes , whistles and communication tools such as WhatsApp to coordinate with the research team and sample through a dedicated group .

A set of perceptual abilities was initially selected by the researchers and presented to experts via a questionnaire to determine their suitability for futsal . After collecting and analyzing the experts' responses the researchers concluded that the Nelson test for both the right and left sides along with perceptual motor coordination ability were the most appropriate and widely accepted measures .

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Pilot Study

A pilot study is defined as "a small-scale version of the main experiment conducted either to reveal certain scientific facts to test procedures and identify obstacles and limitations that may hinder the implementation of the main experiment or to train assisting personnel" (Kazem Haidar Abdulrazzaq, 2015, p. 128). To determine the most effective procedures for field implementation the researchers conducted a pilot study on a group drawn from the research population at Baghdad Education Al-Karkh II on 31/1/2025. The purposes of this pilot study were to verify the suitability and functionality of the devices and equipment assess the efficiency of the assisting team in conducting tests and recording results determine time allocation for test administration, ensure the appropriateness and safety of the testing environment and identify potential obstacles and errors to be avoided .

On 3/6/2025 , pre-tests were administered to both the experimental and control groups. The main experiment involving the application of the proposed training program developed by the researchers was conducted on the experimental group starting on 8/6/2025. Finally , post-tests were administered on 6/8/2025 after which the results were obtained and analyzed.

Results

Table 1. *Presentation of the results of the mean, standard deviation, standard error, calculated t value, significance level (Sig.), and significance of differences for the perceptual abilities of the experimental group in the pre- and post-tests*

Test	Measurement	Test Time	Mean	SD	Standard Error	Calculated *t*	Sig.	Significance
Nelson Test for Motor Response (Right)	Time	Pre-test	2.36	0.11	0.33	6.36	0.00	Significant
		Post-test	2.15	0.07				
Nelson Test for Motor Response (Left)	Time	Pre-test	2.40	0.06	0.03	5.67	0.00	Significant
		Post-test	2.19	0.10				
Ball Rolling, Dribbling, and Shooting Test (10 m) – Perceptual–Motor Coordination	Time	Pre-test	8.12	0.55	0.15	9.41	0.00	Significant
		Post-test	6.67	0.48				

Significant at a significance level of ≤ 0.05 , with degrees of freedom (df = 9)

Table 2. *Presentation of the results of the mean, standard deviation, standard error, calculated t value, significance level (Sig.), and significance of differences for the perceptual abilities of the control group in the pre- and post-tests*

Test	Measurement	Test Time	Mean	SD	Standard Error	Calculated *t*	Sig.	Significance

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Nelson Test for Motor Response (Right)	Time	Pre-test	2.23	0.20	0.42	0.85	0.15	Not significant
		Post-test	2.19	0.14				
Nelson Test for Motor Response (Left)	Time	Pre-test	2.26	0.18	0.01	1.21	0.00	Significant
		Post-test	2.24	0.14				
Ball Rolling, Dribbling, and Shooting Test (10 m) – Perceptual–Motor Coordination	Time	Pre-test	7.04	0.59	0.89	1.17	0.25	Not significant
		Post-test	7.26	0.46				

Significant at a significance level of ≤ 0.05, with degrees of freedom (df = 9).

Table 3. *Means, standard deviations, calculated t values, error level, and significance of differences for the post–post tests between the control and experimental groups*

Test	Measurement	Control Group (Mean)	Control Group (SD)	Experimental Group (Mean)	Experimental Group (SD)	Calculated *t*	Error Level	Sig.	Significance
Nelson Test for Motor Response (Right)	Time	2.19	0.14	2.36	0.07	3.29		0.004	Significant
Nelson Test for Motor Response (Left)	Time	2.24	0.14	2.40	0.10	2.64		0.017	Significant
Ball Rolling, Dribbling, and Shooting Test (10 m) – Perceptual–Motor Coordination	Time	7.26	0.46	8.12	0.48	4.04		0.001	Significant

Significant differences at an error level of ≤ 0.05.

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Discussion

The pre- and post-test results of the experimental group presented in Table (1) for the research variables related to perceptual abilities namely the Nelson test for motor response (right) the Nelson test for motor response (left) and perceptual motor coordination along with the standard error calculated t values significance levels (Sig.) and significance of differences revealed statistically significant differences between the pre- and post-tests across all the investigated perceptual ability measures .

The researchers attribute these significant improvements to the exposure of the experimental group to balls of varying weights both lighter and heavier than the official weight in addition to elastic resistance bands with variable resistance levels. This training approach created different forms of resistance during the execution of exercises within the educational units thereby subjecting players to combined physical and cognitive demands particularly targeting the lower limb muscles. Moreover , this type of training enhanced coordination with the neuromuscular system which was exposed to the same variable resistances applied to muscular force production .

The diversity in ball weights and the use of elastic resistance bands contributed to improving the efficiency and functional capacity of both the central nervous system and the muscular system . This finding is consistent with Abdul Karim's assertion that muscle fibers have the capacity to generate greater force through variation in resistance type ; consequently the number of active motor units increases leading to a corresponding enhancement in energy production capacity (Al-Fadhli, 2003, p. 175) .

The discussion of the pre- and post-test results for the control group presented in Table (2) focuses on the research variables related to perceptual abilities namely the Nelson test for motor response (right) the Nelson test for motor response (left) and perceptual motor coordination. A comparison of the means, standard deviations, standard error values, calculated t values, significance levels (Sig.) and the resulting statistical significance indicates that the post-test results for the control group were largely non-significant (random) in the perceptual ability measures of the Nelson test for motor response (right) and perceptual motor coordination.

The researchers attribute these findings to the coach's limited emphasis on incorporating resistance-based exercises within the training program implemented for the control group during the experimental period. Specifically , the training approach did not include resistance elements such as balls of varying weights or elastic resistance bands. This omission negatively affected the development of perceptual abilities as the absence of varied resistance stimuli reduced the players' exposure to training conditions that challenge both physical and cognitive components of performance .

This interpretation is supported by the view that the use of diverse instructional and training aids enhances the effectiveness and positivity of the learning and training process . The integration of such tools within educational and training programs contributes to the development of motor imagery and its progression in learners while also reducing a significant portion of the instructional and training load (Al-Hassani, 2015, p. 198) .

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The results presented in Table (3) which compare the post-test outcomes of the experimental and control groups clearly indicate statistically significant differences in favor of the experimental group . The researchers attribute these differences and the observed improvements in the study variables to the training program implemented for the experimental group . This program consisted of structured and purposefully designed exercises aimed at developing and enhancing motor response speed and selected perceptual abilities .

In designing the training program the researchers carefully considered the principle of progressive overload within the educational units. This progression was applied through the gradual increase in resistance during exercises, whether in the structure of the instructional units themselves , the variation in ball weights or the graduated resistance provided by elastic bands. Additionally , clear explanations and demonstrations were provided to learners to ensure proper execution of exercises during each instructional unit . As noted by Megown (1999) effective explanation and demonstration help learners understand which aspects of performance to avoid identify key elements of skills, and enhance comprehension.

Furthermore , the specialized exercises contributed to the development of perceptual abilities by employing drills in varied and changing instructional situations . These conditions assisted players in achieving better control, regulation and perception of performance requirements through the targeted abilities addressed in the study . This aligns with the assertion that using exercises in different situations helps athletes control and manage performance demands more effectively (Zaffer Hashim, PhD dissertation, 2002) .

In addition , the exercises implemented during the instructional units were characterized by diversity and systematic organization. Such features played a significant role in enhancing motor abilities through the use of elastic bands, resistance straps and balls of varying weights. The variability and organization of practice, as well as diversity in movement patterns promote the discovery of new learning experiences through variable practice and enhance athletes' ability to perform skills more efficiently (Magill, 1998, p. 230) .

Conclusions

1. The combined use of balls with varying weights and elastic resistance bands within instructional units reduces the time required for the development of perceptual abilities among players aged 15–16 years .
2. Employing balls of different weights while maintaining the official ball size in instructional units leads to significant improvement in the perceptual abilities of futsal players .
3. The use of elastic resistance bands in instructional units contributes positively to the improvement and development of perceptual abilities among futsal players .

Acknowledgments

The researchers extend their sincere gratitude and appreciation to the College of Physical Education and Sport Sciences University of Baghdad represented by the Dean Prof.

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Dr. Sabah Qasim Khalaf . The authors also express their deep thanks and recognition to their supervisor Prof. Dr. Kamal Jalal Nasser for his valuable guidance continuous support, constructive feedback and evaluation throughout the research process. Special thanks are also extended to Prof. Dr. Mohammed Jawad for his generous contribution in providing statistical expertise. Finally , the researchers gratefully acknowledge the Baghdad Provincial Council and its affiliated institutions including the Al-Saydiyah Indoor Hall and the Al-Bayaa Youth Forum, for their support and cooperation in facilitating this study .

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Status of Psychological Well-Being for Academic Members of Physical Education and Sports Science at The Universities of Baghdad and Mustansiriyah

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DOI:

https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2435

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Article history: Received 16/February/2026; Accepted 18/March/2026; Available online 28/October/2026

Abstract

This study aimed to assess the psychological well-being of academic staff in physical education and sports sciences at the Universities of Baghdad and Mustansiriyah. A descriptive survey method was employed involving 206 academics randomly selected from a population of 560 representing 36.786% of the target population. Participants were recruited from the Colleges of Physical Education and Sports Sciences at the University of Baghdad including the Al-Jadriya campus and the College for Women the College of Physical Education and Sports Science at Mustansiriyah University and the Department of Physical Education and Sports Science at the College of Basic Education at Mustansiriyah University during the 2025/2026 academic year. Data were collected using the Warda (2026) psychological well-being scale and analyzed using SPSS. The findings indicated that the scale was appropriate for assessing psychological well-being among academic staff in the target institutions. Furthermore the participants demonstrated an adequate level of psychological well-being although differences were observed across its dimensions. Self-acceptance ranked highest whereas environmental mastery ranked lowest. The study recommends conducting regular psychological assessments using the adopted scale and integrating psychological well-being programs into continuing education courses within physical education and sports sciences colleges and departments. Such initiatives may help strengthen academics self-efficacy, promote psychological well-being and support a healthier academic working environment .

Keywords: Psychological well-being, Physical Education and Sports Science academics.

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

Psychological well-being is One of the main factors that ensures an academic's ability to perform their roles efficiently and effectively. It goes beyond the absence of stress to a deeper level encompassing self-satisfaction, the ability to adapt to the changing demands of professional life, the establishment of positive social relationships, and the achievement of meaningful personal and professional goals. Thus, psychological well-being becomes an essential element in supporting academic and research performance, enhancing an academic's ability for innovation, planning, stress tolerance, and functioning effectively in dynamic and vibrant environments. “The individual spends most of his free time thinking about changing his beliefs in order to reach a better state and position, this thinking must be realistic and based on studying the requirements of change and the possibility of achieving it on the ground, as excessive, uncalculated thinking leads him to illogicality” (Al-Sharif 2023, 218), The academic who constantly changes his beliefs towards what enables him to raise the level of each of these dimensions that Reeve emphasized in her theoretical model will help to increase his productivity, which benefits all formations of colleges and departments of physical education and sports science, especially what students receive from these academic role models. Dealing with students requires that the teaching academic does not suffer from psychological and behavioral problems, in order to motivate them and elevate them in achieving the desired goals in the educational process and its particularity in physical education and sports science. The more attention in the psychological aspects of the teaching academic, the more this is reflected in the availability of a productive generation, in accordance with the views of Albert Bandura in his social theory of modeling and imitation, who is the one who came up with the determinants of self-efficacy under the current research.

“Psychology science borrowed the biological concept of adaptation to refer to the individual’s attempt to adapt to the psychological and social conditions, which constantly require him to make adjustments between himself and them. Thus, self-efficacy is the set of reactions by which the individual modifies his psychological structure or behavior to respond to limited environmental conditions or a new experience. It is also a continuous interactive process if life continues, resulting from a set of interactions between the individual’s motives and desires and attempts to satisfy them. This process results in a change that the individual makes in himself and in his environment, and this change is clearly evident in behavior.” (Departe 2019, 36).

Academics represent the fundamental pillars of the university system, and the focus of development and knowledge renewal in it, especially in the colleges of physical education and sports sciences, which combine theoretical education and practical training, and require a high level of competence, psychological readiness, and human interaction in this university environment. Their continuous university tasks

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

increase in light of the rapid transformations of institutional quality requirements, the rise in its standards, scientific competition, and the expansion of academic tasks such as teaching, scientific research, supervision, evaluation, community service, and others.

"An individual can engage in self-regulation when confronted with thoughts that confuse his behavior with the group to which he belongs, and he uses internal dynamics. Thus, self-development is necessary to increase the ability to confront without psychological pressures." (Akram 2024, 93)

"Since the connections between an individual's feelings and beliefs lead to the manifestation of the dominant trait due to the reciprocal determinism in influencing his behavior, this is reflected positively on self-efficacy and the tendency towards high self-confidence." (Ahrens 2018, 804)

"Information diversifying about events and matching it with reality gives the individual confidence in his actions and protects him from destructive criticism of his talents and aspirations in achieving his goals." (Yassin 2021, 96)

The research problem also focused on the fact that academic members in colleges of physical education and sports science face increasing professional and psychological challenges that require a high level of adaptation and personal effectiveness in academic expansion and the requirements of quality and accreditation. Psychological well-being is one of the essential psychological phenomena that contribute to the academic's ability to do his tasks efficiently. However, studies in the Iraqi university environment especially in the sports specialization — are still limited in analyzing the nature of the relationship between these psychological phenomena among academics. Accordingly, the research problem is defined in the following two questions:

What is the reality and details of psychological well-being among academic members in the Colleges of Physical Education and Sports Sciences at the Universities of Baghdad and Mustansiriyah?

The research aims to identify the reality of psychological well-being among academic members in the Colleges of Physical Education and Sports Sciences at the Universities of Baghdad and Mustansiriyah.

Materials and Methods

Procedure

Researchers adopted the descriptive research method, which is defined as "the study of phenomena as they exist in reality, without the researcher intervening to influence their nature, using a methodology based on measurement and surveying within a specific timeframe, to describe these phenomena in an unbiased, numerical language." (Al-Saleh 2024, 181) Furthermore, the specific nature of the current research problem necessitated the adoption of the survey method within the descriptive

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

approach, which is defined as "the method that employs quantitative and qualitative description to determine the level of variables, by studying their phenomena as they exist, without the researcher intervening to influence this level." (Al-Shafi'i 2024, 109)

Researchers limited with the selection of the study population based on observations derived from the research problem and described its boundaries. They were represented by the academic members affiliated with the Colleges of Physical Education and Sports Sciences at the University of Baghdad (Al-Jadriya campus and Colleges of Physical Education and Sports Sciences for women), the College of Physical Education and Sports Sciences at Al-Mustansiriya University, and the Department of Physical Education and Sports Sciences at the College of Basic Education at Al-Mustansiriya University, for the academic year (2025/2026). They engaged in teaching in these colleges and departments, with a total number of (560) academics, who continued their official duties within the time period of the current research procedures and according to their latest records dated (22-30/12/2025). researchers directed their study of this community for the following reasons:

- Because its members are included in the psychological phenomenon as described in the current research problem.
- Because they are part of readily available communities, facilitating communication with them due to their consistent presence.
- Because they fulfill the research objectives and its various methodological procedures.

Ten academics, representing 1.786% of their original population, were selected for the pilot sample. This number was determined through a randomly simple stratified sampling method with equal numbers of participants from the colleges and department. The methodological procedure for this sample consisted of pilot testing the scale without any statistical analysis of the collected data.

A main study sample selected for the scale, 206 academics, representing 36.786% of their original population. This number was determined through a stratified sampling method from all strata of the total sample, using proportional representation from the colleges and department. The methodological procedure for this sample involved finding solutions to the current research problem and achieving the desired objectives of this research.

To measure psychological well-being, the two researchers adopted the (Warda 2026) scale, which adopted the (Reef 201) model in its construction, specifically for this sample. It underwent several statistical treatments to ensure its acceptance, and no more than (6) months had passed since its developed. It contains (30) items with a positive orientation only, with a total score ranging between (30-150) degrees, with a hypothetical mean of (90), as shown in the details of its structure in Table (1)

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Table 1. *shows the structure of the psychological well-being scale for academic members of the College of Physical Education and Sports Sciences*

scale dimensions	number of items	Response options	Scoring key	Score Range (Min-Max)	hypothetical mean
Autonomy	5	Always applies,	5	25-5	15
Self-Acceptance	5	often applies,		25-5	15
Rational Optimism	5	sometimes	4	25-5	15
Positive Relations with Others	5	applies,		25-5	15
Environmental Adaptation	5	rarely applies,	3	25-5	15
Personal Maturity	5	does not apply	2	25-5	15
Total	30	5	1	150-30	90

The scale includes (6) answer instructions

The researchers conducted a pilot study with a sample of (10) academics from Sunday, January 4, 2026, to Sunday, January 11, 2026, encountering no significant obstacles. Subsequently, the psychological well-being scale was administered to a sample of (206) academics, with the assistance of a support team. This main survey involved direct, group, and individual measurement of the academics at the Colleges of Physical Education and Sports Sciences at the University of Baghdad (Al-Jadriya and women campuses), the College of Physical Education and Sports Sciences at Al-Mustansiriya University, and the Department of Physical Education and Sports Sciences at the College of Basic Education at Al-Mustansiriya University. This survey continued from Sunday, February 2, 2026, to Monday, February 16, 2026, adhering to established measurement procedures and documentation. The scale resulting scores were tabulated, by adopting the mechanism of transcribing the items of the psychometric scale using the weighted five-point scoring key for those five-point alternatives adopted in this research, then collecting the scoring scores for each of the dimensions of the scale, and the total score for it, and transcribing the scores of each academic who answered the scale into paper forms specific to each scale, separately from each other, and then storing them in the computer for statistical processing, as the research results were processed automatically using the Statistical Package for the Social Sciences (SPSS) version (V28), to process the data by finding each of the following values:

1 .Percentage.

2 .Arithmetic mean.

3 .Standard deviation.

4 .One-sample t-test.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

5 .Total scale score = Number of items in the scale × Highest weighted item alternative.

6. Total dimension score = Number of items in the selected dimension × Highest weighted item alternative.

7. Hypothetical mean = $\frac{\text{Sum of alternative weights}}{\text{Number of alternatives}}$ × Number of items.

Results

Table 2. *shows the statistical of the psychological well-being scale for the academics sample compared to the scale hypothetical mean value*

unit	items	total	hypothetical mean	mean	SD	Mean deference	(t)	(Sig)
degree	30	150	90	110.77	10.458	20.77	28.507	0.000

significant: (Sig) > (0.05) at a degree of freedom of (205), and a significance level of (0.05).

Table (2) shows that the mean of the psychological well-being scale for the academic sample is bigger than its hypothetical mean, and that this statistical difference for a (t-test) for a single sample between these two means was significant in favor of the arithmetic mean. For the purpose of accuracy and to avoid speculation in attributing the reasons for the appearance of this overall result for the scale, the researcher presents the results of each of its dimensions in detail in comparison with the hypothetical mean for each of them, as shown by the results of Table (3)

Table 3. *shows the results of the psychological well-being scale dimensions for the academic sample compared to the hypothetical mean for each dimension*

Scale dimension	items	Dimension degree	hypothetical mean	mean	SD	Mean deference	(t)	(Sig)	Order
Independence	5	25	15	17.33	2.433	2.33	13.772	0.000	fifth

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Self-acceptance	5	25	15	22.19	1.595	7.19	64.688	0.000	first
Logical optimism	5	25	15	18.4	1.772	3.4	27.531	0.000	third
positive relationships	5	25	15	17.48	2.247	2.48	15.811	0.000	Forth
Adapting	5	25	15	15.91	2.17	0.91	6.004	0.000	Sixth
Maturity	5	25	15	19.47	1.029	4.47	62.264	0.000	Second

significant: (Sig) > (0.05) at degrees of freedom (205), significance level (0.05), unit of measurement (degrees)

Discussion

A review of the overall score results for the psychological well-being scale of the academic sample, as presented in Table (2) in the aforementioned presentation, reveals that psychological well-being demonstrated a level exceeding the hypothetical mean of the scale applied to the academic sample, indicating a higher probability of the arithmetic mean. However, a review of the results in Table (3) in the aforementioned presentation reveals a variation in the availability of each dimension of this measurement, again indicating a higher probability of the arithmetic mean. The researchers attribute the emergence of these results and the higher scores in the self-acceptance dimension to the fact that the academic sample consistently felt satisfied with themselves, possessing sound mental health qualities. They consistently felt at peace with themselves through their evaluation of their behavior in completing their university tasks. They consistently expressed confidence in their ability to fulfill the requirements of their duties within the university environment. They consistently felt they possessed love and tolerance to support their positive character traits. Furthermore, they sometimes felt desired and welcomed within the university environment. The results of adapting to the environment show that they are drawn towards the need to increase the level of changing their beliefs about their confidence in the decisions they make to raise the level of the reality of the university environment. They also need to link the pleasant experiences in the university environment, as well as increase their beliefs towards scientific organizational justice, and that achieving of goals comes with continuous effort in the university environment, so that they can face the stressful situations in the university environment with ease. They possess the personal maturity that supports their psychological health in feeling psychological well-being, which was supported by logical optimism, as they do not overdo unrealistic expectations with what they possess of capabilities that qualify them to continue their professional work and excel in it. They need to raise the level of independence by granting them more powers

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

and freedom of detail in their various executive tasks in practical and theoretical teaching and scientific research, as well as the tasks of the various committees whose work was assigned to them, and the continuous courses and their requirements. With these strengths and weaknesses, their results showed that they enjoy psychological well-being at a level that exceeded the hypothetical average of its scale, which is required for the academic in physical education and sports sciences.

"Psychological well-being is one of the most important indicators of an individual's mental health. It expresses their understanding of reality, and its theories are consistent with Aristotle's ideas on attaining psychological happiness, Maslow's concepts of self-actualization, Newgarten's processes of personality change in adulthood and old age, and Erikson's model of personal growth, which Reeve summarized as the result of healthy psychological responses to understanding life. It is achieved after an individual goes through many experiences and overcomes crises with emotional stability that embodies the strength of their personality." (Marhoon 2023, 152)

Considering that “an individual’s self-esteem, self-awareness, self-evaluation and behavior, and awareness of his potential and capabilities, determine his future behavior.” (Spring 2019, 19)

"The primary source of an individual's adaptation to a set of beliefs and behaviors is their acceptance of themselves, which leads them to psychological well-being in all of these events." (Mikulincer & Shaver 2015)

Psychological well-being is an emotional component of quality of life that includes acquiring positive experiences and absence of negative experiences, a positive self-assessment, engaging in meaningful activities, and maintaining an optimistic outlook on one's personal life and the world around them. It is also an indicator of an individual's mental health and success in their community (Orosova & Janovska 2016, 184).

Furthermore, “enhancing self-confidence and a sense of personal accomplishment can raise the level of psychological well-being and help in coping with stress more e "A good psychological state makes an individual more capable of transforming negative thoughts into positive ones, as they recall the pleasant events and emotions they experienced during their success in a particular endeavor." (Berter et al. 2016, p. 19) ffectively.” (Lappan 2020, 21)

Psychological well-being refers to an individual's ability to identify their personal strengths and work to develop and enhance them by fully utilizing their energies, abilities, and potential. (Opree & Van 2018, 2)

Furthermore, “positive psychology focused on developing and enhancing self-satisfaction, feelings of well-being, hope, optimism, and present and future happiness,

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

and its programs focused on developing subjective experiences by moving away from illusory thoughts." (Al-Afoun 2025, 29)

Furthermore, "the availability of optimism is a healthy state that is selected for individuals who, by nature, are optimistic about the good deeds they perform in their surrounding environment and believe that what you do of good will be rewarded." (Al-Dhaheri 2016, 2)

Furthermore, "psychological well-being indicates that feeling good doesn't just mean positive emotions like contentment and happiness, but also the presence of affection, trust, care, participation, and the ability to work effectively that is, the individual's ability to establish positive relationships with others, experience a sense of purpose in life, and utilize all their potential." (Khoury, 2019, p. 17)

Moreover, "an individual's conviction in their opinions, their confidence in the development of their abilities over time, and their possession of good relationships with others grant them psychological well-being and harmony with themselves and others. Multiple role theories have confirmed that psychological well-being is achieved at high levels when multiple roles are played, especially among individuals with diverse or high levels of education, both men and women. These individuals possess a high capacity to manage their lives and environment effectively, have a greater purpose in life, and experience increased positive outcomes such as life satisfaction, happiness, and self-efficacy, while experiencing decreased negative outcomes such as depression, distress, and psychological symptoms. Moreover, increased participation in roles leads to higher positive self-esteem, a greater sense of personal growth, and a decrease in negative impacts for both genders." (Viejo & Other 2018, 6)

"It is possible to promote positive behaviors and attitudes in the workplace to contribute to active and happy work performance, and to enhance individual success in this work by understanding the situations that individuals face, with the subsequent stages of this psychological diagnosis being the preparation of psychological development programs." (Peláez-Fernández & Other 2020, 2)

Conclusions

1. The Psychological Well-being Scale is suitable and appropriate for directly measuring this psychometric phenomenon among physical education and sports science academics members at the Universities of Baghdad and Mustansiriyah.
2. Physical education and sports science academics members at the Universities of Baghdad and Mustansiriyah possess the required level of psychological well-being.
3. Varying levels of psychological well-being are present among physical education and sports science academics members at the Universities of Baghdad and Mustansiriyah, with self-acceptance being the most prominent and environmental adaptation the least.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Recommendations

1. The Iraqi Ministry of Higher Education and Scientific Research should focus on reducing the burden of additional courses and activities for physical education and sports science academics members at the Universities of Baghdad and Mustansiriyah, as these increase psychological stress and negatively impact their overall well-being.
2. It is essential to increase the frequency of psychological assessments of the well-being of physical education and sports science academics members at the Universities of Baghdad and Mustansiriyah, using a research-based scale.
3. Continuing education courses in the colleges and departments of physical education and sports science at the Universities of Baghdad and Mustansiriyah should incorporate psychological well-being programs, given their positive role in enhancing the self-efficacy of academics' members.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

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Volume 38 –Special Issue– 2026 Open Access

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

The Effect of Psychomotor Exercises on Visual Interference and Accuracy of Spike Skill in Junior Volleyball Players

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DOI:

https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2307

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Article history: Received 22/ May/2025; Accepted 28/ May/2025; Available online 28/ October/2026

Abstract

This study aimed to investigate the impact of psychomotor exercises on improving visual interference and enhancing the accuracy of certain technical skills particularly the spike among junior volleyball players.The researchers applied an experimental approach with a single-group pre-test/post-test design. The sample was intentionally selected from players aged 15–17 years at the Al-Karkh First Education Club Eight players were randomly selected from a pool of 20 in addition to four players designated as a pilot group.The training program consisted of 24 training sessions distributed over 12 weeks at a rate of two sessions per week under the direct supervision of the researchers and the team coach After carrying out post-tests and analyzing the data using the SPSS statistical software the results showed a clear positive effect of psychomotor exercises on developing visual interference and improving the accuracy of the spike.Research Objective: To validate the positive impact of psychomotor exercises, using assistive training methods on developing visual interference and improving the accuracy of the spike in volleyball players aged 15–17 years.

Keywords: Psychomotor exercises, visual interference, technical skills, smashing.

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

Modern sports training is witnessing swift development in integrating modern technology with psychomotor methods to enhance players' physical and cognitive performance Volleyball is one of the sports that demands a high level of responsiveness to changing motor and visual stimuli particularly when performing crucial offensive skills such as the spike which needs precise timing and collaboration between mental and technical abilities.

Among the cognitive elements affecting performance accuracy visual interference stands out as one of the most important forms of cognitive distraction a player faces during play It refers to an individual's capacity to focus their attention amidst distracting environmental stimuli. Controlling visual interference is key to reaching accurate performance under pressure as a player who can overcome distractions and maintain focus can execute offensive skills with high efficiency (Al-Salehi & Mansour, 2025).

Despite the important role of cognitive abilities in achieving precise skill performance their application in training remains limited. Training programs often concentrate on physical and technical aspects neglecting sufficient attention to psychological factors or the use of modern technologies for measuring and developing them This underscores the importance of employing scientifically designed psychomotor exercises to enhance these abilities.

In this context a study by (Al-Nuwaili, 2017) showed that the use of special exercises improved visual interference and focused attention in young volleyball players according to the computerized (VTS) system that presented accurate measurements.

As demonstrated by the study (Badan, 2015) exercises using visual aids facilities develop the accuracy of the smashing skill, especially from positions (2-3-4), reflecting the importance of visual perception in directing offensive strikes.

Regarding the nature of the exercises a study by (Taqi, 2023) confirmed the effectiveness of psychomotor exercises in developing the smashing skill when applied to junior players which indicates the positive impact of integrating the psychological aspect with the motor aspect in training.

A study by Lotfallah (2013) demonstrate that exercises targeting perceptual environments such as visual perception and psychological endurance directly affect the improvement of attacking performance accuracy including smashing especially under the pressures connected with competitions.

Based on the importance of these variables this research objectives to determine the effect of psychomotor exercises on visual interference and the accuracy of the volleyball spike skill for juniors aged (15-17 years) using computerized techniques and a scientific experimental approach

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

in an attempt to present an integrated training model that improves the cognitive and skill performance efficiency of the players.

The importance of this research depend on the fact that it addresses one of the neglected aspects of local training which is the development of mental abilities connected to skill performance and it provides applicable scientific solutions using modern tools making it an important scientific and field addition to the sports field.

Research Methodology

The researchers used an experimental approach with a single-group pre-test and post-test design, as this design was appropriate for the research procedures The researchers practically selected the research population from the players of Al-Karkh First Education Directorate totaling (20) players. The age group of 15-17 years totaling (16) players was selected. The research sample included (eight) players chosen randomly by lottery. The size of the pilot sample was (4) players. The researchers relied on collecting data through personal interviews with specialists in volleyball and psychology, scientific references and sources and the internet for information. The equipment and tools used in the research were: a Vienna Test System (VTSS) for testing optical interference (one Austrian-made), two light cones, one optical device, two iPhones, one HP laptop, one regulation volleyball court one electrical connector and (12) Molten volleyballs. Colored floor foam (30 pieces), fabric curtain (9m x 1m) adhesive tape colored tape and stationery, wooden box (3 pieces, 50cm high), metal measuring tape (2m) for measuring length metal measuring tape (15m) for skill tests.

The following tests were used

The first test is Stroop's color interference test (Mansour and Al-Salehi, 2020, page 544): Interference, or distractibility denotes to the extent to which an athlete can focus on the core of a task when under stress from internal, external, physical or mental factors and how susceptible they are to distracting stimuli. The ability to control cognitive interference is evaluated using the STROOP test. The task involves reading colored words written in different colors and reacting to the corresponding font color or color indicated in the word The test provides a highly reliable and fair assessment of the capacity to inhibit overlearned responses to simple tasks.

Application

This test measures the degree of conflict or disturbance (interference) in reading word colors, i.e. the deficit in reading speed or color discrimination caused by conflicting information This test is only for adults.

Theoretical basis

The current form of the Stroop test provides a programmed example (model) of color conflict in words based on the assumption that reading speed is slower if a word is written in a

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

color different from what its meaning represents In other words there is a delay in reading the color of a word if the meaning of the word that refers to a specific color does not correspond the font color This model posits that the cause of the disagreement is due to two experimental conditions:

1- Determine the reading speed for the same word color.

2- Determining the speed of color naming.

This first performance is used as a basis related to two conditions namely

1- Reading speed with experimental adjustment for color interference or conflict i.e. the reading speed of a color reduces if the font is of a different color.

2- The experimental control of word interruption as naming the color is more difficult because the color representing the meaning of the word does not match the color of the font used in writing the word itself.

Test application

The task of taking the exam or test can be summarized as pressing the correct input field or word button as quickly as possible.

Test duration:

About 15 minutes.

The second test (Al-Nuwayni, 2017, page 89):

➢ **Test Name: -** Test of Accuracy in Diagonal and Straight Smashing Skills Center (4)

➢ **The purpose of the test:** To assess the accuracy of the diagonal and central straight smash (4).

➢ **Equipment**: A regulation volleyball court, regulation volleyballs two mats measuring 2m long and 1m wide.

▪ Performance specifications: The player being tested performs the smash from position (4) with a setup from the coach from position (3) The player must perform (5) smashes in the diagonal direction and (5) smashes in the straight direction.

➢ **Registration:-**

▪ (4) points for each correct slam that drops the ball onto the mat.

▪ (3) points for each correct smash that lands the ball in the yellow zone based on the type of smash.

▪ (2) points for each correct smash that lands the ball in area (A) for diagonal smashes and in area (B) for straight smashes.

▪ -(1) One point for each slam shot that drops the ball into the rest of the field.

▪ -(zero) for each failed crushing blow.

-Final score for the test (40 points)

Third test_ (Sakhi, 2006, pages 123-124):

➢ **Test Name: -** Test of accuracy of diagonal and straight smashing skill center (2).

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

➢ **The purpose of the test:** To measure the accuracy of diagonal and straight multiplication center (2).

Equipment: Regulation volleyball court, regulation volleyballs two mats measuring 2m long and 1m wide

➢ **Performance specifications:** The player being tested performs the smash from position (2) with the coach's setup from position (3) The player being tested must perform (5) smashes in the diagonal direction and (5) smashes in the straight direction.

➢ **-Registration**:

▪ (4) points for each correct smash that lands the ball on the mat.

▪ (3) points for each correct smash hit that lands the ball in the yellow zone according to the type of smash.

▪ (2) points for each correct smash that lands the ball in area (A) for a diagonal smash and in area (B) for a straight smash.

▪ (1) One point for each smash that drops the ball into the rest of the domain.

▪ (Zero) for every failed crushing blow.

▪ Final score for the test (40 points)

After the research variables and their tests were identified the two researchers carried out the pilot experiment on a sample of (4) participants who were selected by lottery from the research population, with the help of the assisting work team The pilot experiment was conducted with the aim of verifying the suitability of the tests for the research sample and the ease of their application identifying the time need to carry out the tests determining the obstacles that may appear during the course of the tests and identifying the occurrence of errors and interference in the work as well as the efficiency of the assisting work team.

Pre-tests were conducted on the research sample of (8 players) The conditions connected to the tests were recorded in terms of time, place, tools used method of implementation and the assisting team in order to provide them in the post-tests. After that, the training units were implemented under the direct supervision of the two researchers with the help of the team coach. The syllabus included (12) weeks during the special preparation phase that precedes the competition period, at a rate of (3) units per week (Saturday, Tuesday) Thus the training units amounted to (24) units over the period of implementing the curriculum After the completion of implementing the training units the post-tests were conducted under the same conditions procedures and conditions as the pre-tests and with the help of the same assisting team The two researchers used the statistical program (SPSS) to statistically procedure the data.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Table1. *shows the descriptive statistics of the pre-test and post-test measurements for the experimental group*

variables	pre-test		post-test	
	M	SD	M	SD
Diagonal Spike Accuracy Test from Position 4	8.375	1.187	14.500	1.414
Accuracy Test of the Diagonal Spike from Position 4	7.875	1.414	14.250	3.615
Diagonal Spike Accuracy Test from 2Position	08.00	1.851	12.750	1.908
Accuracy Test of the Diagonal Spike from Position 4	8.500	1.195	14.500	1.414
Visual Interference Accuracy Test	29.625	3.204	50.875	3.720

Table2. *shows the descriptive statistics of the pre-test and post-test measurements for the control group*

variables	Mean of differences	Standard deviation	Standard error of difference	T	Sig
Diagonal Spike Test from Position 4	-6.125	1.642	.580	-10.550	.000
Test of the Diagonal Spike from Position 4	-6.375	2.722	.962	-6.624	.000
Diagonal Spike Test from Position 2	-4.750	1.281	.453	-10.482	.000
Test of the Diagonal Spike from Position 4	-6.000	1.511	.534	-11.225	.000
Visual Interference Test	-21.250	6.670	2.358	-9.010	.000

The results in Tables 1 and 2 show that the calculated t-value was higher than the tabulated t-value at a significance level of 0.05 indicating statistically significant differences in favor of the experimental group This leads the researcher to refuses the null hypothesis and accept the

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

alternative hypothesis This advantage is attributed to the effectiveness of the psychomotor training program used which vital contributed to developing both skill and cognitive performance.

The results showed obvious development in the smashing skills (straight and diagonal from positions 2 and 4) along with developed cognitive abilities connected to visual interference.

The researcher attributes this improvement to the nature of the psychomotor exercises which combined visual stimulation with motor response These facilities the players enhance their timing, focus and performance accuracy within a training environment that simulates real-life playing conditions.

Regarding the skill of both types of spikes important improvement was noticed the accuracy of direction and timing of movements This reflects the effectiveness of the exercises in improving neuromuscular coordination and hand-eye integration during skill performance.

This is confirmed by what Saba (2012, p. 64) indicated: that the spike needs harmony between physical and motor qualities, and that precise execution is essential to bypass the block and reach open areas.

Furthermore, the use of exercises based on visual and light signals contributed to raising the players' spatial awareness and their capacity to selected appropriate angles for shooting.

These results are consistent with what Williams, Davids and Williams (1999, p. 144) stated: that decision-making under time pressure needs training that simulates the playing environment which is what the implemented exercises provided.

Regarding visual interference stimulus filtering exercises contributed to rising the players' ability to concentrate even if their multiple stimuli This is an advanced cognitive skill that needs specialized programs As Brown (2001, p. 54) indicated developing environmental awareness contributes to enhancing performance by improving visual discrimination and spatial awareness

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Table3. *shows the descriptive statistics for the pre- and post-tests of the control group*

variables	control group			
	Post		Pre	
	M	SD	M	SD
Diagonal Spike Accuracy Test from Position 4	7.750	1.488	10.125	2.587
Accuracy Test of the Diagonal Spike from Position 4	7.250	1.388	9.250	2.052
Diagonal Spike Accuracy Test from 2Position	8.125	1.356	9.375	1.505
Accuracy Test of the Diagonal Spike from Position 4	7.875	1.246	10.000	2.672
Visual Interference Accuracy Test	27.125	7.239	27.25	4.367

Table 4. *shows the inferential statistics for the pre- and post-tests of the control group*

variables	Mean of differences	Standard deviation	Standard error of difference	T	Sig
Diagonal Spike Test from Position 4	-2.375	1.922	.679	-3.494	.010
Test of the Diagonal Spike from Position 4	-2.000	1.511	.534	-3.742	.007
Diagonal Spike Test from 2Position	-1.250	1.164	.411	-3.035	.019
Test of the Diagonal Spike from Position 2	-2.125	1.807	.639	-3.325	.013
Visual 2Interference Accuracy Test	-0.125	9.295	3.286	-.038	.971

Tables (3, 4) show the results of the control group in the post-test demonstrating a slight improvement in some of the studied skills. However this improvement did not achieve the level of qualitative development or high statistical significance that emerged in the experimental group.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The performance of the control group persisted within the normal limits of improvement resulting from routine training without being attributed to a targeted training program or one according to modern scientific principles.

At the level of the smashing skill (diagonal and straight) although some improvement was noticed in a limited number of individuals this development was not driven by enhancement in cognitive or visual abilities but was closer to the mechanical repetition of the movement. Ali (2000, p. 95) pointed out that getting used to the exercise alone may lead to a slight improvement but it does not produce a qualitative development particularly in complex skills that rely on spatial timing and motor accuracy as is the case in the smash hit.

This supports the researcher's observation that the traditional training used in this as for visual interference the findings demonstrate near-stability in the performance of individuals which is attributed to the inadequacy of traditional training in dealing with this complex cognitive skill.

Visual interference requires a training environment rich in stimuli that demand selective attention and the ability to distinguish between important and unimportant stimuli Al-Hawari (2016, p. 148) noted that attention changes with varying situations and conditions and that inadequate attention management training can lead to technical and tactical errors.

Brown (2001, p. 54) also confirms that improving the efficiency of perceptual environments, including visual interference can only be reached through programs designed to stimulate visual attention and spatial awareness programs which have not been implemented to this group.

Accordingly, the researcher characteristic the limited performance of the control group to the shortcomings of the traditional training program which was incapable of target the skills that require visual-motor-cognitive integration.

Al-Farmawi (1994, p. 163) explained that cognitive methods are a cornerstone in developing the ability to make decisions and analyze situations and these are factors that were not included in the training program for this group.

Table5. *shows the descriptive statistics for the post-tests of the control and experimental groups*

Tests	Sample	N	Mean	Standard deviation	Standard error of difference
Diagonal Spike Test from Position 4	experimental	8	14.500	1.414	0.500
	control	8	10.125	2.587	0.914
Test of the Diagonal Spike from Position 4	experimental	8	14.250	3.615	1.278
	control	8	9.250	2.052	0.725
Diagonal Spike Test from 2Position	experimental	8	12.750	1.908	0.674
	control	8	9.375	1.505	0.532

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Test of the Diagonal Spike from Position2	experimental	8	14.500	1.414	0.500
	control	8	10.000	2.672	0.944
Visual Interference Accuracy Test	experimental	8	50.8750	3.720	1.315
	control	8	27.125	4.454	1.574

Table6. *shows the inferential statistics for the post-test scores of the control and experimental groups*

variables	Value T	Sample size	Error rate	Significance
Diagonal Spike Test from Position 4	4.196	14	0.001	Significant
Test of the Diagonal Spike from Position 4	3.402	14	0.004	Significant
Diagonal Spike Test from Position 2	3.926	14	0.002	Significant
Test of the Diagonal Spike from 2 Position	4.209	14	0.001	Significant
Visual Interference Accuracy Test	11.575	14	0.000	Significant

The results in Tables 5 and 6 clearly reveal statistically significant advantage for the experimental group compared to the control group in all variables under study The experimental group members showed remarkable improvement in both types of smashes from centers 2 and 4 as well as in visual interference. This development is attributed to the psychomotor exercises implemented which were designed to promote the senses and activate the nervous and muscular systems in an integrated manner This contributed to improved motor timing and response accuracy both of which are key determinants of effective athletic performance particularly in team sports such as volleyball.

The slam slam particularly when executed from attacking positions needs a high degree of visual-motor coordination along with precise spatial awareness of teammates' positions and open playing space, and an ability to assess the opponent's changing performance Psychomotor exercises have contributed to enhancing this awareness by linking motor activity to the spatial and temporal perception of the attacking situation Nawar (quoting Qasim Hassan) pointed out that the motor performance of skills such as the slam is not random but depends on the pre-organization of information within the brain based on a pre-programmed pathway This highlights the significant of perceptual-sensory interaction in the execution of motor skills (Hussein H., 2008, p. 97).

As for visual interference the differences were statistically significant in favor of the experimental group, which is attributed to the fact that the psychomotor exercises focused directly

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

on enhancing visual abilities conected to the speed of capturing stimuli the accuracy of following them and prioritizing attention during performance.

(Brin Ariel, quoted by Al-Shammari, 2019, page 81) confirms that high skill performance is closely related to ideal visual capacities as weakness in these abilities negatively affects the quality of performance since the inaccuracy of visual information disrupts the timing of the response leading to a noticeable decline in the technical or cognitive level of the skills performed. The integration of visual and perceptual exercises with motor activities has had a significant effect on improving reactions to unexpected situations on the playing field.

This type of training has supporting to raising the players' efficiency in organizing motor responses based on a precise understanding of the opponent's stimuli.

This is consistent with what Schmidt indicated (quoting Hashem, 2017, page 100) that designing a learning environment rich in stimuli and connected to the learner's needs leads to stimulating motor behavior and achieving remarkable development in performance unlike random environments that may weaken interaction and limit the ability to comprehend.

Regarding accuracy the experimental group clearly outperformed the target group which is attributed to their intensive training based on conscious repetition of movements in contexts similar to real-life situations It is worth noting that accuracy is a key factort of success in athletic performance as strength and speed lose their effectiveness without proper timing and precise execution.

Hassanein and Abdel Moneim (1998, p. 21) pointed out that accurate performance can only be achieved through exercises that allow the learner to deal with unexpected situations within a realistic training environment helping him to accurately control and time his responses.

Therefore, these results confirm the validity of the main hypothesis of the study which states that psychomotor exercises are an effective training approach in developing motor and visual skills in volleyball particularly in the early stages of preparation making their adoption in modern training programs an inevitable necessity to reach qualitative and sustainable results for young players.

Conclusions

1. Psychomotor exercises have proven effective in developing the performance of the smashing skills (from positions 2 and 4) among volleyball players aged (15-17) years.

2. The experimental group showed a clear statistical superiority over the control group in the post-test measurement which verifies the impact of the training program based on the integration of sensory visual and motor perception.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

3. Psychomotor exercises contributed to decreasing visual interference among players which was reflected in the accuracy of motor response and decision-making during performance.

4. The improvement recorded by the experimental group was not random or the result of routine repetition but rather the find of a purposeful scientific training program that combined sensory stimulation visual attention and spatial awareness.

5- The results confirmed the validity of the research hypothesis which states that psychomotor exercises play a vital role in improving the technical and visual performance of junior volleyball players.

Recommendations

1. Adopting psychomotor exercises as an essential part of the training programs for junior volleyball players, due to their important role in improving technical skills, cognitive abilities and visual perception.

2. Designing special training programs that combine skill exercises with sensory and visual stimuli in a way that suitable to the characteristics of players in the (15-17) age group.

3. To use the results of this study in preparing scientific training curricula that contribute to improving the skill and mental performance of young players.

4-carring out similar studies on other age groups or on different team sports to verify the effectiveness of psychomotor exercises in developing athletic performance in general.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Special Exercises Based on Offensive Play Moment and Their Impact on Two Complex Offensive Skills in Soccer Players Aged 15-16 Years

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DOI:
https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2304
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Article history: Received 21/May /2025; Accepted 3/June/2025; Available online 28/October/2026

Abstract

The importance of the research lies in the researcher design of special exercises that mirror the modern game of soccer and its fast pace in accordance with offensive play moments, aiming to develop two complex offensive skills for Soccer players aged 15 to 16 years. Research Problem The researcher observed that the rhythm of play is characterized by slowness, with many of mistakes in skill performance accuracy among most players in the clubs. This negatively impacted the performance level in the clubs across various categories. This rhythm of performance does not match with the modernity and rhythm of global soccer. Therefore, the researcher decided to study this problem The researcher aimed to Design exercises based on offensive play moments. Identify the impact of these exercises on the two complex offensive skills. The researcher Methodology employed an experimental design utilizing two equivalent groups with pre-test and post-test assessments, applying statistical treatments using the SPSS statistical software. The study conclusions that special exercises based on offensive moments have a positive effect on enhancing the speed and accuracy of performance in the studied complex offensive skills.

Keywords: Special exercises based on offensive moments, two complex offensive skills.

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

Human beings have established the principles governing the practice of sports activities and games, proposed their theoretical foundations and methods of application, and conducted numerous studies and experiments across various disciplines and levels to gain a comprehensive understanding of the sciences related to sports, their components, and underlying principles. Consequently, scientific efforts and practical expertise have converged with the aim of improving athletic performance across all sports in general and soccer in particular. In modern soccer, competition has become extremely intense, extending to the finest details of the physical, technical, tactical, physiological (functional efficiency of the body systems), and psychological aspects of performance. Achieving victory has become dependent on very small differences between competing teams in one or more of these aspects, which ultimately determine the superiority of one team over another. Therefore, modern training methods and approaches, together with a variety of specialized exercises designed to replicate real match conditions, have emerged with the objective of developing these performance components and enhancing them, thereby enabling players and teams to maintain a high level of performance throughout the entire duration of the match.

The various methods, approaches, and specialized training exercises associated with the demands of soccer have often been linked to the countries in which they originated or to the names of their developers, such as the Dutch School, the Spanish School, and the coaching philosophies of Guardiola and Van Gaal. All of these approaches, methods, and specialized exercises are intended to enhance the level and tempo of performance in order to create effective attacking play, reach the opponent's goal, and score goals. Accordingly, the training exercises used in soccer should be characterized by a level of specificity that reflects the speed, effectiveness, and dynamic nature of attacking performance, while simulating its constantly changing demands and match conditions.

Through observing Iraqi Premier League matches, reviewing the performance of youth age groups, and watching their competitive matches, the researcher noticed that the tempo of play is characterized by slow execution and a high frequency of technical errors among the majority of players in clubs, which has negatively affected the overall standard of performance. This performance tempo does not reflect the modern demands and pace of contemporary international soccer. Therefore, training methods and exercises should be designed to simulate the current evolution of the game and meet its performance requirements. Accordingly, the researcher deemed it necessary to investigate this issue by designing special exercises based on the offensive play moment in order to improve the speed and accuracy of performing two combined offensive skills in soccer players aged 15–16 years.

An offensive play moment is a critical phase that occurs during a soccer match when a team is in ball possession. It has a significant influence on controlling the game and gaining a performance advantage over the opponent (Antonsen, 2021).

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Methodology

The research methodology is a systematic approach followed by researchers to define the procedures and stages of their scientific investigation, through which solutions to research problems can be achieved (Mahjoub & Hussein, 2002, p. 34). Accordingly, the researcher employed the experimental method using a pre-test–post-test equivalent groups design consisting of a control group and an experimental group, as it was deemed the most appropriate approach for addressing the research problem. The experimental method is considered the only research method that accurately identifies the cause-and-effect relationship and is distinguished by its ability to control and regulate the variables under investigation (Al-Kadhimi, 2012, p. 137).

Population and Sample

The research sample is one of the fundamental aspects that requires careful consideration by the researcher, particularly regarding the method of its selection and its suitability for the research being conducted, as it represents a subset of the target population. A sample is defined as the representative portion of the original population upon which the researcher conducts the entire research process (Al-Kadhimi, 2012, p. 84).

The research population consisted of 200 soccer players, aged 15–16 years, representing teams and clubs in Baghdad that participated in the 2022–2023 Iraqi Premier League. The research sample was selected using a purposive sampling method and consisted of 35 players from the Sports Talent Centers accredited by the Iraqi Central Football Association in Baghdad, within the same age category (15–16 years). The selected sample represented 17.5% of the total research population. Subsequently, the sample was divided into two equal groups, and through a lottery procedure, the participants were randomly assigned to either the experimental group or the control group.

Sample Equivalence

The researcher divided the research sample into two groups (experimental and control) using a random allocation method (lottery). The sample was first divided into two equal groups through an alternating numbering procedure, whereby participants assigned even numbers were allocated to the experimental group, whereas those assigned odd numbers were allocated to the control group. To ensure that the allocation process was free from bias and to maintain scientific objectivity, an equivalence procedure was conducted between the two research groups to control the variables under investigation. Table (3-1) presents the equivalence of the sample based on the results of the pre-test assessments for both the experimental and control groups. Prior to conducting the equivalence procedure, the researcher provided a

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

familiarization session to all participants explaining the procedures for administering the research tests.

Table 1. *Sample Equivalence Based on the Pre-test Results of the Combined Skills for the Experimental and Control Groups*

Tests	Unit of Measurement	Experimental Group		Control Group		Calculated t-value	Sig.
		Mean	SD	Mean	SD		
Ball Receiving and Passing	Score/Time	0.641	0.095	0.660	0.070	0.621	0.540
Ball Receiving, Dribbling, and Shooting	Score/Time	0.385	0.077	0.374	0.077	0.379	0.707

Degrees of freedom (df) = 28; Level of significance = 0.05

Data Collection Methods, Equipment, and Instruments Used in the Research

Data Collection Methods

Arabic and foreign scientific references, Field observation and experimentation, The Internet, Tests and measurements.

Research Instruments

Soccer field, Twenty (20) official soccer balls, Two (2) whistles, Soccer goals of different sizes.
Thirty (30) training poles, Ten (10) cones of varying heights, Two (2) stopwatches.
Measuring tape for determining the specified distances on the field, Adhesive tape of different colors for marking the training areas and Spray field-marking paint.

Research Equipment

Twenty (20) Polar H10 heart rate monitoring devices, One (1) Apple tablet, One HP laptop computer, One (1) Canon video camera, One (1) Sony video camera, One (1) drone camera.

Field Research Procedures

Identification of the Combined Technical Skill Variables

1- Ball Receiving (first-touch control) and passing.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

2- Ball dribbling and passing.
3-

Combined Technical Skill Tests in Soccer

❖ **Ball Receiving (First-Touch Control) and Passing in Two Different Directions Test** (Al-Asadi, 2020, "The Effect of Special Exercises Using FITLIGHT and RESPINCE QUALITY Devices on Developing the Speed and Accuracy of Performing Certain Combined Skills and Motor Abilities in Soccer Players Aged 14 Years," pp. 111–112) (Modified by the Researcher).

- **Test Name**: Ball Receiving (First-Touch Control) and Passing in Two Different Directions Test.
- Purpose of the Test To measure the speed and accuracy of Ball Receiving (first-touch control) and passing.
- Equipment Used :Eight (8) soccer balls ,measuring tape, Field-marking spray paint, A one-meter measuring ruler for determining the reception (first-touch control) area, Two (2) small goals (60 cm × 60 cm), Stopwatch.

Performance Description

The participant stands behind the reception area line, which is positioned 8 m from the feeder on both the right and left sides. Upon the starting signal, the feeder delivers a ground pass from the right side toward the reception area. The player moves into the reception area and attempts to receive the ball using any part of the foot while directing it toward the passing area. The player then passes the ball toward Goal (1). During the second attempt, the ball is passed toward Goal (2). This sequence continues alternately between Goal (1) and Goal (2) until the first four attempts are completed. Subsequently, all participants perform the remaining four attempts starting from the opposite side using the same procedure adopted in the first four attempts (see Figure 3-1).

- Goal (1) is positioned to the right at an angle of 20° relative to the horizontal line of the reception area and is located 10 m from the reception area.
- Goal (2) is positioned to the left at an angle of 20° relative to the horizontal line of the reception area and is located 10 m from the reception area.

Performance Conditions

- The ball must be received (first touch) within the designated receiving area.
- The test shall be performed by receiving the ball and passing it alternately toward Goal (1), Goal (2), Goal (1), and Goal (2), following the prescribed sequence.
- The participant shall perform both the receiving (first touch) and passing skills as quickly as possible.

Scoring Procedure

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

- Each participant is given eight (8) attempts, consisting of four attempts from each side.
- One (1) point is awarded for each successful receiving (first touch).
- Zero (0) points are awarded for an unsuccessful receiving (first touch).
  - One (1) point is awarded for each successful pass.
  - Zero (0) points are awarded for an unsuccessful pass.

Notes

✓ With regard to accuracy, the maximum score is 16 points, of which 8 points are allocated to receiving (first touch) and 8 points to passing.

✓ The completion time is recorded using a stopwatch.

✓ The unit of measurement is Score/Second.

✓ The total test time is calculated by summing the completion times of the eight attempts. The time for each attempt is recorded from the moment the player receives (first touches) the ball until the ball reaches the goal line. The total accuracy score is calculated by summing the scores obtained for the receiving (first touch) and passing skills. Subsequently, the technical performance score is determined using the modified Fitts' Index (Khayoun, Motor Learning: Between Principle and Application, 2010, p. 45), as follows:

Technical Performance Score = Total Accuracy Score ÷ Total Time

The distance between the goals and the receiving area was modified to 10 m.

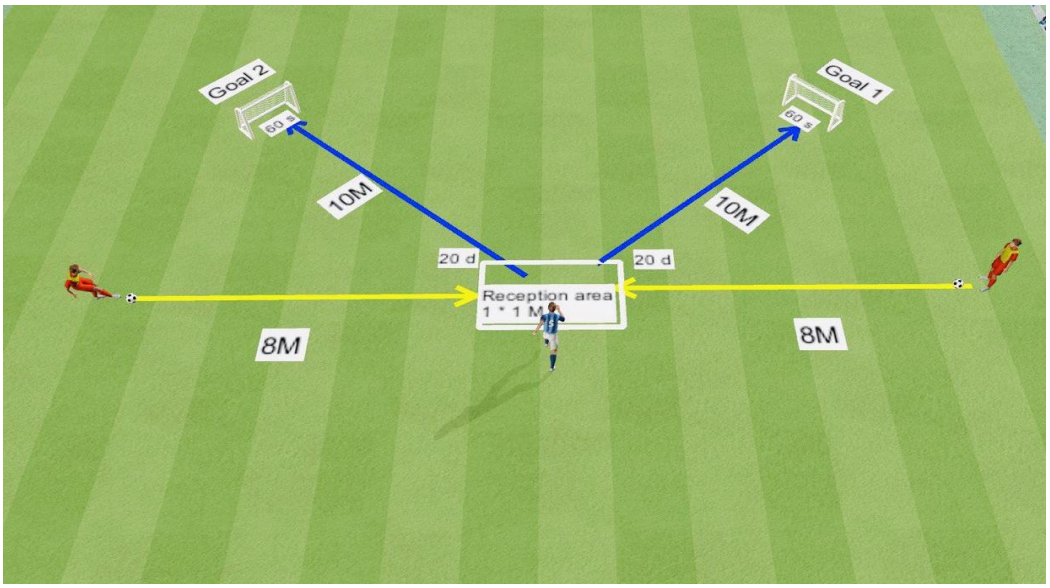


Figure 1. *Receiving (First Touch) and Passing in Two Different Directions*

❖ **Receiving (First Touch), Dribbling Through Poles, and Shooting Test**(Al-Asadi, 2020, The Effect of Special Exercises Using FITLIGHT and RESPINCE QUALITY Devices on Developing the Speed and Accuracy of Performing Selected Combined Technical Skills and Motor Abilities in 14-Year-Old Soccer Players **(Modified by the Researcher)).**

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Test Name : Receiving (First Touch), Dribbling Between Poles, and Shooting Test
Purpose of the Test : To assess the speed and accuracy of receiving (first touch), dribbling, and shooting.
Equipment: Four (4) official soccer balls, Measuring tape**,** One (1) whistle.

One (1) regulation soccer goal (7.32 × 2.44 m), divided into three scoring zones: two side zones measuring 2.00 × 2.44 m each and one central zone measuring 3.32 × 2.44 m.
One 1-m measuring ruler to mark the receiving area (1 × 1 m).
One 1.5-m measuring ruler to mark the shooting area (1.5 × 1.5 m), Ten (10) training poles.
Elastic training tape for dividing the goal into scoring zones, Stopwatch.

Performance Description:

The participant stands behind Receiving Area (1), measuring 1 × 1 m, which is located 6 m from the shooting area. The shooting area, measuring 1.5 × 1.5 m, is positioned at the intersection of the 6-m line extending to the right and left of the goal with the 16.5-m line in front of the goal, thereby creating a diagonal distance between the shooting area and the goal.

Upon the starting signal, the feeder delivers a ground pass toward Receiving Area (1). The participant attempts to receive (first touch) the ball within the designated receiving area before dribbling through the poles over a distance of 6 m until reaching the designated shooting area. The participant then performs a shot toward the pre-marked scoring zones of the goal according to their respective levels of difficulty and scoring value.
All participants perform the first and second attempts consecutively. They then move to the opposite side to perform the third and fourth attempts using the same procedure adopted for the first two attempts.

The feeder is positioned directly in front of the goal, midway between Receiving Area (1) and Receiving Area (2), and is located 8 m from each receiving area (see Figure 3-5).

Performance Conditions

- The ball must be received (first touch) within the designated receiving area.
- The shooting skill must be performed from within the designated shooting area.
- The participant shall complete the test as quickly as possible.

Scoring Procedure

- Each participant is given four (4) attempts, comprising two attempts from each side.
- One (1) point is awarded for each successful first touch.
- Zero (0) points are awarded for an unsuccessful first touch.
- One (1) point is awarded for successful dribbling.
- Zero (0) points are awarded if the participant loses control of the ball or knocks over any of the training poles.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

- Three (3) points are awarded if the ball is successfully shot into Scoring Zone (3).
- Two (2) points are awarded if the ball is successfully shot into Scoring Zone (2).
- One (1) point is awarded if the ball strikes either the goalpost or the crossbar.
- Zero (0) points are awarded if the ball is shot outside the boundaries of the goal.

Notes:

- With regard to accuracy, the maximum attainable score is 20 points, distributed as follows: 4 points for receiving (first touch), 4 points for dribbling, and 12 points for shooting.
- The completion time is recorded using a stopwatch.
- The unit of measurement is Score/Second.
- The total test time is calculated by summing the completion times of the four attempts. The time for each attempt is recorded from the moment the participant receives (first touches) the ball, continues through dribbling through the poles, and ends when the ball reaches the goal line of the divided goal. The total accuracy score is then calculated by summing the scores obtained for the three technical skills and dividing the total accuracy score by the total completion time using the modified Fitts' Index, expressed as follows:

Technical Performance Score = Total Accuracy Score ÷ Total Completion Time

The distance between the shooting area and the goal was modified to 16.5 m.

The goal was divided into three scoring zones: two side zones measuring 2.00 × 2.44 m each and one central zone measuring 3.32 × 2.44 m.

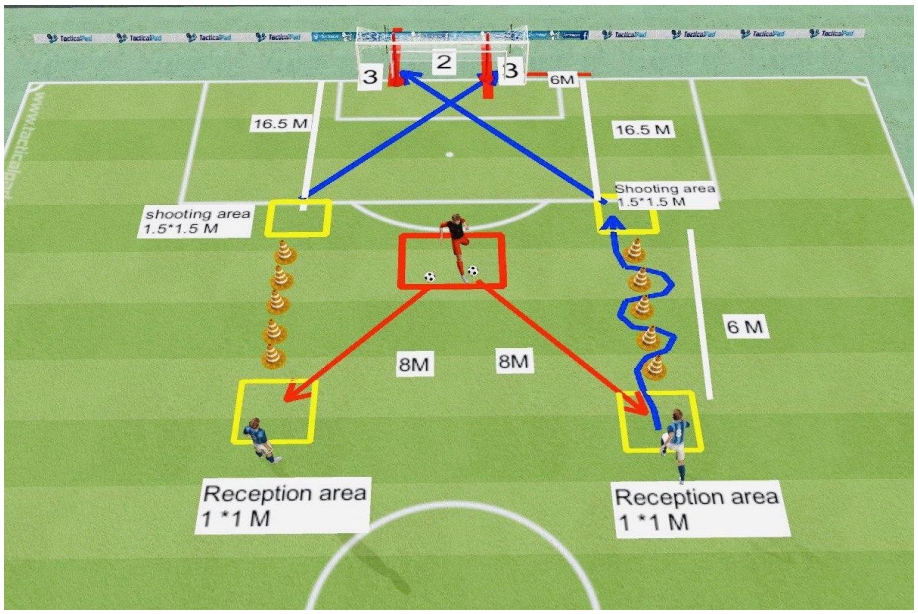


Figure 2. *Receiving (First Touch), Dribbling Through Poles, and Shooting Main Experiment*

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Pre-test Assessments

The researcher conducted the pre-test assessments for the research sample on Wednesday, June 12, 2024, at 5:00 p.m. on the soccer field of the College of Physical Education and Sport Sciences, University of Baghdad. All testing conditions were standardized, including the testing venue, time, test administration procedures, equipment, instruments, and the assisting research team, in order to control all variables that might influence the results during the administration of the post-test assessments.

Special Exercises

The researcher designed and implemented special exercises based on the Offensive Moment of Play in soccer with the aim of developing the combined offensive technical skills of the research sample. The exercises were designed to be diverse, technically advanced, and representative of the demands of modern soccer, while being appropriate for the participants' performance level. Furthermore, the exercises closely simulated the execution of technical skills under actual match conditions to achieve the objectives of the study.

The independent variable (special exercises) was incorporated into the main part of the training session. The exercises were administered to the experimental group at a frequency of three training sessions per week by the assisting research team under the direct supervision of the researcher. In contrast, the control group continued to follow the training program implemented by its coach. Throughout the intervention period, the researcher adhered to the fundamental principles of sports training.

Post-test Assessments

Following the completion of the special exercises designed by the researcher, the combined technical skill tests were administered to the research sample on Sunday, August 18, 2024, at 5:00 p.m. on the soccer field of the College of Physical Education and Sport Sciences, University of Baghdad. The researcher ensured that all testing conditions were identical to those adopted during the pre-test assessments, thereby maintaining the consistency of the testing procedures.

Statistical Analysis

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) to obtain the research results.

Results

Table 2. *Differences in the means, standard deviations, mean differences, standard deviation of the differences, t-values, significance levels, and standard errors for the pre-test and post-test results of the combined technical skill tests for the experimental group.*

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Tests	Unit of Measurement	Experimental Group (Pre-test)		Experimental Group (Post-test)		Mean Difference	Standard Deviation of the Differences	Sig.	t-value	Standard Error
		Mean	SD	Mean	SD					
Receiving (First Touch) and Passing	Score/Sec.	0.641	0.095	1.059	0.085	0.417	0.093	0.000	17.248	0.02421833
Receiving (First Touch), Dribbling, and Shooting	Score/Sec.	0.385	0.077	0.596	0.046	0.211	0.074	0.000	10.955	0.01930718

N = 15 , Degrees of freedom (df) = 14; Level of significance = 0.05

Table 3. *Differences in the means, standard deviations, mean differences, standard deviations of the differences, t-values, significance levels, and standard errors for the pre-test and post-test results of the combined technical skill tests for the control group.*

Tests	Unit of Measurement	Control Group (Pre-test)		Control Group (Post-test)		Mean Difference	Standard Deviation of the Differences	Sig.	t-value	Standard Error
		Mean	SD	Mean	SD					
Receiving (First Touch) and Passing	Score/Sec.	0.660	0.0700	0.824	0.068	0.164	0.038	0.000	16.32	0.01
Receiving (First Touch), Dribbling, and Shooting	Score/Sec.	0.374	0.077	0.455	0.068	0.081	0.103	0.009	3.033	0.026

N = 15 , Degrees of freedom (df) = 14; Level of significance = 0.05

Presentation of the Post-test Results of the Combined Technical Skill Tests for the Experimental and Control Groups:

Table 4. *Means, standard deviations, calculated t-values, and significance levels for the post-test results of the combined technical skill tests for the experimental and control groups.*

Tests	Unit of Measurement	Experimental Group (Post-test)		Control Group (Post-test)		Calculated t-value	Sig.
		Mean	SD	Mean	SD		

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Receiving (First Touch) and Passing	Score/Second	1.059	0.0859	0.824	0.068	8.265	0.000
Receiving (First Touch), Dribbling, and Shooting	Score/Second	0.596	0.0466	0.455	0.0688	6.573	0.000

Discussion

Based on the differences between the pre-test and post-test results of the research variables related to the combined technical skills—namely Receiving (First Touch) and Passing, and Receiving (First Touch), Dribbling, and Shooting—for both the experimental and control groups, as presented in Tables (1) and (2), statistically significant differences were observed between the pre-test and post-test assessments, with the post-test results demonstrating superior performance.Furthermore, the comparison of the post-test results for the combined technical skill variables between the experimental and control groups, as presented in Table (3), revealed statistically significant differences in favor of the experimental group, as all mean values were higher than those of the control group.

The researcher attributes the improvement observed in both the experimental and control groups to the training programs implemented by the researcher and the coach, respectively, as both programs contributed to the development of the combined technical skill variables, while placing considerable emphasis on technical skill development. However, the greater improvement demonstrated by the experimental group in all combined technical skill test results can be attributed to the implementation of the special exercises based on the Offensive Moment of Play. These exercises required the execution of combined technical skills during the offensive phase, with particular emphasis on execution speed and performance accuracy, in a manner consistent with the demands and contemporary nature of modern soccer during actual competition.the researcher ensured that the exercises were systematically prescribed in accordance with the components of training load, while applying the principles of progressive overload and load undulation (wave-like periodization) in a manner appropriate to the players' abilities. This approach contributed to the improvement of the variables under investigation and was developed on the basis of both established scientific literature and the researcher's practical field experience. The development of an effective training program or training curriculum requires researchers and coaches to rely on sound scientific evidence while possessing sufficient academic knowledge and practical experience to design and implement such programs effectively. This is consistent with the view of Risan Khuraibet, who emphasized that the structuring of the training process, planning of training programs, and

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

decisions related to training intensity can only be performed effectively and appropriately by individuals possessing both scientific expertise and practical experience (Khuraibet, 2017, p. 10).In addition, the researcher ensured that the exercises were specific, varied, and representative of actual match demands, based on the principle of training specificity, whereby training conditions closely resemble competitive conditions. This approach aimed to achieve highly proficient technical performance capable of improving performance under constantly changing competitive situations. Consequently, the exercises had a positive effect on the development of the combined technical skills investigated in the present study. In this regard, Mohammed Reda stated that one of the principal objectives of sports training is to achieve technically proficient and sport-specific skill performance, while simultaneously developing the athlete's ability to execute all technical movements at the highest possible speed, with a high level of precision, fluidity, and power, regardless of the competitive situation (Ibrahim, 2017, p. 35).Furthermore, the researcher ensured that the prescribed exercises reflected the continuous evolution of modern soccer by incorporating contemporary training approaches characterized by speed, accuracy, and rapid decision-making, while simultaneously targeting multiple technical objectives in addition to enhancing movement execution speed. The exercises designed by the researcher were based on the actual execution of combined technical skills during the Offensive Moment of Play, namely the phase in which the ball is under the player's control. This phase requires a high level of technical proficiency to maintain ball possession through receiving (first touch), dribbling, and passing, or to conclude the attacking action by shooting, in accordance with the demands of modern competitive soccer.

Accordingly, these exercises represent a form of soccer-specific training, as they integrate different phases of play within a structured training format, thereby contributing to the development of multiple performance variables and performance dimensions. In this regard, Al-Saffar et al. emphasized the importance of designing multi-objective training exercises in soccer, recommending that each exercise should incorporate movements and actions performed with a high level of technical quality, execution speed, and accuracy (Al-Saffar et al., 1990, p. 196).results can be attributed, in the researcher's opinion, to the players' commitment to the training program, which consisted of three training sessions per week in accordance with the system established by the Technical Director of the center and the training program implemented by the team's coach. This training program contributed to enhancing the players' technical abilities, ball feel, and game awareness, which consequently led to improvements in their technical performance.In this regard, Mufti Ibrahim emphasized that the repeated practice of training exercises during training sessions reduces players' technical errors and enables them to gain greater control over skill execution as a natural consequence of improving their ball feel. This allows players to adopt the correct body position when performing technical skills, avoid common execution errors, and develop better motor

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

coordination during skill performance (Hammad, 1994, p. 22).The researcher also believes that the improvement observed in the control group in the technical skill test results was attributable to the coach's use of a variety of technical training exercises, which were performed with different numbers of players, both with and without shooting at the goal. These exercises contributed to enhancing the players' technical abilities and improving their overall technical performance.Furthermore, the comparison of the post-test results (post-test–post-test) for both the experimental and control groups with respect to the combined technical skill variables revealed statistically significant differences in favor of the experimental group. The researcher attributes these findings to the effectiveness of the training intervention implemented throughout the experimental period, in addition to the players' regular attendance and continuous participation in the training sessions without interruption. The success of the training process largely depends on the continuity of training, together with the quality, quantity, and frequency of the training exercises prescribed by the researcher, which were implemented in a more comprehensive and systematic manner, thereby contributing to the achievement of the intended training objectives.Furthermore, the research sample performed the special exercises based on the Offensive Moment of Play, which emphasized the execution of combined technical skills under training conditions that closely simulated the demands of actual match play. These conditions were characterized by high execution speed, performance accuracy, time pressure, and opponent pressure, compelling players in possession of the ball to execute combined technical skills rapidly while maintaining a high level of technical quality and accuracy. This approach ensured that skill execution was aligned with the intended training objectives and the demands of modern competitive soccer.As stated by Luiselli and Reed (2011), achieving effective combined technical performance with the required level of speed and accuracy requires training exercises that closely resemble or replicate the conditions encountered during actual match play (Luiselli & Reed, 2011, pp. 162–164).Furthermore, variation in training exercises, together with their organization in different formats and under dynamic and non-routine performance conditions, has a positive influence on the players' psychological state, motivation, and readiness for training. Such an approach creates an enjoyable training environment while fostering challenge and competition among players in their pursuit of superior performance during training activities. Consequently, this enhances training effectiveness, increases motivation to perform, and ultimately contributes to achieving better performance outcomes.

In this regard, Al-Khashab et al. stated that diversity in training exercises, training methods, and the use of different training aids and equipment helps prevent the boredom that may result from repeatedly performing the same exercises (Al-Khashab, Asmar, & Al-Bayati, 1999).Furthermore, the exercises designed by the researcher took into consideration incorporating the competitive aspect in performance between attackers and defenders in

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

specific areas of the field, in addition to applying them under different conditions and with different numbers of players, together with speed, accuracy, and quality in performing the different types of combined technical skills. In addition, the exercises were varied through the use of different equipment and goals of different sizes, both small and large, as well as the presence of an opponent for the purpose of increasing the level of difficulty, which helped make receiving (first touch), passing, shooting, dribbling, and feinting performed under opponent pressure, forcing the player to deal with the variables during performance. This contributes to improving and controlling the accuracy of performing the combined technical skills because of their great importance and influence on the overall level of performance in soccer and increasing its effectiveness. The better and higher the quality of the combined technical performance, the greater the opportunity to control the match, maintain ball possession, and then score goals. A good team is one that possesses players with good technical abilities and the ability to use the fewest possible touches to build up play with the highest possible accuracy and speed, and then shoot under opponent pressure and under changing conditions, while focusing on the smoothness, ease, and accuracy of performance, and making the appropriate decision when performing the combined technical skills, away from complexity and making the task more difficult. This is the foundation of modern performance in soccer matches.

Conclusions and Recommendations

1.The special exercises based on the Offensive Moment of Play had a positive effect on developing the speed and accuracy of performing the combined offensive technical skills investigated in the present study.

2.Scientific planning in the prescription of training loads and the application of exercises that simulate the actual performance during competition contributed effectively to improving the combined offensive technical skills.

3.The researcher recommends that coaches adopt special exercises based on the Offensive Moment of Play within their training programs, as they have proven effective in improving the performance of combined offensive technical skills.

4.Coaches should apply the principle of variation in training exercises and adopt exercises that simulate the actual performance during matches.

5.Greater emphasis should be placed on exercises that simulate the actual performance and its high tempo, as they represent an essential, fundamental, and influential component of modern soccer matches.

A Sample of the Special Exercises Based on the Offensive Moment of Play:

Attack with Three Players

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

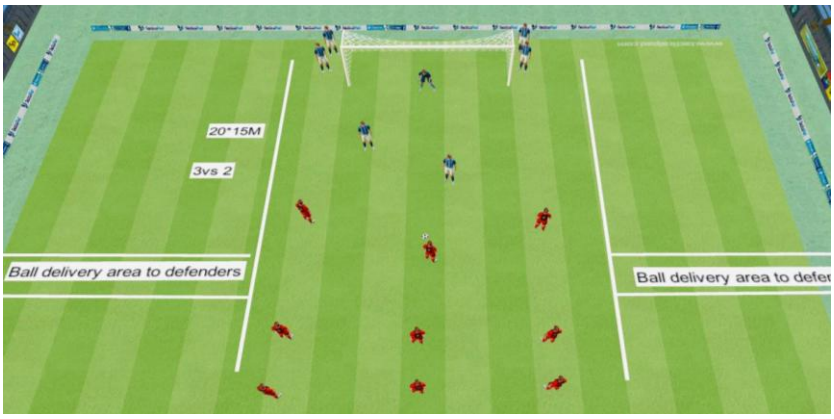


Figure 3. Illustration of the Exercise.

Exercise Name: Triple Attack Playing Area: (20 × 15 m), **Number of Players**: 15 players to perform the exercise (3 vs. 2 + 1 Goalkeeper)
Equipment Used: One full-size goal, training bibs (red and yellow), soccer balls.
Total Exercise Duration: 26 min 40 s, **Exercise Duration**: (10 s × 6 repetitions × 4 sets) = 4 min
Rest Interval Between Repetitions: (50 s × 5 repetitions × 4 sets) = 16 min 40 s
Rest Interval Between Sets: (2 min × 3) = 6 min
Objective of the Exercise:
To develop the offensive ability; for the defenders, to develop the defensive ability and the transition to attack.
Method of Performance:
The red team attempts to score as quickly as possible, while the defenders attempt to intercept the ball and deliver it to the designated area on either side.

Main Coaching Points:

1. Pass the ball as quickly as possible using the fewest possible touches (high tempo of performance).
2. Continuous movement to create space for a teammate.
3. Emphasize scanning before receiving the ball (the field, teammate, and opponent).
4. Quick movement into the available spaces to provide more passing options for the teammate.
5. Emphasize quick decision-making.
6. For the defenders, emphasize pressure, cover, and balance.

Double Attack:

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

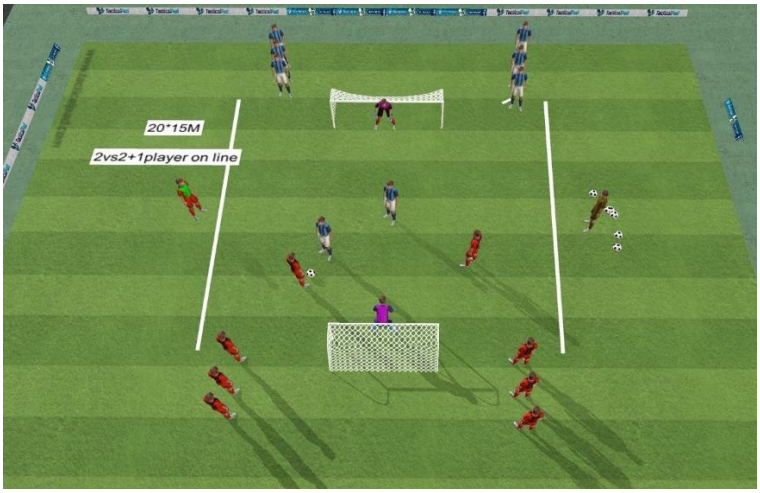


Figure 4. Illustration of the Exercise.

Exercise Name: Double Attack
Playing Area: (20 × 15 m)
Number of Players: 16 players, with 6 players performing the exercise (2 vs. 2 + 2 Support Players + 2 Goalkeepers).
Equipment Used:Two full-size goals, training bibs (red, yellow, and blue), soccer balls.
Total Exercise Duration:21 min 20 s , **Exercise Duration**:(10 s × 10 repetitions × 2 sets) = 3 min 20 s , **Rest Interval Between Repetitions**: (50 s × 9 repetitions × 2 sets) = 15 min
Rest Interval Between Sets: 3 min
Objective of the Exercise: To increase the players' ability to attack, defend, and transition between them as quickly as possible under opponent pressure.
Method of Performance: The exercise is performed 2 vs. 2. The team in possession of the ball is allowed to play with the support players to create superiority for two passes only. When the defenders win possession of the ball, they must make a quick transition to attack and shoot.
Main Coaching Points

1. Pass the ball as quickly as possible using the fewest possible touches (high tempo of performance).
2. Continuous movement to create space for a teammate.
3. Play with the support players to escape pressure and move toward the goal.
4. Emphasize scanning before receiving the ball (the field, teammate, and opponent).
5. Quick movement through the available spaces to provide more passing options for the teammate.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The Impact of Differentiated Teaching With a Graduated Activities Strategy on Some of The Students Psychomotor Skills

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DOI:
https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2257
https://creativecommons.org/licenses/by/4.0/
Article history: Received 24/February/2025; Accepted 4/March/2025; Available online 28/October/2026

Abstract

Thru her long tenure as a physical fitness instructor at the College of Physical Education and Sports Sciences, and her familiarity with the teaching methods used in the college, the researcher noticed that most of them rely on Mustin's methods such as the command, practice, and reciprocal styles in the physical fitness lesson. This observation led to the idea of the research, which aims to move away from these methods and adopt an approach that aligns with modern educational trends and accommodates the varying physical abilities of the students. The researcher used an experimental method with the design of experimental and control groups, including pre- and post-tests, with a comparison of the post-tests. The researcher selected one class to represent the experimental group and another class to represent the control group, with 25 students in each class. After dividing the sample into three classifications (weak, average, good), she applied the strategy of progressive activities. After conducting the statistical treatments, the results showed that the experimental group outperformed the control group in all research tests.

Keywords: methods, graded activities, differentiated instruction, biokinetics.

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

Modern teaching methods and techniques represent one of the pillars for achieving the goals of the educational process. Classical teaching methods or classical education are no longer prevalent these days; rather, the whole world is moving toward modernity and development, "using the latest advancements in creativity and technology. Successful attempts to use modern teaching and learning strategies, especially in developing countries striving for progress, have significantly contributed to narrowing the large gap between them and the developed countries" (Abizi, 2023, p. 39). The serious attempts to develop teaching and learning strategies in general are no different from those in physical education and the delivery of physical education lessons. The efforts to advance in this field have been and continue to be in line with the development of other fields, and at times, they may have even surpassed them due to the significant importance of physical education lessons. This importance is not limited to recreation but extends far beyond that, often reaching the discovery, development, and qualification of talented individuals to participate in official competitions.

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Teaching methods in physical education guide the educator or sports teacher to the means that achieve the goals and the levels that must be met to achieve those goals, in addition to the methods, steps, means, and tools that can assist the educator in their success. Physical education includes physical, motor, skill-based, psychological, and creative goals that cannot be achieved merely by having learners present on the field. Instead, it requires guidance and the selection of appropriate teaching methods that lead to imparting physical, psychological, and creative abilities and skills to the learners. (Aktop & Karahan, 2022)

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Thru her long experience as a physical fitness instructor at the College of Physical Education and Sports Sciences, and her familiarity with the teaching methods used in the college, the researcher noticed that most of them rely on methods such as the command, practice, and reciprocal styles in the physical fitness lesson. This observation led to the idea of the research, which aims to move away from these methods and adopt an approach that aligns with modern educational trends and accommodates the varying physical abilities of the students.

The study aimed to identify the impact of using differentiated teaching with a graduated activities strategy on some motor abilities of first-year female students in the College of Physical Education and Sports Sciences.

Many researchers have studied the differentiated instruction strategy. The study by (Qabil, Al-Sayed, and Abdel Azim, 2024) aimed to identify the effect of using the differentiated instruction strategy on the performance level of some basic skills in handball. The researchers used the experimental method on a sample of 40 female college students who were randomly selected. They were equally divided into a control group and an experimental group. The researchers used a set of skill tests to determine the impact of this strategy, and the results showed significant differences between the two groups, indicating the positive effect of differentiated instruction. As for the study by (Mahrous, El-Sayed, and Fahmy, 2021), it aimed to identify the effectiveness of extracurricular activities using the differentiated teaching strategy in some basic skills in table tennis. The researchers used the experimental method on a sample of students numbering (18) who were willing to participate in extracurricular activities. The sample was divided into three groups of (6) students each, according to the levels (low-medium-high), The results showed a significant effect in improving the skills of the research sample. Furthermore, the results indicated that the first and second groups, classified as weak and medium, outperformed the third group, which was at a high level. The study by Khalifa and Nour El-Din (2021) aimed to identify the impact of using differentiated instruction in teaching basketball passing skills. The researchers used the experimental method on a group of 40 first-year preparatory students, with the passing skill defined at the preparatory stage. Based on the data obtained by the researchers, the results showed that the use of the differentiated instruction strategy was more effective than the method followed by the teacher.

As for the study by Rashid and Abulkhair (2025), the study aimed to identify the impact of using differentiated instruction supported by technology on learning the shot put skill for second-stage basic education students. The researchers used the experimental method on a sample of 30 students, who were divided into two groups: an experimental group and a control group, each consisting of 15 students. The researcher used electronically supported differentiated instruction on the experimental group. After completing data collection, the researchers subjected the data to statistical

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

analyzes to obtain the results. They found that the experimental group outperformed the control group in both the skill and numerical levels of the shot put skill.

Method and Tools

The researcher used the experimental method with the design of experimental and control groups with pre- and post-tests, comparing the post-tests. The research community included first-year students in the College of Physical Education and Sports Sciences at the University of Baghdad for the academic year 2023-2024, totaling (579) male and female students. Since this study was limited to female students only, male students (428) were excluded, and only female students (151) were retained, distributed across four sections. The researcher chose one section to represent the experimental group and another section to represent the control group, with (25) female students in each section.

The research test included the following tests:

1. Front support for women in 60 seconds: (Lazarowitz, Hadas, Hutzler, & Tsuk, 2024).
2. Trunk flexion and extension test from a lying position for 60 seconds (Al-Khafaji, 2023).
3. Long jump forward from a standing position (Ab Rahman, Kamal, & Noor, 2021)
4. 400-meter run test (Hanon, Lepretre, Bishop, & Thomas, 2010)
5. 50-meter run test (Čović, Smajlović, & Likić, 2015)
6. 10-meter shuttle run test (Sasaki, Nagano, Sakurai, & Fukubayashi, 2010).

Classification of the research sample

In recent years, teaching methods have witnessed tremendous development and a scientific revolution in all aspects, racing toward finding new and suitable approaches to achieve the set goals. This has contributed to the formation of new ideas that attempt to move away from repetition and imitation in teaching methods, taking into account individual differences and being more effective. It has created new training situations using diverse ideas to convey information and teach skills while considering their physical needs. Here, the researcher adopted the "Gradual Activities Strategy," whose main goal is to overcome physical and skill-related individual differences, which are suitable for all levels of participants. To identify the levels of the sample, the researcher classified the sample into three levels according to the following steps:

1. Extracting the descriptive variables for the research sample as shown in Table (1)
2. Use the following equation for the purpose of classification into three levels (weak - average - good): (Hand, 2015, p. 106).

A. We subtract the lowest value from the highest value to extract the range.
b. Divide the range by 3 (three levels) to extract the interval between the levels.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

C. Add the result to the lowest value to extract the range for the (weak) level, which is the score between the lowest score and the sum result.
D. The median (average) is the score that lies between the sum result plus the interval value.
E. Then add the period to the result to extract the level (good).
3. Use the equation on all tests for both groups. Using the equation on all tests for both groups.

Table 1. *Classification of Pre-Test Results into Three Levels for the Experimental Group*

Level	Limits	60-s Front Support for Women	Sit-Ups (Flexion and Extension of the Trunk) in 60 s	Standing Broad Jump	400 m Run	50 m Run	Hurdle Run (10 m Between Hurdles)
Weak	Lower Limit	12.00	15.00	1.05	3.35	9.88	10.88
	Upper Limit	17.00	18.33	1.22	3.02	9.60	10.60
Moderate	Lower Limit	17.00	18.33	1.22	3.02	9.60	10.60
	Upper Limit	22.00	21.67	1.38	2.68	9.33	10.33
Good	Lower Limit	22.00	21.67	1.38	2.68	9.33	10.33
	Upper Limit	27.00	25.00	1.55	2.35	9.05	10.05
Frequency of Weak Level		16	9	8	14	13	10
Frequency of Moderate Level		4	9	12	6	7	8
Frequency of Good Level		5	7	5	5	5	7
Total		25	25	25	25	25	25

Table 2. *Classification of Pre-Test Results into Three Levels for the Control Group*

Level	Limits	60-s Front Support for Women	Sit-Ups (Flexion and Extension of the Trunk) in 60 s	Standing Broad Jump	400 m Run	50 m Run	Hurdle Run (10 m Between Hurdles)
Weak	Lower Limit	10.00	18.00	1.15	3.30	9.98	11.00
	Upper Limit	15.67	19.67	1.22	2.95	9.69	10.68
Moderate	Lower Limit	15.67	19.67	1.22	2.95	9.69	10.68
	Upper Limit	21.33	21.33	1.29	2.60	9.39	10.37

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Good	Lower Limit	21.33	21.33	1.29	2.60	9.39	10.37
	Upper Limit	27.00	23.00	1.36	2.25	9.10	10.05
Frequency of Weak Level		17	17	14	17	13	7
Frequency of Moderate Level		2	2	10	4	7	11
Frequency of Good Level		6	6	1	4	5	7
Total		25	25	25	25	25	25

Building lesson plans

After the physical fitness levels of the students were classified, lesson plans were developed according to the classification level of the group members. The lesson plan included (15) weeks, which is the duration allocated for the physical fitness course for the first stage at the College of Physical Education and Sports Sciences – University of Baghdad. This course is exclusively for female students, with two lectures per week. Since the course description indicates the presence of two exams each semester, only one week was excluded from the course weeks. Two additional weeks were excluded for conducting pre- and post-tests, leaving (11) weeks for the course duration. Thus, the total number of lessons for the main experiment reached (22) lessons. The teaching plan for each lesson included the following:

1. **The preparatory section:** Its total duration is (20) minutes per lesson, and its purpose is to take attendance and organize the administrative side, as well as to prepare the students physically and functionally thru general and specific warm-up exercises.
2. **The main section:** Its total duration was (60) minutes per lesson.
3. **Final section:** Its total duration was (10) minutes per lesson, and its goal was to bring the students back to a normal state thru relaxation exercises and small recreational games.

Results

Table 3. *Means, Standard Deviations, and t-Test Results for the Pre-Test and Post-Test Measurements of the Experimental Group*

Test	Pre-Test Mean	Pre-Test SD	Post-Test Mean	Post-Test SD	t-value	Significance (p)	Interpretation
60-s Front Support for Women	16.960	4.869	21.960	3.791	5.80	0.000	Significant

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Sit-Ups (Flexion and Extension of the Trunk) in 60 s	19.600	3.082	21.160	2.249	13.70	0.000	Significant
Standing Broad Jump	1.462	0.129	1.551	0.118	5.00	0.000	Significant
400 m Run	3.026	0.348	2.704	0.249	4.23	0.000	Significant
50 m Run	9.581	0.276	9.208	0.294	4.84	0.000	Significant
10 m Shuttle Hurdle Run (Out-and-Back)	10.511	0.237	10.296	0.234	3.63	0.000	Significant

Table 4. *Means, Standard Deviations, and t-Test Results for the Pre-Test and Post-Test Measurements of the Control Group*

Test	Pre-Test Mean	Pre-Test SD	Post-Test Mean	Post-Test SD	t-value	Significance (p)	Interpretation
60-s Front Support for Women	15.080	5.267	18.120	4.531	2.60	0.02	Significant
Sit-Ups (Flexion and Extension of the Trunk) in 60 s	19.240	2.803	19.360	2.550	2.19	0.04	Significant
Standing Broad Jump	1.393	0.081	1.459	0.117	3.21	0.00	Significant
400 m Run	2.976	0.276	2.830	0.267	2.57	0.02	Significant
50 m Run	9.545	0.233	9.369	0.254	2.66	0.01	Significant
10 m Shuttle Hurdle Run (Out-and-Back)	10.570	0.317	10.419	0.370	2.13	0.04	Significant

Table 5. *Differences Between the Post-Test Results of the Experimental and Control Groups*

Test	Experimental Group Mean	Experimental Group SD	Control Group Mean	Control Group SD	t-value	Significance (p)	Interpretation
60-s Front Support for Women	21.960	3.791	18.120	4.531	2.56	0.02	Significant
Sit-Ups (Flexion	21.160	2.249	19.360	2.550	3.18	0.04	Significant

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

and Extension of the Trunk) in 60 s							
Standing Broad Jump	1.551	0.118	1.459	0.117	6.01	0.00	Significant
400 m Run	2.704	0.249	2.830	0.267	2.39	0.02	Significant
50 m Run	9.208	0.294	9.369	0.254	3.148	0.01	Significant
10 m Shuttle Hurdle Run (Out-and-Back)	10.296	0.234	10.419	0.370	2.98	0.04	Significant

Table 6. *Frequency Distribution According to Performance Levels in the Pre-Test and Post-Test Research Variables*

Test	Group	Pre-Test Low Level	Pre-Test Moderate Level	Pre-Test Good Level	Post-Test Low Level	Post-Test Moderate Level	Post-Test Good Level
60-s Front Support for Women	Experimental	16	4	5	5	9	11
	Control	17	2	6	12	5	8
Sit-Ups (Flexion and Extension of the Trunk) in 60 s	Experimental	11	9	5	4	5	16
	Control	15	3	7	11	4	10
Standing Broad Jump	Experimental	11	9	5	5	6	14
	Control	16	2	5	12	5	8
400 m Run	Experimental	14	6	5	8	6	11
	Control	17	4	4	12	8	5
50 m Run	Experimental	13	7	5	7	8	10
	Control	13	7	5	8	7	10
10 m Shuttle Hurdle Run (Out-and-Back)	Experimental	9	10	6	5	9	11
	Control	9	9	7	8	8	9

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Discussion

The researcher used the Statistical Package for the Social Sciences (SPSS) to extract the difference values for the paired samples, and it was found that the significance values (Sig.) All of them were below the significance level of (0.05) and under the degree of freedom (24), indicating the presence of significant differences between the pre-test and post-test. These results align with the anticipated benefits of differentiated teaching and the use of graded activities, as they are one of the methods that provide a comprehensive environment according to the needs of the educated female students, offering them equal opportunities to learn exercises and perform repetitions according to each individual's capability (Mabrouk, 2011). The researcher believes that the development of teaching strategies and the innovation of new methods, characterized by effectiveness and centered around the learner, is the foundation from which all teaching strategies should originate. Hence, the researcher attributes the significant differences observed between the pre-test and post-test of the experimental sample to the use of differentiated education and the strategy of graded activities, as "the biggest problem facing those working in the field of physical education teaching is the variation in the level of learners" (Siraj al-Din, 2020).

These problems become apparent when dealing with first-year students in physical education and sports science colleges, as the majority of them have not practiced sports regularly, have not joined sports teams, or have not been part of sports institutions that engage in continuous training for either competitive or non-competitive purposes. Therefore, we find a clear disparity in physical fitness levels among the female students, and this problem is difficult to solve using traditional methods such as the American method or other known techniques.

The researcher in this regard refers to what Ibrahim (2016) mentioned, which indicated that differentiated activities are not a new method in the field of education and teaching, as working with learners has been, is, and will continue to be to meet the needs of learners at different levels. Hence, differentiated teaching is nothing but the results of previous research in the field of education, and it is considered one of the best strategies for managing classes with varying levels. Accordingly, the results observed in this group can be attributed to the use of differentiated instruction and the focus on the learner being at the center of the educational process. The exercises used were not the sole reason for the development of this group, but their use according to the strategy of graded activities was fundamental to the development process. Although exercise, correct performance, repetition, and rest periods are very important in the development process, this cannot succeed with all group members due to individual differences among them. Individuals with high-level abilities will not benefit from exercises that are below their level, and individuals with low-level abilities will not be able to perform the exercises correctly or complete the repetitions with the required intensity.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

The Effect of Dynamic Pilaplank Exercises on Cardiorespiratory Fitness and Core Strength in First-Year Female Students at the College of Physical Education and Sports Sciences for Women Aged 19–22 Years

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DOI:

https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2326

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Article history: Received 15/ June/2025; Accepted 23/ June/2025; Available online 28/October/2026

Abstract

Healthy individuals can play a significant role in society. Good health and fitness boost confidence and supply the vitality and motivation needed to perform. In the past, sports have played an important role and are now recognised as a barometer of national growth and advancement. In today's world, sports are increasingly seen as a basis for reform and development, particularly when sports activities are scientifically oriented. There's general agreement about the positive effects of exercise and its impact on health. This recognition has driven a quest for more effective methods of training to tackle contemporary health issues. The Pilaplank Dynamic exercise regimen, which integrates Pilates and plank exercises, is one such approach to address key fitness parameters such as cardiorespiratory and core muscle strength. Safe and overall physical fitness demands participation in a variety of exercises with physiological benefits to the muscular and cardiovascular systems. The effects of Pilaplank Dynamic exercises on enhancing these fitness variables are investigated in this study. This study is significant because it deals with a common problem, a prevalent problem among young adults: the continuous increase in waist circumference, linked to future health problems. The reduction of abdominal fat is a challenge and requires safe and natural approaches with scientific backing. The combined Pilates-plank approach offers a holistic approach to address this problem. The activation of the core muscles and improvement in cardiorespiratory efficiency result in improved posture, strength, and overall health. A combination of exercises was developed, a variety of compound Pilaplank Dynamic exercises, and tested on female university students between 19 and 22 years of age. The researchers found that these exercises have shown considerable effectiveness in enhancing cardiorespiratory function as well as strengthening the core muscle area, and this is a practical solution for young people's health and fitness. and this finding is in line with Sustainable Development Goal 3 (Good Health and Well-Being) of United Nations in Iraq.

Keywords: Pilaplank Dynamic exercises, components of cardiorespiratory fitness, core area.

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Introduction

Bodyweight exercises are one of the most popular types of exercise. These exercises are a basic option, despite their long history, because of their many benefits. They do not require equipment - a small area is needed to carry them out - and can therefore be done anywhere.

These exercises are based on the combination of different strength exercises that require body weight as an alternative to free weights, thus offering resistance that's derived from body weight and gravity. They promote basic movement patterns and comprise a variety of movements with multiple joint actions, leading to gains in muscular strength, flexibility, and endurance.

These exercises are commonly used because of their effectiveness, adaptability, and suitability for all levels of fitness. Notable examples include Pilates, as well as static, dynamic, low, or high plank exercises.

So, does the muscle-building potential of these exercises also have a positive influence on fat reduction, physical conditioning, and body shaping to achieve the perfect measurements? A previous study has shown a relationship between waist and hip circumference, so this is a problem.

The idea for the current study was inspired by a review of the literature, and the question was:

Is it possible to modify and organize these exercises to establish new applications and benefits that have been less investigated in the literature?

As health consciousness increases and health sciences develop in the areas of health and physical fitness, fitness today is defined as the capacity of a person to perform everyday tasks functionally and physically. Samia Khalil highlighted that physical education is a science of health and should be practised within the natural limits of health to promote health and increase physical capacity (Mohammed, 2006).

There have been significant advances in health and fitness over the last few years, from using mobile apps for basic exercises and healthy meal plans to new classes and modalities. Over the years, new and exciting trends continue to emerge that are becoming more integrated into everyday living, which has led to quality of life improvements and influences individuals through the participation and choices they make to enhance their health.

Cardiorespiratory fitness is among the key components that make up an individual's physical activity capacity. This is one of the key goals of sports training interventions (Ahmed, 2021).

The ACSM developed a classification for physical fitness components based on two principles:

1. Health-related components: body conformation, cardiorespiratory fitness, muscular fitness, and flexibility.
2. Performance- or skill-related components: such as speed, agility, coordination, balance, accuracy, etc. To maintain general health, emphasis should be placed on the development of health-related components (Mossa, 2015).

Pilates is considered a type of passive resistance exercise, which typically does not involve special equipment, although the use of some basic tools may be required (Podstawski, 2019).

At times, it might be necessary to add difficulty to the exercise, which leads to increased physical, physiological, and functional adaptations. This is where the importance of an integration

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

of Pilates with other types of exercise having the same goal but different performance increases, such as dynamic planks.

This combination of both types of exercise results in a newer form of exercise which has been little applied in practice, enabling the merging of the benefits of both types of exercise and achieving more holistic and effective outcomes. According to Moriabadi, the plank exercise is performed with the arms extended in front of the body, inhale, then exhale, and twist the head and upper part of the body to the right. She stressed the need to maintain a flat stomach and to pull the pelvic floor muscles towards the center of the body and upwards (Wahib, Saeed & Shaib, 2016).

Combining dynamic plank exercises and Pilates exercises at their crossroads may offer new insights into physical and health-related adaptations.

This concept formed the basis of the current study after reviewing the literature and recognizing the opportunity of scientifically designed and targeted exercises that may introduce new benefits.

One of the main issues young people are confronted with today, due to lifestyle changes, is a larger circumference of the waist (core) area, which is linked to possible short- and long-term health complications. The challenge is to find a natural and safe method to progressively eliminate fat from this region while keeping a normal relationship between height, weight, waist circumference, and hip circumference. Therefore, the creation of a type of exercise regime incorporating both kinds of exercise may provide a holistic approach. This may improve posture and strengthen the muscles while increasing overall health by scientifically addressing the parts of the body on which fat is likely to accumulate.

The present research also looks at a scientific component that has been overlooked, as it hasn't been considered an independent variable and has not been the subject of detailed research, yet it is highly significant.

When diagnosing and focusing on negative aspects to address them clearly and precisely, it is evident that a problem requiring suitable solutions. Through observation and review of similar previous studies, the researcher raises several questions, these questions guided the structure of the investigation:

- Are dynamic Pilaplank exercises suitable for the study’s target group?
- Will these new exercises be effective in reducing core fat and creating noticeable changes?
- Will the time frame allotted for applying these exercises be sufficient to produce statistically significant and observable effects?

The study seeks to design compound Pilaplank Dynamic exercises and to inspect their influence on cardiorespiratory fitness and core endurance among female students aged 19–22.

The researchers hypothesized that statistically important variances would exist between pre-test and post-test outcomes in cardiorespiratory fitness and core muscle endurance for the study sample, which consisted of 16 female students.

The research was carried out from December 11, 2024, to March 25, 2025, in fitness hall of College of Physical Education and Sports Sciences for Women at the University of Baghdad.

Study Scope

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

- **Human Scope:** Female first-year students at the College of Physical Education and Sport Sciences for Women, University of Baghdad, aged 19-24 years.
- **Spatial Scope:** The fitness facility within the College of Physical Education and Sport Sciences for Women, University of Baghdad.
- **Temporal Scope:** The research period extended from December 11, 2024, to March 25, 2025.

Research Methodology

The research methodology refers to the approach adopted by the researchers to systematically implement the study techniques and obtain objective results. According to Jawad (2011, p. 140), it "relies on experimentation and field testing, guided by tools of observation and experimentation, and based on contemporary scientific methods." Accordingly, the researchers adopted the investigational technique based on a single-collection design, which was considered appropriate for the study's objectives and conditions. Al-Saadaawi (2013, p. 13) indicated that "the sample is the model upon which the researcher bases and focuses the entirety of their work." Thus, research residents were first-year female college students aged 19-22 years with central obesity (fat storage in the abdominal region) at College of Physical Education and Sports Sciences for Women. A sample of 16 pupils was selected, all of whom were centrally obese. All 16 students participated throughout the entire experiment, resulting in a 100% response rate.

Data Collection Tools

The study adopted the following data collection tools: Arabic and international texts, Internet sources, observation, testing and measurement steps, and data extraction forms. In addition, the following equipment was used: a stopwatch, a whistle, a measuring tape, an Acer laptop computer, and a Citizen electronic calculator.

Field Research Procedures

When choosing the variables and tests for the research, it's important to make sure they achieve the research objectives and can be used to measure the variables needed in the sample group. Therefore, researchers designed tests and measurements based on theoretical studies, relevant scientific literature, and expert views. The selected tests are standardized and recognized as reliable instruments in scientific research. Only those tests that achieved an expert agreement rate of 80% or above among the experts were approved for use, while the others were not included.

International Beep Push-Up Test (Podstawski, 2019).

Purpose of the Test: To evaluate core muscular endurance.

Applicable Age Range: 18–25 years.

Performance Procedure and Scoring: The test begins in a standing position with arms extended forward. The participant does a squat, moves into a push-up position, and then returns to initial

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

location. This sequence is recurrent continuously for three minutes. The total number of completed replications total number of completed repetitions is recorded as the test score.

Queen's College Step Test (Radwan, 1998)

Purpose of the Test: This test is used to measure cardiorespiratory fitness under submaximal conditions using a step exercise.

Required Equipment:

- A step box 15–17 inches in height.
- A stopwatch to measure test duration and pulse rate.
- A metronome to control the stepping pace.

Performance Procedure

Prior to administering test, the examiner demonstrates the correct execution of the step test in front of students. Every student is provided with a single 15-second trial to practice the procedure.

The pupil stands in front of stage box and, after the start signal, begins walking up and down continuously for a total duration of three minutes. At the end of the three-minute period, the examiner signals the end of the test, and the student immediately ceases the activity and remains standing on both feet. Then, a researcher counts the student's pulse for 15 seconds following a short rest period.

Scoring Method: The number of pulses counted in 15 seconds is multiplied by four to give the heart rate.

Pilot Study

The pilot research was carried out by researchers on November 24, 2024, with three female students from study population. The pilot study was conducted to evaluate testing methods and verify them. The purpose of pilot research was to:

1. To calculate appropriateness of exercises for specimen.
2. To determine the suitability and validity of tests for specimen.
3. To ensure suitability of environment for chief study.

The field research was carried out in fitness hall of College of Physical Education and Sport Sciences for Women, which was equipped with all the necessary facilities and resources. The researchers implemented the necessary procedures to ensure the smooth execution of the study. The pre-tests, which were approved by a panel of seven experts in the field, were then carried out. The selection of tests was depended on consensus of the experts, with only those obtaining an agreement rate of 80% or higher being selected (See Appendix 2), as detailed in Table (1). These pre-tests were carried out on November 25, 2024, at 10:00 a.m. in the fitness hall.

Subsequently, researchers conducted the chief field experiment from December 1, 2024, to March 2, 2025. The sessions were conducted twice a week—on Sundays and Mondays—at 11:30 a.m., following the scheduled lecture.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Table 1. *Shows the percentage of agreement among experts regarding the identification of health-related fitness components, with those components that received an agreement rate of 75% or higher being adopted by the researcher.*

Seq.	Cardiac fitness	Agreement Ratio
1	Cooper Test (9 sec Walking Run)	50%
2	Queens Step Test	87.5%
3	800m running test	25%
4	Systolic and diastolic blood pressure	12.5%
5	Heart rate	12.5%
	Strength tolerance for core middle muscles	
6	International Burpee Test (3 minutes)	100%
7	Trunk dynamometer test	12.5%

The proposed Pilates-Plank exercises (see Appendix (1)) were particular by the researchers and designed depended on relevant scientific and academic sources in the field of physical fitness. These exercises were submitted to a panel of experts, whose feedback was taken into account to evaluate the difficulty level and progression of the exercises according to the load mechanism. The exercises considered suitable for the level of the study sample were then selected and approved.

The researchers followed to the following basic principles in implementing the training program :

- Specialized “Pilablank” exercises were designed specifically for study specimen.
- The training program began on Sunday, December 11, 2024, at 10:00 a.m., and continued until, March 25, 2025.
- The total period of the Pilablank training program was 12 weeks, with two sessions per week, for a total of 24 training units.
- The Pilablank exercises were performed during the main part of each training session.
- The duration of each session ranged from 25 to 30 minutes, with the main section approximately 15 and 20 minutes.
- Training sessions were conducted every Sunday and Monday at 10:00 a.m.
- The continuous exercise technique was utlizied, with intensity levels ranging from 55% to 75%.
- Looking at Table 2, the training load is fully apparent to us.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Table 2. *Load Mechanism*

Weeks	Warm Up	Section Main	Section Final	Total Time	Intensity	Determination Of Intensity by Pulse	Rest Between Repetitions
First week	10-7min	Dynamic Pilates-Plank Exercises-15 12min	Relaxation Exercises 5 minutes	25-30min	55%	1-Measurement of resting heart rate 2- Maximum heart rate = 220 − age	Training in a continuous way So, there's no comfort between the repetitions.
Second week	10-7min	15-12min	5min	20-30min	55%		
Third week	10-7min	15-10min	5min	20-30min	60%		
Fourth week	10-7min	15-10min	5min	20-30min	60%		
Fifth week	10-5min	12-8min	5min	20-30min	65%		
Sixth week	10-5min	12-8min	5min	20-30min	65%		
Seventh week	10-5min	12-7min	5min	20-30min	65%		
Eighth week	10-5min	10-7min	5min	20-25min	70%		
Ninth week	10-5min	10-7min	5min	20-25min	70%		
Tenth week	10-5min	8-5min	5min	20-25min	75%		
Eleventh week	10-5min	8-5min	5min	20-25min	75%		
Twelfth week	10-5min	10-7min	5min	20-25min	65%		

The post-tests were carried out on March 25, 2025 in the same fitness hall, below the similar situations as the pre-tests.

Results

Table 3. *presents the mean, standard deviation, determined t-value, level of significance, and the variances between pre-test and post-test outcomes for study variables.*

Research variables	N.	Measurement Unit	Pre-test		Post-Test		Value Difference	Mean Difference	T-Value	Statistics	Significance
			Mean	Standard Deviation	Mean	SD ±					
The Bierbauer Test (Core Muscle Strength Endurance)	16	number	30.46	8.1667	34.13	8.219	3.666	1.175	12.08	.000	Significant
Queen's Step Test (Cardiorespiratory Fitness)		Pulse	130.2	22.68	125.8	21.45	4.466	7.809	2.215	.044	Significant

Discussion

Table (3) displays statistically important variances amid pre-and post-tests in cardiorespiratory fitness and core muscular strength, these improvements may be attributed these improvements to the Pilaplank exercises. These trainings contributed to improving particular study variables. Al-Busati (1998) indicates that "guided sports and physical activities contribute to improving health-related physical fitness and reduce body fat percentage" (p. 361).

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

This indicates that Pilaplank exercises involve moderate contractions resulting from the work of specific muscle groups over a prolonged period. Their aim is to enhance the efficiency of the respiratory and circulatory systems and to develop aerobic endurance, which in turn improves the heart and cardiorespiratory system's ability to deliver oxygen and nutrients to working cells and tissues, while simultaneously removing waste products resulting from muscular effort (Mohamed, 1997). This indicates the effectiveness of Pilaplank exercises in improving core muscle strength and endurance (Ibraheem, 2022).

In addition, regular and structured exercise improves functional efficiency of body organizations, permitting them to adapt to various physical loads while maintaining energy efficiency (Mohamed, 1997). The adherence of the study specimen to exercise package also may have contributed to improvements in cardiorespiratory fitness, as measured by Queen's Stage Test, and in core muscular endurance.

Guyton also suggests that "the strength of respiratory muscles plays a major role in refilling oxygen stores through inhaling additional amounts of oxygen exceeding the body's needs under normal conditions. "Enjoying good health and high physical fitness means having limitless potential." (Nawaf & Al-Badry. 2024) " Additionally, efforts to reduce fat in certain areas led to an improvement in lung capacity, which enhances cardiorespiratory activity (Podstawski, 2019), although this is also due to the exercises designed by the researchers. The structured training load, the use of time-specific repetitions, and reliance on scientific sources also contributed to these improvements (Radwan, 1998).

Conclusions

Based on presentation, examination and discussion of the pre- and post-test results, researchers concluded following :

1. Dynamic Pilaplank exercises effectively improve cardiorespiratory fitness and strengthen the core muscle region.
2. Training over a reasonable period contributed to muscle balance in the trainees' bodies by varying the involvement of different muscle groups, which activated dormant and weak muscles.

Recommendations

The researchers recommend the following :

1. Applying the dynamic Pilaplank exercises used in this study in physical training centers.
2. Gradual progression in training intensity, starting from light intensity and increasing gradually based on the objective and purpose of the exercise.
3. The necessity of using dynamic Pila Planck exercises in future studies on other samples, including different age groups and both sexes.
4. Developing new exercises that combine two or more types of training in a way that serves the intended goal .

Appendix (1): Pila Planck Exercises

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

1. **Plank to Prone Alternating Arm and Leg Raise**

Begin in a traditional plank position. Alternately raise the right arm, then the left, inhaling and exhaling with each repetition. Transition directly into a prone position without pausing. From there, lift the opposite arm and leg, alternating sides continuously.

2. **Spider Plank with Prone Transition**

From a plank position, bring one knee to the opposite elbow, then extend it back. Alternate knees. Rotate the body into a prone position. Lift and lower the torso using the arms—inhale when lifting, exhale when lowering (10 repetitions). Hold the raised position for 30 seconds.

3. **Shoulder Tap Plank with Arm Extension**

From the plank position, alternately bend one arm and tap the opposite shoulder (2 repetitions each arm). Without resting, transition to kneeling on all fours, then bend and extend both arms (2 repetitions).

4. **Knee Drive Plank with Seated Forward Fold**

From a plank with arms shoulder-width apart, drive the left knee toward the chest while inhaling, then return with an exhale. Alternate knees (2 repetitions each). Transition to a cross-legged seated position. Lean the torso forward three times, holding the third lean for 30 seconds.

5. **Side Plank Hold with Contralateral Extension**

Begin in a plank. Rotate into a right-side plank, supporting with the right hand. Hold for several seconds while inhaling. Return to plank with an exhale, then switch sides. From a kneeling plank, extend the right leg and left arm, maintaining a flat lower back. Hold for 5 seconds and alternate sides.

6. **Hip Dip Plank and Supine Trunk Twist**

In a forearm plank, tilt the hips to the right until the hip touches the ground. Alternate sides (2 repetitions each) while breathing steadily. Transition to lying on your back, shoulders and head grounded. Rotate the torso right then left (2 repetitions).

7. **Reverse Plank with Leg Circles**

Sit upright with legs extended, hands on the floor behind you. Lift hips until the body forms a straight line. Hold for several seconds. Transition to lying down, lift the left leg straight and rotate it counterclockwise. Repeat with the right leg.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

8. **Side Plank with Knee to Elbow and Supine Crunch**

   From a side plank, bring the left knee toward the right elbow, then switch. Alternate sides (3 repetitions), breathing with each. Lie on your back with hands behind the head and legs raised. Alternately bend and extend the legs, bringing the opposite elbow toward the bent knee.

9. **Hip and Leg Lift from Modified Side Plank**

   Lie on your side with elbow under shoulder and knees bent. Raise the hips, placing the top hand on the waist. Then lie flat with arms and legs extended. Lift the legs straight toward the head, then slowly return to start.

10. **Plank with Opposite Arm and Leg Raise and Supine Arm Curl**

    From a plank, raise one arm and the opposite leg simultaneously. Transition to lying down, arms extended. Inhale and lift the shoulders while rotating arms outward with palms facing in. Exhale, then bend arms to return to start.

11. **Leg Raise Plank with Coordinated Breathing**

    From a plank, alternate leg lifts (3 repetitions). Transition to lying down with head and shoulders lifted, legs held at a 45° angle. Pulse the arms up and down rapidly—inhale for 5 beats, exhale for 5 beats.

12. **Rotational Plank with Hip Bridge**

    From a plank, place heels together and rotate to the left, raising the right arm toward the ceiling to balance. Transition to lying down with knees bent. Slowly lift and lower the hips, inhaling on the way up and exhaling on the way down (2 repetitions).

13. **Straight-Leg Lift Plank and Alternating Knee Pull**

    From a plank, raise the right leg straight, then alternate. Transition to lying down with legs at 45°, head and shoulders lifted. Alternately pull each extended leg toward the chest using both hands.

14. **Pike (V) Plank with Leg Raise**

    From a plank, lift the hips and lower the torso to form an inverted "V." Hold for a few seconds. Lie on your side and lift and lower the top leg, flexing and extending the ankle. Inhale when lifting, exhale when lowering.

15. **Kneeling Plank to Seated V-Hold**

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

From a plank, drop the knees to the ground, keeping the torso tight. Hold for several seconds. Sit and lift the legs to a 45° angle, lean the torso back at the same angle, extend arms forward, and hold while breathing deeply from the abdomen.

16. **Jumping Plank and Fast Arm Movement**

From a plank, jump the legs in and out quickly while keeping hips stable. Transition to lying down, head and shoulders lifted, knees bent. Pulse the arms up and down rapidly. Inhale every 5 beats, exhale every 5 beats.

17. **Side Jump Plank to Seated V-Hold**

From a plank, keep the legs together and jump side to side. Transition to seated with legs raised at 45°, torso leaned back at the same angle. Extend arms forward and hold for 20 seconds, breathing deeply from the abdomen.

18. **Spider Plank with Hand Walkout**

From a plank, alternately bring the knee to the opposite elbow. Transition to standing, bend forward, place hands on the ground, and walk them forward into a plank. Perform three arm bands and extensions, then return to standing.

19. **Plank with Upper Body Lift and Side Knee Raise**

From a prone position, place hands under shoulders and lift the upper body, then the lower body, supporting on the toes. Lie on your right side with head resting on right arm, knees bent. Raise the left knee while keeping heels touching, then return to start.

20. **Crossed-Arm Forearm Plank and Foot Lift**

Lie prone and prop up on forearms with hands crossed under the chest. Lift the body. Transition to all fours, lift one foot high, then bend and extend the arms. Inhale on the extension, and exhale slowly on the flexion.

Appendix 2

A list of academic titles, names, specializations, and workplaces of the professors and experts who were contacted or interviewed in person.

Seq	Names	Title	Specialization	Workplace

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

1	Prof. Dr. Falih Hashim Finjan	Professor	Sports Training + Weights	College of Physical Education and Sports Sciences / University of Baghdad
2	Prof. Dr. Wassan Hanoon Ali	Professor	Sports Training / Physiology	Physical Education and Sports Sciences / University of Baghdad
3	Prof. Dr. Wasan Saeed Rasheed	Professor	Fitness / Physiology	College of Physical Education and Sports Sciences / University of Baghdad
4	Prof. Dr. Raad Khanjar	Professor	Sports Training / Handball	College of Physical Education and Sports Sciences / University of Baghdad
5	Asst.Prof. Saeed Ahmad Saeed	Assistant Professor	+Fitness	College of Physical Education and Sports Sciences / University of Baghdad
6	Asst.Prof. Dr. Lamiaa Abdulsattar Khalil	Assistant Professor	Sports Injury/Fitness Rehabilitation	University of Baghdad / College of Physical Education and Sports Sciences for Girls
7	Asst.Prof. Dr.Lisa Rustum Yaacoob	Assistant Professor	Sports Training/Judo	University of Baghdad / College of Physical Education and Sports Sciences for Girls

Appendix 2

In the Name of Allah, the Most Gracious, the Most Merciful

Subject: Expert Opinion Survey Form on Identifying the Tests Related to the Research Variables

To the esteemed professor .....

The researcher intends to conduct a study in the field of Physical Education and Sports Sciences for Women, titled: *"The Effect of Dynamic Pilaplank Exercises on Some Components of Health-Related Fitness in First-Year Female Students with Central Obesity"*—an experimental study involving first-year students at the College of Physical Education and Sports Sciences for Women.

As you are an expert in this field, we kindly request your assistance in selecting the appropriate tests for the study.

With sincere thanks and appreciation.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Notes:

Please place a (✓) mark next to the option you consider appropriate.

Please place an (✗) mark next to the option you believe does not serve the objective.

Kindly provide your observations and anything you consider worth adding to the study variables.

Expert's Name:

Academic Title:

Place of Work:

Date:

Researcher:

Aya Dhafer Fawzi

Research variables	Test	Fit	Unfit	Observations
Cardiac fitness	Cooper Test (9min Walking Run)			
	Queens Step Test			
	800m running test			
	Systolic and diastolic blood pressure			
	Heart rate			
Strength tolerance for core middle muscles	International Burpee Test 3 minutes			
	Trunk dynamometer test			

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The Effect of Special Exercises Using a Proposed Magnetic Device on the Development of Certain Motor Abilities in Youth Soccer Players

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DOI:
https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2162
https://creativecommons.org/licenses/by/4.0/
Article history: Received 30/May/2024; Accepted 2/June/2024; Available online 28/October/2026

Abstract

A magnetic resistance device called the Magnetic Legs Box has been designed and manufactured. It is a training device aimed at resisting the player's movement during jumping or transitioning, similar to natural joint movements. The magnetic device possesses several distinct characteristics such as consolidating force in one direction without dispersion, resulting in direct reactions from the working muscles. Additionally , it adds an element of excitement and stimulation for the players. The device enhances the leg muscles' capacity crucial for football players to improve their performance levels. It also aids in developing some motor skills making it one of the best solutions to elevate the performance of young football players and achieve better achievements in the future. The researcher designed specific exercises on the proposed device and incorporated them into a training program to enhance some motor skills for the age group of 15-16 football players from Al-Zawraa Sports Club. The researcher utilized experimental design for both the experimental and control groups, with pre- and post-observation controlled experiments, coupled with processing to suit the nature of the research problem. Positive results were observed after conducting pre- and post-tests on the players favoring the experimental group. The device had a positive impact on developing some motor skills for young football players. Based on the results the researcher recommends directing efforts towards manufacturing various training devices utilizing magnetic attraction force for different sports activities aiming to provide opportunities for all athletes to benefit from these devices.

Keywords: magnetic device, motor skills, junior football players.

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

Soccer is characterized by its enjoyment and excitement , as it combines physical , mental and technical aspects. This has attracted considerable attention from millions of people worldwide particularly as a result of the noticeable development in players' performance and the improvement of their technical and physical levels through the use of advanced technologies . These developments range from modern training methods to technologies used for match analysis and the assessment of players' performance levels and physical abilities during matches. Decades of development and innovation have also contributed to the emergence of a wide range of advanced products and equipment designed to improve technical skills, physical fitness, recovery and players' overall health (Hamdan & Ghazi, 2020) .

Soccer involves complex strategies and tactics aimed at developing players' muscular , motor and physical abilities to control the course of the match through the organization of defensive and offensive patterns. Playing styles and formations vary as soccer matches may be tactical and defensive or open and offensive, depending on each team's strategy and objectives (Farhan, 2022). Sports training in its various forms represents a process that plays an important role in the field of competition. It is a means rather than an end providing individuals with the opportunity to perform their duties at the highest possible level. It also contributes to improving athletic achievement and enabling athletes to reach advanced levels in their respective activities while developing the components of physical fitness in general (Hussein, 2023). "No human activity can be performed without muscular strength as it represents one of the most important components of human activity. Through muscular strength all motor processes necessary to accomplish a required task are performed. Muscular strength can therefore be regarded as the foundation of human activity and the primary source of any movement performed by an individual; without it such movements cannot be executed. This demonstrates that a person cannot maintain a level of activity and movement without maintaining muscular strength" (Al-A'ithi, 2011).

Accordingly the researcher developed the idea of manufacturing a device designed to develop the strength of the leg muscles which are particularly important for soccer players in improving their performance. The researcher hopes that the device will be useful in developing certain motor abilities and will contribute to finding practical solutions that may help improve the performance level of youth soccer players and enable them to achieve better performance outcomes in the future (Ali, 2021).

The need to use devices and equipment in muscular strength training has become increasingly important and has gained considerable attention in soccer players' training. However some of these devices and equipment have certain limitations in training practice. These may include restricting the body's center of gravity during performance applying an unbalanced load to certain parts of the body or affecting joint ligaments and the angles of muscular action. Therefore the researcher sought to develop a device that differs from previously used equipment by adopting modern technology based on floor magnetization. This design allows the body's center of gravity to remain relatively unrestricted and reduces excessive pressure on certain body parts thereby helping to minimize the risk of injury. In addition, the device may contribute to increasing motivation and excitement during training by reducing the routine and boredom associated with continuously repeating conventional exercises (Taher & Al-Hasani, 2020).

Through the researcher's observation of Iraqi youth soccer league matches it was noted that there was weakness in upward propulsion and jumping ability, as well as deficiencies in

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

players' balance , rotational movements and speed of changing direction. These deficiencies may negatively affect their technical performance, indicating a need to develop muscular strength and certain motor abilities among youth soccer players.

The research aimed to design special exercises using the manufactured Magnetic Legs Box device to develop certain motor abilities of the lower limbs that contribute to improving jumping and upward propulsion among youth soccer players . It also aimed to identify the effect of the special exercises performed using the manufactured device on the development of certain motor abilities among youth soccer players .

The researchers hypothesized that there would be no statistically significant differences between the pre- and post-test results of the experimental and control groups in favor of either test. They also hypothesized that there would be no statistically significant differences between the experimental and control groups in the post-test results in favor of either group .

The significance of the research lies in developing the muscular strength of the lower limbs in general and standing vertical jumping ability in particular in soccer as these abilities contribute significantly to improving players' performance and developing certain motor abilities during match play. Improved jumping ability enables players to perform standing and moving jumps more effectively during competition .

The primary objective of sports training is to enable players to reach a high level of physical, motor, and technical performance in the aspects targeted by training. In this context innovative locally manufactured devices can be used at an affordable cost to the researcher as alternatives to some conventional devices and equipment designed to develop muscular strength and achieve the desired level of physical development despite differences in the mechanical characteristics of the resistance provided by each device .

The magnetic device is characterized by several distinctive features including concentrating the applied force in a single direction and minimizing its dispersion thereby producing a more direct response from the working muscles. In addition, the device introduces an element of motivation , excitement and novelty for the players, helping to reduce the monotony associated with repetitive training. Therefore, the significance of this research lies in employing a magnetic device to develop muscular strength and coordination abilities among youth soccer players .

Methods and Tools

The researcher employed an experimental design involving experimental and control groups, with controlled pre- and post-test measurements and an intervention applied between the two measurements. This design is used when comparing two groups. the researcher adopted a controlled experimental approach because it was appropriate to the nature of the research problem under investigation.

Table 1. *Experimental Design for the Experimental and Control Groups*

Group	Pre-Tests	Experimental Design	Post-Tests
Control Group	Tests of Certain Motor Abilities	Proposed Research Method	Tests of Certain Motor Abilities
Experimental Group	Tests of Certain Motor Abilities	Special Exercises Using the Magnetic Legs Box Device	Tests of Certain Motor Abilities

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Table 2. *Homogeneity of the Research Sample in Certain Anthropometric Measurements*

Variables	Unit	n	Mean	Median	Standard Deviation	Skewness
Height	cm	10	171.9	173	3.478	0.371
Weight	kg		63.6	63	2.716	0.778
Age	years		15.5	15.5	0.527	0.000
Training Age	years		2.90	3	0.373	0.166

Data Collection

The tools , equipment and auxiliary means used are among the important requirements for conducting and completing the experiment. Research instruments represent the means through which the researcher can collect data and address the research problem in order to achieve the objectives of the study, regardless of whether these instruments consist of data , samples , devices or other materials (Wajih, 1988, p. 133) .

1. Arabic and foreign sources and references .
2. Observation .
3. Personal interviews .
4. Testing and measurement .
5. The Internet .

Equipment and Devices Used

1. Special innovative sports shoes designed for use with the device .
2. An innovative device operating using magnetic resistance .
3. Bauer device for measuring heart rate .
4. MacBook Air computer, manufactured in the United States .
5. Two Nikon video cameras, manufactured in Japan .
6. Whistle .
7. Stopwatch .
8. Cones .
9. Measuring tape .
10. Plastic rings .
11. Balance testing device .
12. Two moving targets .
13. Five soccer balls .
14. Numbered paper cards .
15. Electronic scale for measuring magnetic attraction force

Conceptual Details

The concept of the Magnetic Legs Box device was developed through the researcher's review of various sports training devices . The idea involved designing a magnetic-resistance training device that provides resistance to the player's movements during jumping or locomotion in a manner similar to the natural movements of the joints . The device consists of several interconnected components, each serving a specific function or purpose . The

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

components were designed to facilitate easy assembly and disassembly with some parts being fixed and others being movable and interchangeable .

The concept of the device is based on establishing a resistance that restricts the player's movement and attempts to prevent upward jumping or forward movement through magnetic attraction force . Specific resistance levels can be selected by controlling the electrical current and the number of coils used. The device also includes specially designed footwear fitted with metal components on the underside which are attached over the athlete's original sports shoes to facilitate movement and performance. After consulting specialists in electrical and mechanical engineering and discussing various proposals regarding the device's design, as well as presenting the concept to experts in the field of sports training the researcher under the guidance of the supervisors initiated the first stages of manufacturing the device on November 11, 2023 .

Resistance exercises and weighted loads placed on the athlete's body are commonly used to develop strength-power abilities. Other methods include the use of multi-gym equipment and elastic resistance bands . These types of resistance generally apply a vertical force toward the ground which may place additional stress on the spine and muscles and potentially contribute to certain injuries or physical strain . the proposed device generates a pulling force directed toward the ground through magnetic attraction. This represents a different form of resistance that allows the muscles to work against a novel resistance mechanism, which constitutes one of the main rationales for designing the device .

The device provides an element of excitement and novelty because it operates through a different resistance mechanism from conventional training equipment . This may increase players' motivation and willingness to participate in training and perform the prescribed exercises .

Motor Ability Tests

1. Coordination Test

Motor Coordination Test (Numbered Circles Test) (Abdel-Fattah, Y., 2004, p. 103)

Purpose of the Test: To measure leg–eye coordination.

Equipment Used:

- Stopwatch.
- Eight circles drawn on the floor , each with a diameter of 60 cm , numbered as illustrated in Figure (1) .

Test Instructions: The participant stands inside Circle No. (1). Upon hearing the starting signal , the participant jumps with both feet together into Circle No. (2) , then Circle No. (3) , and continues in the same manner until reaching Circle No. (8) , performing the sequence at maximum speed.

Scoring:

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

- The time required by the participant to move through the eight circles is recorded to the nearest tenth of a second .
- Three trials are performed. If the participant makes an error in any of the circles, the trial is repeated .



Figure 1. *Illustrates the Coordination Test*

2. Agility Test With and Without the Ball

Test Name: Arrowhead Test for Measuring Agility With and Without the Ball (Topend Sports, 2008) .

Purpose of the Test: To measure agility .

Equipment: Eight cones, a stopwatch, a whistle and a regulation soccer ball.

Performance Specifications: The cones are arranged with a distance of 1 meter between each cone . The distance between the starting point and Point (A) is 10 meters while the distance between Point (A) and Point (B) is 5 meters and the distance between Point (A) and Point (C) is 5 meters. The test consists of two trials: one performed toward the right and the other toward the left. Upon hearing the whistle the participant runs from the starting point through the designated course until crossing the finish line as illustrated in Figure (2) .

Performance Conditions: The participant must avoid touching the cones during the test and must follow the designated running course .

Scoring: The time taken by the participant from the starting signal given by the examiner until crossing the finish line is recorded . Each participant performs one trial without the ball and another trial with the ball, and the results of the two trials are recorded separately .

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

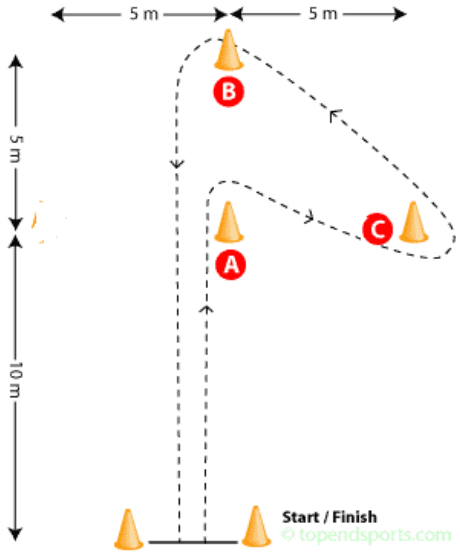


Figure 2. *Illustrates the Agility Test*

3. Modified Static Balance and Applied Force Test (Radhi, 2017, p. 63)

Purpose of the Test: To measure the duration of static balance and the applied force exerted by both feet during balance .

Equipment Used: A modified static balance and applied force testing device, for which a patent has been obtained .

Test Procedure: The examiner provides a detailed explanation of the operating procedure of the device and the required performance allowing the participants sufficient time to become familiar with and practice using the device before testing . The participant stands on the device and once a stable balance position is achieved and the participant is ready to perform the test the timer begins recording the performance duration through the time display . The applied force exerted by each foot is simultaneously measured through the force displays . When either of the two plates comes into contact indicating that the upper plate has tilted toward one side the timer stops , representing the duration of static balance. The force displays also stop and show the amount of applied force exerted by each foot. Each participant is given two trials and the better result is recorded.

Scoring: Static balance is measured as time (seconds)

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq



Figure 3. *Illustrates the Balance Test*

Pilot Study

On Thursday, February 22, 2024 at 3:00 p.m. the researcher conducted a pilot study involving three players who were not included in the main research sample . The purpose of the pilot study was to familiarize the assisting research team with the procedures for administering the selected tests assess the capabilities and readiness of the assisting team determine the time required to perform the tests and evaluate the efficiency and validity of the tests used in the study .

Procedures

Pre-Test

After obtaining the required official approvals from Al-Zawraa Sports Club the researcher conducted the pre-test for the research sample at 4:00 p.m. on Saturday , February 24, 2024 The participants underwent tests to assess certain motor abilities as presented in Table (3) .

Table 3. *Normal Distribution of the Sample in Certain Research Variables*

Variables	Unit	n	Mean	Median	Standard Deviation	Skewness
Coordination	s	10	8.685	8.52	0.335	1.172
Agility Without the Ball	s		9.362	9.38	0.056	−0.383
Agility With the Ball	s		11.519	11.53	0.043	−0.965
Balance	s		2.021	2.085	0.274	−0.526

One of the requirements of the experimental design adopted in this study was to determine the baseline level of the two research groups in the pre-tests . The research sample was randomly divided by drawing lots into two groups : an experimental group consisting of 5 players and a control group consisting of 5 players . The researcher established the equivalence between the experimental and control groups using the independent-samples t-test to determine the statistical significance of the differences between the two groups , as presented in Table (4).

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Table 4. *Equivalence of the Two Research Groups*

Variables	Unit	Control Group		Experimental Group		t-value	p-value
		Mean	± SD	Mean	± SD		
Coordination	s	8.78	0.417	8.59	0.238	0.884	0.403
Agility Without the Ball	s	9.358	0.064	9.366	0.055	0.210	0.839
Agility With the Ball	s	11.520	0.046	11.518	0.046	0.068	0.947
Balance	s	1.970	0.236	2.072	0.322	0.566	0.587

Experimental Training Program

The researcher prepared a set of special exercises using the designed device from Monday , February 26, 2024 to Saturday , April 27, 2024 with the aim of developing muscular strength . The training program consisted of 24 training units, with 4–6 exercises included in each training unit. The intensity of the exercises ranged from moderate to high and the exercises were performed three times per week. The duration of the exercises ranged from 20 to 30 minutes per training unit .

The special exercises were incorporated into the training sessions designated for developing muscular strength in accordance with the planned training program . The intervention was implemented during the competition and semi-competition phases with the use of high-intensity interval training (HIIT) . The researcher also adopted the principle of exercise variation and repetition to ensure training diversity and continuity . Some exercises involved the use of a soccer ball and were performed while using the designed device whereas other exercises were performed without the ball and focused on physical movements using the device .

The control group meanwhile continued its regular training program under the supervision of the team coach without using the designed magnetic device .

Post-Test

The researcher conducted the post-test on Monday April 29, 2024 following the same procedures and conditions as those used in the pre-test for the research sample .

Statistical Analysis

The researcher used the Statistical Package (SPSS) to analyze the research variables and obtain the required statistical measures including the mean, median , standard deviation , Pearson correlation , paired-samples t-test and independent-samples t-test.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Results

Table 5. *Means , Standard Deviations , Differences and Calculated t-Values for the Pre- and Post-Tests of Motor Abilities in the Control Group*

Variables	Unit	Pre-Test		Post-Test		Mean Difference (D)	SD of Differences	*t*-Value	p-value	Development Rate
		M	SD	M	SD					
Coordination	s	8.780	0.417	8.686	0.393	0.094	0.034	6.119	0.004	1.1%
Agility Without the Ball	s	9.358	0.064	9.304	0.065	0.054	0.005	22.040	0.000	0.5%
Agility With the Ball	s	11.520	0.046	11.462	0.034	0.058	0.031	4.164	0.014	0.5%
Balance	s	1.970	0.236	2.188	0.121	0.218	0.353	1.379	0.240	9.9%

df = 4 , α = 0.05.

Table 6. *Means , Standard Deviations , Differences and Calculated t-Values for the Pre- and Post-Tests of Motor Abilities in the Experimental Group*

Variables	Unit	Pre-Test		Post-Test		Mean Difference	SD of Differences	*t*-Value	p-value	Development Rate
		M	SD	M	SD					
Coordination	s	8.590	0.238	8.248	0.088	0.342	0.246	3.097	0.036	3.9%
Agility Without the Ball	s	9.366	0.055	9.200	0.015	0.166	0.051	7.170	0.002	1.7%
Agility With the Ball	s	11.518	0.046	11.382	0.037	0.136	0.023	13.209	0.000	11%
Balance	s	2.072	0.322	2.630	0.386	0.558	0.201	6.179	0.003	21%

df = 4 , α = 0.05.

Table 7. *Results of the Differences Between the Experimental and Control Groups in the Measurement of Motor Abilities*

Variables	Unit	Control Group		Experimental Group		*t*-Value	p-value
		Mean	± SD	Mean	± SD		
Coordination	s	8.686	0.393	8.248	0.088	2.429	0.041
Agility Without the Ball	s	9.304	0.065	9.200	0.015	3.474	0.008
Agility With the Ball	s	11.462	0.034	11.382	0.037	3.482	0.008
Balance	s	2.188	0.121	2.630	0.386	2.442	0.008

df = 8, α = 0.05.

Discussion

The results of the statistical analysis of the data obtained from the experimental and control groups, using the independent-samples t-test revealed statistically significant differences between the two groups in the development of the investigated motor abilities, namely coordination, agility without the ball , agility with the ball and balance, in favor of the experimental group that performed the special exercises using the manufactured device. These findings indicate that the proposed training intervention contributed to improving the motor abilities of the youth soccer players. Motor abilities are directly associated with muscular and

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

neuromuscular function and with the body positions adopted during performance particularly in activities requiring rapid muscular contractions and a high rate of force development .

Regarding agility it is closely associated with other motor abilities because of its complex nature . This characteristic results from the relationship between agility and physical abilities on the one hand and the motor performance itself on the other. Mufti Ibrahim (2001) stated that agility has a special position among physical attributes because it is associated with various physical and motor abilities (Hammad, 2001, p. 199) . The researcher attributes the superior results of the experimental group to the resistance exercises performed using the designed device. The magnetic resistance increased the resistance acting against the movement of the body or its segments thereby providing an opportunity to train strength under magnetic resistance and enabling the players to employ greater levels of force and speed to overcome the imposed resistance . This contributed to improving movement efficiency and agility . Agility refers to "the ability to change direction rapidly and with proper timing" (Salama, 2000, p. 158) which reflects the player's ability to rapidly change body positions and direction , whether through the movement of the entire body or individual segments, as a result of improved muscular strength.

With regard to dynamic balance balance is defined as "the ability to maintain body stability while performing various movements whether during movement or in a stationary position. It also refers to the individual's ability to control the positions of different body segments through the effective functioning of the nervous system in controlling the muscular system" (Al-Fadhli & Al-Bayati, 2012, p. 274) . The researcher considers the superior results of the experimental group to be attributable to the resistance exercises performed using the designed device. During movement the magnetic resistance generates an opposing force directed toward the ground. This force requires the player to exert muscular effort to overcome the external resistance and maintain body stability. The muscles must therefore produce sufficient force to counteract the external forces acting on the body . As Al-Fadhli (2010, p. 252) noted, muscular force is also used to resist gravity and friction and to increase the force of reaction .

In addition resistance training contributes to strengthening the stabilizing muscles which play an essential role in maintaining proper body alignment and postural control . Strong stabilizing muscles enable athletes to perform complex movements with greater control and precision which may reduce the risk of injuries associated with poor coordination . These findings are also consistent with Abdel-Fattah and Hassanein (1997, p. 175) who emphasized that the development of motor performance is associated with the continuous interaction between the nervous system which sends commands to the muscles to produce contractions and the sensory organs, which provide the nervous system with information resulting from these contractions . The role of sensory systems becomes particularly evident during the performance of different movements. Therefore , the observed improvements in the experimental group's motor abilities can be considered consistent with the physiological and neuromuscular demands imposed by the special exercises using the designed magnetic-resistance device .

Conclusions

The researcher concluded that adopting the proposed exercises using the magnetic-resistance training device contributed to the development of anaerobic capacity and certain motor abilities among youth soccer players , including motor coordination , agility without the

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

ball , agility with the ball and motor balance. The proposed training intervention also contributed to improving selected skill-performance outcomes, particularly dribbling performance speed and right-side shooting accuracy among youth soccer players .

Recommendations

The researcher recommends incorporating the proposed magnetic-resistance training device into training programs for youth soccer players as an auxiliary means for developing their physical and motor abilities ; conducting training courses that integrate the proposed device with physical exercises; using the device to develop leg muscular strength in general ; encouraging researchers to design and manufacture innovative training devices based on magnetic attraction forces for different sports and physical activities to provide athletes with opportunities to benefit from such technologies and utilizing the proposed device in similar studies involving other sports, such as volleyball and basketball, among male and female athletes as well as youth and junior players .

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Modeling the Causal Relationship Between Situational Awareness and Some Basic Skills in Futsal Among Students

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DOI:
https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2618
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Article history: Received 5/September/2026; Accepted 20/September/2026; Available online 28/October/2026

Abstract

This study aimed to develop a causal relationship model and identify the direct and indirect effects of situational awareness on some basic futsal skills among fourth-year students at the College of Physical Education and Sports Sciences, Al-Qadisiyah University during the academic year 2025–2026. The research problem stemmed from observing student training sessions, revealing a significant disparity in cognitive abilities and skill-based decision-making despite their similar technical levels. The researcher employed a descriptive methodology using both survey and correlational approaches. The research population consisted of 100 students randomly selected and divided into construction pilot (20 students) and application (60 students) samples. A 14-item situational awareness scale was adapted for the sports context and its validity and reliability were verified (the corrected split-half reliability coefficient was 0.819 and Cronbach's Alpha was 0.866). The Statistical Package for the Social Sciences (SPSS) and AMOS software (v.24) were used to analyze the data. The results showed that students possessed a high level of situational awareness with a mean score of 33.090 and a standard deviation of 4.856. The study recommended incorporating the causal model into educational and training curricula to link cognitive-psychological factors with technical skill performance in futsal.

Keywords: Situational Awareness, Futsal, Basic Skills.

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

The contemporary sporting arena is witnessing rapid developments in training and preparation concepts as success no longer depends solely on physical and technical abilities but has become the result of the integration of physical technical, psychological and cognitive factors that contribute to enhancing performance efficiency and improving the quality of decision-making during competition. This development has led to growing interest amongst researchers in studying cognitive variables as decisive factors in performance development in team sports, which are characterised by rapidly changing competitive conditions. Futsal is a sport that demands a high level of awareness, quick reflexes and precise decision-making given the small size of the pitch, the speed at which the ball moves, and the constantly changing tactical situations. A player's success therefore goes beyond simply possessing basic skills it also depends on having the cognitive abilities that enable them to recognise and analyse situations and choose the appropriate response within the time available. Situational awareness is considered one of the most important cognitive factors that help a player recognise the elements of a competitive situation, understand the relationships between its components, and anticipate potential changes, thereby contributing to more accurate and effective decision-making during play. Furthermore, the fundamental skills in futsal form the main pillar of technical performance through which players translate their cognitive and physical abilities into practical motor behavior on the pitch. Consequently, recent research has turned to the use of causal modelling as it offers the possibility of explaining the direct and indirect effects between variables and determining the nature of these relationships within an integrated scientific model. The significance of the present study lies in presenting a scientific model that links situational awareness to core skills among fourth-year students at the Faculty of Physical Education and Sports Sciences, Al-Qadisiya University, to be utilized in the design of educational and training programmes based on rigorous scientific principles.

Method and Tools

The researcher employed a descriptive approach, utilising both survey and correlational methods, as these were appropriate to the nature of the research. The research population was defined as fourth-year students enrolled at the Faculty of Physical Education and Sports Sciences at Al-Qadisiyah University for the academic year (2025–2026) numbering 100 students, who were selected using random sampling

Methods tools and equipment used

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

To ensure that the field study was carried out and that its methodological and statistical requirements were met in an objective and accurate manner the researcher relied on a range of technical and practical tools and methods which helped to overcome the obstacles to data collection and achieve the intended objectives

These methods are as follows: face-to-face interviews; a situational awareness scale; observation; an expert questionnaire regarding the tests used in the research; adhesive tape; a measuring tape tape for marking the scoring area for the test; a futsal goal; 10 futsal balls a futsal pitch a whistle 14 markers, a registration form one HP laptop, one CASIO desktop calculator and two CASIO digital stopwatches.

Field Research Procedures

The researcher adapted the situational awareness scale previously developed for university students (Al-Qaisi, 2020) to make it suitable for the field of sport and for students of the Faculty of Physical Education and Sports Sciences. The scale, in its initial form consisted of 14 items with each item offering three response options (A, B, C).

Validation of the items

The 14 items of the scale were presented to a committee of experts and specialists in sports psychology and physical education to assess their validity and suitability for the research samples. The chi-squared (\chi^2) test was used to verify the significance of the differences between the experts opinions all items were accepted as the calculated (\chi^2) value (11.00) was higher than the critical value (3.84) at a significance level of (0.05) with a 100 per cent agreement rate.

Table1. *Shows the views of experts and specialists on the items of the Situational Awareness Scale*

items	items numbers	Agreed	Disagree	Percentage	k^2 value	Significance
1-2-3-4-5-6-7-8-9-10-11-12-13-14	14	11	Zero	%100	11.00	Sig

Pilot study of the Situational Awareness Scale

The items on the scale may not be as clear to the test administrators as they are to the researcher therefore the researcher conducted a pilot study of the Situational Awareness Scale on a group of students in order to ascertain the following (Amer, 2016, p. 64): The administration procedure and the time required for it.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The researcher will gain practical experience in identifying the challenges and advantages encountered when conducting the main experiment.

- To ensure that the instructions are clear to the participants.
- To familiarize themselves with the conditions under which the scale is administered and any associated difficulties.
- To assess the competence of the support team.

The pilot study was conducted on (16 February 2026) with a sample of (20) students from the research population (outside the main sample) with the aim of verifying the clarity of the instructions calculating the average response time (which was 10 minutes), and assessing the competence of the support team.

Application of the Situational Awareness Scale to the preparatory sample

In order to verify the research objectives, the scale was administered in its entirety to the preparatory sample, comprising 100 fourth-year students from the Faculty of Physical Education and Sports Sciences at Al-Qadisiyah University This took place from Monday 16 February 2026 to Wednesday 18 February 2026 in the lecture theatres. The researcher distributed the scale to the members of the preparatory sample to answer its items in accordance with a work plan drawn up by the researcher together with members of the support team following the steps below:

1- The researcher explains the scale's terminology and instructions to the support team.
2- Members of the support team explain the scale's terminology and instructions to the students (the pilot sample).
3- Neither the researcher nor members of the support team must interfere with the sample participants' responses.

The main experiment on the scale's pilot sample

The pilot study for the application of the Situational Awareness Scale and the basic skills tests in futsal was conducted on the final sample of 60 fourth-year students from the Faculty of Physical Education and Sports Sciences at Al-Qadisiyah University, during the period from Monday 23 February 2026 to Wednesday 25 February 2026. The researcher and the supporting team took care to provide standardised environmental and methodological conditions for all members of the sample to ensure the accuracy of the data collected and to identify the causal relationships between the variables.

Statistical analysis of the items on the Situational Awareness Scale

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

In order to identify discriminant and non-discriminant items the scale items were statistically analysed using the following two methods:

The two extreme groups:
Discriminant power of the items (two-extreme-groups method):
To determine the discriminant power of the scale items the responses from the construct sample, comprising 100 questionnaires were analysed:
The total scores were ranked in descending order.

The upper limit (27 per cent) and lower limit (27 per cent) were adopted in accordance with Kelley's rule resulting in 27 questionnaires per group.

Differences between the means were analysed using a t-test for two independent samples via SPSS Thirdly: A t-test for two independent samples was applied using the SPSS statistical software to compare the means of the two groups (upper and lower) for each item, and the discriminant power and validity of the item were determined based on the probability value of the significance level obtained.

Table2. *shows the discriminant validity of the situational awareness scale*

Scale	items	Lower Group		Upper Group		T	SIG
		mean	SD	mean	SD		
Situational awareness	1	2.889	0.424	1.704	0.669	7.779	0.000
	2	2.926	0.267	1.963	0.808	5.882	0.000
	3	2.926	0.385	2.222	0.698	4.587	0.000
	4	2.667	0.555	2.111	0.934	2.658	0.010
	5	2.926	0.267	1.923	0.744	6.556	0.000
	6	2.667	0.555	2.037	0.759	3.481	0.001
	7	2.778	0.424	2.037	0.759	4.430	0.000
	8	2.815	0.396	1.815	0.681	6.593	0.000
	9	2.852	0.362	2.074	0.730	4.960	0.000
	10	2.815	0.396	1.704	0.775	6.632	0.000
	11	2.815	0.396	1.852	0.770	5.781	0.000
	12	2.889	0.320	1.963	0.854	5.275	0.000
	13	2.741	0.447	2.148	0.818	3.303	0.002
	14	2.852	0.362	1.778	0.751	6.694	0.000

Significance level (0.05) and df (n + n – 2) = (27 + 27) – 2 = 52

Following completion of the methodological steps for the two-group approach, the researcher employed a t-test on two independent samples, with the aim of investigating the statistical significance of differences between the responses of the high and low groups for each individual item of the scale. The results indicated that all items were accepted and retained in the preliminary version of the scale, as the associated p-

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

values were below the accepted threshold 0.05 This demonstrates that all items possess high discriminatory power and a consistent ability to detect individual differences amongst respondents.

Internal consistency

In order to determine the internal consistency coefficient ((Internal Consistency) of the scale, the correlation coefficient between the item score and the total score was calculated using Pearson's correlation coefficient, in order to reveal the nature and strength of the relationship between each item's score and the total score obtained by the individual on the scale as a whole thereby ensuring the consistency of the items in measuring the target concept or variable.

Table3. *shows the correlation coefficient for each item with the total score for the domain to which it belongs and the situational awareness scale*

NO	Pearson's correlation	Significance	NO	Pearson's correlation	Significance	NO	Pearson's correlation	Significance
1	0.738	Significant	6	0.675	Significant	11	0.759	Sig
2	0.752	Significant	7	0.686	Significant	12	0.684	Sig
3	0.760	Significant	8	0.786	Significant	13	0.693	Sig
4	0.637	Significant	9	0.767	Significant	14	0.748	Sig
5	0.795	Significant	10	0.740	Significant			

Psychometric properties of the Situational Awareness Scale

The process of developing scales requires certain psychometric conditions that are of great importance in ensuring the validity and practicality of this development; among these conditions are the validity and reliability of the scale.

Validity

Validity is defined as 'an indicator of the test's accuracy in measuring the phenomenon, trait or characteristic intended to be measured and that alone or the test's accuracy in measuring the objective for which it was designed (Abdul-Moneim Ahmed

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Jassim Al-Janabi and Omar Samir Thunoun Al-Malahmo, 96, 2020). In order to achieve validity of the scale.

Content validity

This is determined on the basis of the test's external form, as the test's external form indicates that it measures the trait or characteristic for which it was designed" (Abdul-Moneim Ahmed Jassim Al-Janabi, 86, 2019). The face validity of the scale was verified by presenting its items to a group of experts and specialists in the fields of physical education, sports science and sports psychology, in order to ascertain the validity of the items, the accuracy of their linguistic formulation, and their suitability for the nature of the measurement and the research sample.

Construct Validity

This refers to construct validity (or hypothetical construct validity), which indicates the extent of the connection and relationship between the theoretical basis of the test (or the theoretical background from which the construct was derived) and its individual items and wording. In other words it is the indicator that reveals the extent to which the test is capable of measuring the theoretical hypotheses and concepts on which it is based.

The implications of this validity and its statistical indicators cannot be verified in the present study except by employing two statistical methods namely:

Reliability

Reliability is a central pillar and an indispensable methodological requirement for ensuring the efficiency and technical validity of measurement instruments; it reflects the consistency of the instrument and the stability of its results when re-administered under similar conditions. It indicates that individuals' scores do not change substantially when the test is re-administered, reflecting the stability of the instrument and its immunity to random factors. It is statistically expressed as the correlation coefficient between individuals' scores across different test administrations (Zakaria Ahmed Al-Zahir et al., 140, 1999). The stability of the scale was verified using:

Split-Half Method

The Split-Half Method is essentially based on dividing the items of a scale into two equal halves, such that each individual receives a separate score for each half, Thus,

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

each part is treated as if it were a test in its own right with the advantage that the scale is administered only once which completely eliminates the time interval between the two parts of the test and removes the effects of practice and learning (Mohammed Subhi Hassanein, 146, 2001). The odd-numbered paragraphs were separated from the even-numbered ones. To verify the conditions for statistical homogeneity between the two halves, the F-test for differences in variances was applied the results showed complete homogeneity between the two halves as the calculated F-value of 1.254 for the situational awareness scale This was smaller than the table value of 3.356 at a significance level of 0.05 and two df (98:98). After ensuring homogeneity the Pearson correlation coefficient was calculated between the scores of the odd-numbered and even-numbered items.

A high, positive correlation coefficient was observed, reflecting promising initial consistency. As the correlation coefficient obtained reflects only half of the scale's items, it was necessary to apply the Spearman–Brown formula to correct for scale length and determine the stability coefficient for the scale as a whole.

Following statistical analysis, it became clear that the overall reliability coefficient was high and reliable, confirming that the scale possesses a high degree of stability and reliability, making it suitable for field application.

Table4. *shows the reliability coefficients of the Situational Awareness Scale using half-split analysis with the correction coefficient.*

NO	Scale	Stability before correction	Stability after correction
1	Situational Awareness Scale	0.693	0,84

Cronbach's Alpha Coefficient

This method is based on calculating the inter-item correlations between all items in the scale to assess the internal consistency of measurement instruments. Under this method the scale is not simply divided into two halves as is the case with the split-half method but the test is divided into a number of parts equal to the exact number of its items such that each item is treated statistically as if it were an independent self-contained subtest (Saad Abdul Rahman, 201, 1983).To assess reliability all sample questionnaires were subjected to Cronbach's alpha analysis upon statistical analysis the results indicated high levels of internal consistency and reliability demonstrating the stability of the scale and its high suitability for final field application.

Identifying core skills tests in futsal

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

In order to identify the skills tests most appropriate to the research variables, the researcher designed a questionnaire for experts and specialists in the fields of futsal, testing and assessment (Appendix 9) which included a set of candidate tests for each skill. The experts were asked to give their opinions on the suitability of each test by ticking the 'suitable' or 'not suitable' box. After collecting the questionnaires and analysing the data statistically the researcher adopted an agreement rate of 80 per cent or higher of the total expert opinions as the criterion for accepting and adopting the test in the research all tests that achieved a lower agreement rate were excluded. Table 7 illustrates the relative importance and the levels of expert agreement on the targeted skill tests.

Results

Table7. *shows the arithmetic means and standard deviations for the research variables (situational awareness; certain basic indoor football skills)*

Variables	Unit	mean	SD	Median	Skewness	Kurtosis	CV
Situational awareness	Degree	33.090	4.856	32	0.673	-0.405	14.675
Passing accuracy	Degree	6.320	1.370	6	0.701	0.135	21.677
Dribbling	Second	6.252	0.517	6.215	0.215	0.165	8.269
Goalscoring	Degree	11.657	1.959	11.800	-0.219	-0.083	16.805

Table 8. *shows the regression weights for the indirect effects of the independent variable (situational awareness) on the dependent variables*

Independent variable	Dependent variables	Weight Regression		SE	CR	SIG	Significance
		Standard	Non-standard				
Situational awareness	Passing	0.089	0.025	0.035	0.714	0.421	Not Sig
	Dribbling	-0.254	-0.027	0.010	-2.700	0.013	Sig
	Scoring	0.227	0.092	0.024	3.833	0.000	Sig

Discussion

A discussion of the findings regarding the effect of situational awareness on basic skills (passing, dribbling, scoring) The statistical table relating to linear regression and prediction coefficients, which was used to determine the statistical effect of the independent variable (situational awareness) on the dependent skill variables, reveals the following:

Discussion of the impact of situational awareness on passing skills

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The statistical data presented in the table show that the non-standardised regression coefficient was (0.089), whilst the standardised regression coefficient was (0.025) with a standardised error of (0.035) When testing predictive power using a critical value of (0.714), the results showed that the significance level was (0.421) which is greater than the statistically accepted significance level of (0.05).

Interpretation and scientific significance

This finding can be attributed to the fact that passing performance at competitive levels is significantly influenced by motor mechanisms and repetitive neuromuscular coordination in players, rather than depending directly on situational awareness alone; in routine game situations the passing process becomes an automated motor response (automated skill) perfected through repetition and continuous training, thereby reducing the relative contribution of complex cognitive abilities to it except in specific tactical situations. This finding is consistent with the assertion made by (Allawi, 1998, p. 112) that basic skills of a repetitive motor nature are fundamentally governed by purely technical performance and the player's mastery of the motor sequence, which means that the influence of cognitive and psychological variables on them is limited to the context of direct competitive situations. As Field (2018, p. 345) also noted that the development of regression models does not require all independent variables to be significant if the mechanism underlying the phenomenon under study is purely motor in nature.

Discussion of the effect of situational awareness on dribbling skills

The results showed a non-standardised regression coefficient (B) of (-0.254), a standardised regression coefficient (beta) of (-0.027) and a standardised error of (0.010). When the critical t-test was performed, the value was (-2.700) at a significance level of (0.013), which is statistically significant at the (0.05) level.

This result confirms the existence of a statistically significant inverse regression relationship between situational awareness and dribbling skill. The negative sign of the regression coefficient can be interpreted as follows: the higher a player's level of situational awareness, the greater their tactical maturity and the quicker their perception of the spaces and collective solutions available on the pitch, which leads them to minimise individual ball retention (dribbling) and opt instead for quick passing and more efficient attack build-up; A player with high situational awareness views the game holistically, which reduces their reliance on individual dribbling skills on the pitch.

This finding is consistent with the thesis put forward by Ratib (2002, p. 87), which explained that a high level of situational awareness helps to speed up the decision-

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

making process favours collective options with the highest tactical payoff and discourages individual skilful behaviours such as dribbling, except in situations where an attack is necessary.

Discussion of the impact of situational awareness on shooting ability

Statistical analyses showed that the non-standardised regression coefficient (B) for shooting ability was 0.227 whilst the standardised regression coefficient (beta) was 0.092 with a standardised error of 0.024. The critical t-value was a high 3.833, with a significance level of 0.000 indicating very high statistical significance at the $\alpha \leq 0.01$ level.

This finding confirms the direct positive impact and high predictive power of situational awareness on the quality and accuracy of finishing. This is due to the decisive nature of the shooting skill which requires the utmost concentration, instantaneous analysis of the goal angles the positioning of the goalkeeper and defenders, as well as choosing the right moment to shoot in a fraction of a second. Consequently, the development of situational awareness is directly and proportionally reflected in higher success rates in shooting. This finding is consistent with the scientific argument put forward by Hassanein (2004, p. 204) who argues that complex and decisive sporting skills require accurate and rapid processing of environmental and situational information with sensorimotor perception and situational awareness forming the fundamental basis for successful shooting decisions.

Conclusions

- The results of the causal modelling analysis revealed a statistically significant relationship between situational awareness and certain fundamental skills in futsal amongst students.
- Situational awareness helps to explain part of the variation in the level of performance of fundamental skills, indicating the importance of cognitive processes associated with understanding the sporting situation in skill performance.
- The results showed that a higher level of situational awareness is associated with an improvement in the student's ability to perceive and interpret important information from the surrounding environment, and to predict possible changes in the situation.
- The results of the causal model suggest that situational awareness can play an important role in improving skill performance by helping students choose the appropriate response at the right time and in the right place.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Recommendations

- The need to incorporate situational awareness exercises into the educational and training modules for futsal for students.
- Adopt training exercises and game situations that require students to observe, perceive, interpret, anticipate and respond, rather than limiting themselves to traditional skill repetition.
- Use mini-games and match-like situations to develop students' ability to perceive important information and respond appropriately under game conditions
- Focusing on the development of core skills in conjunction with the associated cognitive and mental abilities, such as attention, perception, anticipation and rapid decision-making.
- Utilising causal modelling to identify the variables most closely linked to skill performance, and drawing on these when designing educational and training programmes.

Appendix (1)

The Situational Awareness Scale (Final Version)

1. During the lesson you notice one of your classmates throwing a water bottle onto the gym floor after a short break:
a. I ignore the incident and carry on with the exercise.
b. I take note of his behaviour and consider speaking to him about it later.
c. I tell him straight away not to repeat this behaviour in the gym.
2. During a group exercise, one of the students fell whilst trying to control the ball:
a. I carry on with the exercise without paying any attention.
b. I wait for the coach or teammates to intervene.
c. I go over to him straight away and help him up, in the spirit of fair play.
3. During a tactical drill one of your teammates stopped play because another teammate had fallen:
a. I ignore the situation and carry on playing.
b. I observe the situation and consider his actions.
c. I speak to him and commend his sportsmanship.
4. After the training session had finished, some of my colleagues began tidying up the equipment in the hall:
a. I join in straight away.
b. I think about joining in a little later.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

c. I let them get on with it without interfering.
5. Whilst sitting in the lecture, you saw a student drop their wallet, and then another person came along and took it:
a. I ignore the situation.
b. I watch the person who took the wallet and consider speaking to them.
c. I speak to the person who took the wallet offer them advice, and explain to them why this is wrong.
6. You have noticed that one of your classmates' academic performance has declined in recent lessons:
a. I ignore the situation.
b. I try to find out why their performance has declined.
c. I offer them support and encourage them to get back to their usual standard.
7. During a short break in the hall, I saw a colleague standing without a seat:
a. I ignore the situation.
b. I consider offering him my seat.
c. I offer him my seat straight away so he can sit down.
8. As you were entering the hall, you noticed a colleague stumbling and falling whilst carrying his training equipment:
a. I carry on without stopping.
b. I consider helping him.
c. I go straight over to him and help him.
9. I noticed a new student in the group who seemed unaware of the exercise routine or where the equipment was:
a. I watch him without intervening.
b. I think about helping him later.
c. I explain the routine to him and show him where the equipment is.
10. During the training session, I noticed a group of students making sarcastic remarks about one of their classmates:
a. I ignore the situation.
b. I consider telling them off.
c. I advise them to stop behaving like th
11. I heard a colleague speaking very heatedly to another because of a mistake during the exercise:
a. I ignore the situation.
b. I try to calm him down.
c. I intervene and ask him to control his emotions.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

12. After the lesson had finished, I noticed the hall attendant busily cleaning the floor and looking tired:
a. I walked past him without saying anything.
b. I thought about helping him later.
c. I helped him gather the equipment or tidy up the room.
13. During the training session, I noticed smoke or the smell of burning coming from one of the rooms inside the hall:
a. I simply monitor the situation.
b. I consider informing the trainer.
c. I immediately inform the safety unit or management.
14. You see one of your colleagues throwing away their workout rubbish or a water bottle in the wrong place:
a. I ignore the situation.
b. I think about advising them later.
c. I point it out to them straight away and explain the importance of keeping the gym clean.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

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Journal of Physical Education

Volume 38 – Issue (Special Issue) – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Building and Codifying Tests According to Complex Kinetic Forms to Assess The Skill of Passing From above in Volleyball for Third Grade Students

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DOI:
https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2274
https://creativecommons.org/licenses/by/4.0/
Article history: Received 1/April/2025; Accepted 6/May/2025; Available online 28/October/2026

Abstract

The important of this research lies in the Improvement of tests based on complex motor patterns which naturally influence pupils' skill levels and physical activity this in turn, has a positive on the assessment of basic skills in sport in general, and in mini-volleyball in particular by linking the basic movement pattern to the technical nature of the fundamental skills involved, Keywords Construction regulation, combined tests midfield volleyball The aim of the study was to Building and standardise tests based on complex motor patterns to assess overhead passing skills among third-year primary school pupils both boys and girls. A review was conducted of the literature and studies relating to complex motor patterns covering topics relevant to the research the researchers employed a descriptive approach as it was appropriate to the nature and problem of the research The research population Construction Sample of (%65) pupils comprising (36) boys and 29 girls, who were selected at random and constituted 65 per cent of the total research population The main experimental sample comprised 12 pupils, comprising (6) male pupils and (6) female pupils, who constituted the study population for the experiment, representing 12 per cent of the study population. A further 16 pupils were selected using simple random sampling to form a pilot sample, representing (10%) The most important Conclusions were accurately derived from the results of tests designed in accordance with complex motor patterns similar to fundamental volleyball skills, specifically in the performance of the overhead pass in volleyball. Furthermore, the results achieved the objective for which these tests were developed: to assess the overhead pass skill among third-year primary school pupils, both boys and girls. The researchers recommend that these test based

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Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

on complex motor patterns, should be used in physical education lessons for Year 3 primary school pupils given their effective and vital role in developing their motor ability.

Keywords: construction and codification, composite kinetic forms volleyball.

Introduction

Early childhood is the best stage of life for learning through Complex Movement Patterns as the physical changes a pupil undergoes at this stage influence their level of skill and physical activity, and this in turn, has a positive impact on the acquisition of basic skills in sports in general, and in mini-volleyball in particular as it is a team sport comprising several fundamental skills that require a high level of basic and Complex Movement Patterns This is considered the starting point For Beginners Skill Learning; therefore, it can be applied in the field of sports skills training and to assess learning progress with a view to enhancing pupils ability to master the basic skills of mini-volleyball as once they have learnt the basic and compound movement patterns, it becomes easier for them to learn the basic skills of the game more quickly by linking the basic movement pattern to the technical nature of the basic skills The first section will focus on learning a basic movement pattern, whilst the second section will focus on a more skilful movement pattern; this will result in a complex movement that complements the learning of the required basic skill, whilst at the same time allowing for its assessment at this age group. In turn this will serve as a bridge linking this stage to older age groups. The first section will focus on learning a basic movement pattern whilst the second section will focus on a more skilful movement pattern; this will result in a complex movement that complements the learning of the required basic skill whilst at the same time allowing for its assessment at this age group. In turn this will serve as a bridge linking this stage to older age groups The first section will focus on learning a basic Movement Form whilst the second section will focus on a more skilful movement pattern; this will result in a complex movement that complements the learning of the required basic skill, whilst at the same time allowing for its assessment at this age group In turn this will serve as a bridge linking this stage to older age groups.

The process of improving volleyball skills and achieving a good level of performance is an educational objective pursued by educators particularly given that young beginners in volleyball form the foundation for future clubs and national teams. Furthermore, as there is a lack of focus on mini-volleyball in primary schools especially for this age group it was necessary to develop and standardize tests suited to the ages of these pupils and to utilize the progress they are making in their motor skills in order to assess their performance in these skills by improving their motor skills which is similar in

Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

technique to the overhead pass in volleyball and provides an opportunity for the most talented pupils to take up the sport and become familiar with it at this early age.

The important of this research stems from the need to utilise complex motor patterns with the aim of teaching and assessing fundamental volleyball skills at an early stage this is because pupils foundational skills must be established during the early stages of life and the earlier a pupil masters a skill the faster their future development in that skill will be. Therefore the researchers set out to Building and standardize tests based on complex motor patterns to assess the overhead pass skill in volleyball among Year 3 primary school pupils, and to apply these tests to a group of pupils to determine the accuracy and reliability of the results.

A study by (Waad Rahim Boutros ,2010) titled "The Effect of a Proposed Ball Games-Based Instructional Approach on the Development of Certain Cognitive-Motor Abilities and Basic Movements in 9-Year-Old Elementary School Students which aimed to examine the effect of a proposed ball games-based instructional approach on the development of cognitive and motor skills and basic movements. The sample consisted of 9-year-old elementary school students and the study employed an experimental design One of the most notable findings was that the use of both the proposed teaching programmed and the current programmed led to the development of certain cognitive-motor skills and basic movements in 9-year-old boys and girls and that the proposed teaching programmed was more effective than the current programmed in developing certain cognitive – motor skills and basic movements in 9-year-old boys and girls with the exception of the directional ability The experimental females outperformed the control males in the walking-on-a-board test whilst the experimental males outperformed the control females in the obstacle-crossing test, As for the chalkboard test, no improvement was observed in either sex whilst the experimental males outperformed the experimental females, albeit by relatively small margins in all basic movements (Waad Rahim Boutros, 2010).

As for the study by Ali Jabr Jihad Al-Otaibi (2017), entitled 'The impact of Audiovisual Sensory Modelling on the Development of General Cognitive Ability and the Learning of Serving and Receiving Skills in Mini-Volleyball' which aimed to investigate the effect of sensory-auditory-visual modelling on the development of general cognitive ability and the learning of serving and receiving skills in mini-volleyball, with a sample comprising (10–12)-year-olds was conducted using an experimental approach. One of its most notable findings was that the use of sensory-auditory-visual modelling It has helped to achieve better results in the development of general cognitive ability through demonstrations and simulations; the use of sensory modelling (audiovisual) has made an

Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

effective contribution to the learning of both sending and receiving skills, as well as saving the trainer time and effort in conveying the material to be learnt. (Ali Jabr Jihad, 2017).

Following this review of the most relevant studies on the research topic, it is necessary to present the rationale for drawing on these studies In the three studies reference was made to the importance of basic and complex movement patterns in the development of mini-volleyball skills.

Method and tools

The researchers employed the descriptive approach which is defined as a form of organized scientific analysis and interpretation aimed at describing classifying and analyzing a phenomenon or problem and subjecting it to study and analysis (Kadhim, 2011). The exploratory sample was selected at random (by drawing lots) from pupils in Section (B) comprising 16 pupils (both boys and girls) from the research population who were not included in the main research sample Ten pupils comprising both boys and girls, were selected to represent the pilot sample for test construction As for the sample for the development of tests on complex kinematic figures this comprised 65 pupils – 36 boys and 29 girls – who were selected at random by drawing lots from Sections A and B, constituting 65 per cent of the total research populations shown in Table (1).

Table1. *Shows the distribution of the study population and samples*

Stage	Division	Number of pupils	A pilot study sample	Building ion sample	excluded
3 of Primary School	A	50		20 males 14 females	4
	B	50	10	16 males 15 females	3
Total	2	100	10	36 males 29 females Total: 65	7
Percentage%	%100	%100	%10	%65	%7

Field Research Procedures (Procedures for Determining Tests)

In determining the research variables, the researchers relied on available scientific studies and sources and subsequently consulted with experts and specialists in the fields of testing, measurement motor learning and volleyball (Appendix 1), Compound motor patterns (walking-push, running-push, bending and extending the legs-push) were identified and the overhead pass skill in mini-volleyball was selected taking into account

Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

the age of the sample—third-year primary school pupils—and the fact that they had no prior experience or knowledge of basic volleyball skills...

Objective of developing tests for complex motor patterns

The aim of designing these tests is to assess complex motor patterns (basic movements + basic movements similar to skill performance) in Year 3 primary school pupils. They are used in the following situations (to determine curricula for the development of complex motor patterns in pupils they may also be used as a measure in research addressing the development of complex motor patterns as for the components of these tests, they comprise a set of complex motor pattern tests similar to the skill of overhead passing in volleyball The tests comprise two types static and dynamic. They were presented to nine experts and specialists in testing, measurement motor learning and volleyball as shown in Table (2).

Table2. *shows the calculated percentage values of the opinions of the experts and specialists regarding the validity of the tests designed for complex motor patterns and the technical performance test for the skill of passing from above*

Test Name	Approved	Rejected	Percentage	Accepted and Rejected Tests
Walking and tapping the ball with your fingers from above	9	0	%100	Accepted
Running and tapping the ball with your fingers from above	9	0	%100	Accepted
Bend_ Extend both legs and tap the ball from above with your fingers	8	1	%88.8	Accepted
Pass from above	9	0	%100	Accepted

Description of the Complex Motor Patterns Tests

The primary objective of designing these tests is to measure complex motor patterns (basic movements + basic movements similar to skill performance) in children aged 8–9 years. They are used in the following situations:

1.To determine curricula for the development of complex motor patterns in students.

2. It can be used as a measure in research addressing the development of complex motor patterns.

3. To assess the observable form of the overhead pass skill in volleyball.

As for the components of these tests, they include a set of complex motor pattern tests similar to the performance of basic volleyball skills (overhand pass), and they consist of

Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

two types: static and dynamic. To obtain the results from these tests, the following is required:

1.Before the tests a complete test form must be prepared for all tests.

2.Provide a verbal explanation and a 5-minute demonstration of each skill before beginning.

3.An additional demonstration may be provided if the student does not understand the test.

4.The test is repeated three times for each student.

The appropriate space for conducting these tests is 6 m long by 6 m wide, and the maximum test score (0–10) is based on the observed performance and the Ohio State University Scale of Basic Movements (Appendix 2), as adapted by Noor Jassim (Jassim, N., 2016, p. 114). The tests were presented after being designed to three expert evaluators (Appendix 3) and the highest score from each expert was selected, and the arithmetic mean of the three evaluators scores was calculated The results were evaluated on the day of the test by the support team (Appendix 4) on a scale of 0–3 points

First: Walking and Flicking a Ball Upward with the Fingers Test

Purpose of the test: To measure performance in walking and flicking a ball upward

Age and gender: 8–9 years old both genders

Tools Used: A mini-volleyball court with a marked 6-meter distance in front of the net 4 meters of which is designated for walking and marked with tape (starting line); the finish line is 2 meters from the net which is set at a height of 2 meters above the ground; a 200-gram volleyball a whistle and a ball thrower as shown in the figure (1).

Performance Specifications The student stands with one foot on the starting line, and upon hearing the starting whistle sets off to cover the specified walking distance (4 m). When the student reaches the designated finish line the ball thrower standing behind the net, throws the ball over the net toward the top of the students head The student then flicks the ball upward with their fingers toward the net which is 2 meters from the finish line so that it clears the net.

Test Performance Requirements

Walking Movement/

1- The attempt must be performed from the starting line; otherwise, the attempt must be repeated.

2-The base of support for the feet must be narrow.

3-The stride must be as wide as possible.

4- There must be proper coordination between the arm movements and the leg movements.

Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Ball Tapping Movement/
1- The ball must be tapped upward and forward with the fingers of both hands.
2-The movement of the hands while tapping the ball should form a triangle.
3- The ball must be tapped directly; the student must not catch the ball and hold it to the chest.
4- The ball tapped by the hands must pass over the net.
Scoring Procedure1- Grading is based on the visual appearance of the performance on a scale of (0–10) points, with a maximum score for the test broken down as follows:
Preparatory Section (Walking)/ The student is given a score of (2) and the walking movement is evaluated based on the visual appearance of the performance
Main Section (Tapping) The student is given a score of 5 and the tapping motion is evaluated based on the visual appearance of the performance.
-Each participant is given three attempts and the best attempt is recorded.
2- Scoring is based on the test result and whether the ball crosses the net. A student receives a score of 1 if the ball crosses the net even if it merely touches the net; if the ball does not cross the net the student receives a score of 0. Successful attempts are calculated from the three attempts in which the ball crossed the net.

Test 2: Running and Flicking the Ball Upward with the Fingers
Purpose of the Test: To measure performance in running and flicking the ball upward
Age and Gender: 8–9 years old both genders
Equipment Used: A mini-volleyball court with a 6-meter distance marked in front of the net, 4 meters of which is designated for running and marked with tape (starting line); the finish line is 2 meters from the net which is set at a height of 2 meters above the ground; a 200-gram volleyball a whistle and a ball thrower as shown in the figure (2).
Performance specifications: The pupil stands with one foot on the starting line; upon hearing the starting whistle, they set off and cover the specified running distance (4 m), When the pupil reaches the designated finish line the ball thrower standing behind the net, throws the ball to the pupil over the net and towards the top of the pupil's head so that the pupil can flick the ball upwards with their fingers towards the net which is 2 metres from the finish line so that it clears the net.
Test Performance Requirements
Running Movement/
1- The attempt must be performed from the starting line; otherwise, the attempt must be repeated.
2-The stride length during the run must be as long as possible (long stride).

Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

3-There must be appropriate coordination between the movements of the arms and the legs.

Tapping Movement/

1-The ball must be tapped upwards and forwards with both hands.

2-The movement of the hands whilst tapping the ball must form a triangle.

3-The ball must be tapped directly the pupil must not catch the ball and hold it to their chest.

4- The ball tapped with the fingers must pass over the net.

Scoring Procedure:

1- Marking is based on the apparent form of performance and is scored on a scale of (0–10), with the maximum possible score for the test being divided as follows:

Preparatory section (running)/ The pupil is awarded a mark of (2) and the running movement is assessed based on the apparent form of performance.

Main section (tapping)/ The pupil is awarded a mark of (5) and the tapping movement is assessed based on the visual appearance of the performance.

Final section: The student is awarded a mark out of 3. After finishing tapping the ball with their fingers the body returns to its normal state whilst maintaining balance.

- Each candidate is given three attempts and the best result is recorded
- The scoring method is based on the result of the test and depends on whether the ball crosses the net; the pupil is awarded one mark if the ball crosses the net even if it merely touches it. If the ball does not cross the net the pupil is awarded zero marks Successful attempts are calculated from the three attempts in which the ball crossed the net.

Test 3: (Leg Bend – Straighten) and flicking the ball upwards with the fingers

Purpose of the test: To assess performance in the leg bend and straighten movement from a stationary position and flicking the ball upwards with the fingers

Age and gender: 8–9 years, both genders

Equipment used: Mini volleyball court a mini volleyball net 2 m above the ground and positioned 2 m from the pupil's starting line a 200 g volleyball a whistle a ball thrower standing behind the net as shown in Figure 3.

Performance specifications the pupil stands on the designated performance line 2 m from the net the ball thrower stands behind the net and in front of the pupil the ball throws the ball accurately to the pupil when the whistle sounds the pupil then bends and straightens their legs and flicks the ball upwards towards the net with both hands so that it clears the net.

Test Performance Requirements

Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

1- The pupil must stand on the designated line to perform the test.
2-The pupil must bend and extend their leg whilst kicking the ball.
3-The ball must be tapped upwards and forwards with both hands.
4-The movement of the hands whilst tapping the ball must form a triangle.
5-The ball must be tapped directly the pupil must not catch the ball and hold it to their chest.
6-The ball when tapped with the fingers must pass over the net.

Scoring Procedure:

1-Marking is based on the visual appearance of the performance and is scored on a scale of (0–10), with the maximum possible mark for the test being divided as follows:
Preparatory section (bending and stretching) / The pupil is awarded a mark of (2) for the test, and the bending and stretching movements of the legs are assessed based on the visual appearance of the performance.
Main section (tapping): The pupil is awarded a mark out of 5, and the tapping movement is assessed based on the visual appearance of the performance.
Final section: The pupil is awarded a mark out of 3 after finishing tapping the ball with their fingers, the body returns to its normal position whilst maintaining balance.
Each student is given three attempts and the best attempt is recorded.
2. Scoring is based on the test result and depends on (crossing the net). The maximum test score is (0–3) whereby the pupil is awarded a mark of (1) if the ball crosses the net, even if it merely touches the net however if the ball does not cross the net the pupil is awarded a mark of zero. Successful attempts are calculated from the three attempts in which the ball crossed the net.

Test 4: Repeated overhead pass test against a wall

Purpose of the test: To measure the player's passing speed and their proficiency in performing overhead passes with their fingers this is considered one of the most suitable tests commonly used for young players and beginners
Equipment: A smooth wall with a line drawn parallel to the floor 1.20 cm above the floor a line drawn parallel to the wall on the floor, 1 metre away from it a volleyball a stopwatch.

Performance specifications

The test subject stands behind a line 1 m from the wall (the passing line), holding the ball with both hands in front of their face. They then pass the ball towards the wall, above the line marked on it so that the ball rebounds and reaches them again behind the

Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

passing line, where they continue the pass from above using their fingers. The test subject continues this action for half a minute (30 seconds) as illustrated in Figure 4.

Conditions

1- Passes must be made from behind the passing line at all times during the test
2-Passes must be made above the line marked on the wall, which is 1.20 cm above the floor
3- The time is counted from the first pass for a duration of 30 seconds
4- At the start of the test, the ball must be held with both hands in front of the face, then passed using the fingers
5- If the ball goes beyond the wall or touches the wall below the line marked on it and rebounds in such a way that the test taker continues the pass from in front of the passing line, in all such cases the test taker must catch the ball and restart the test in the same manner as at the start.

Scoring Procedure

- Assessment is based on the visual appearance of the performance, on a scale of 0–10, which is the maximum mark for the test, and is broken down as follows:

Preparatory section: The pupil is awarded a mark of 2. Assessment is based on holding the ball with both hands in front of the face and then beginning to pass it with the fingers.
Main section: The pupil is awarded a mark of 5. The assessment is based on the movement of tapping the ball and continuing to pass it against the wall.
Final section: The pupil is awarded a mark of 3. This is assessed after the pupil has finished pushing the ball with both hands, returned their body to its normal position, and maintained their balance.

Scoring is based on the number of times the ball touches the wall within the 30 seconds allotted for the test; attempts that do not comply with the following conditions are not counted (balls passed at the start of the test or the pass following any interruption caused by a mistake made by the test taker are not counted).

Application of composite motor pattern tests and technical performance testing for the overhead pass skill

Compound motor pattern tests were administered and statistically analyzed to select valid tests and exclude invalid ones based on discriminant validity using the 'two-extreme groups' method as well as to establish the scientific foundations of the tests (validity, reliability objectivity discriminant validity, and difficulty and ease coefficients) (Khamas, 2020) on a pilot sample comprising 65 male and female pupils. On Sunday and Monday (7–8 January 2024), in the school's outdoor playground and in the presence of

Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

the support team the tests were repeated seven days later (14–15 January 2024), and the scientific basis for them was established following the necessary adjustments to ensure they were appropriate for the age of the sample.

Statistical analysis of composite motor pattern tests and the technical performance of the overhead pass

The statistical analysis aims to calculate the discriminatory power and the difficulty and ease coefficients for the composite motor patterns tests and the technical performance of the overhead pass in mini-volleyball. On this basis the researchers employed the two-group method to determine the discriminatory power of the tests. The researchers then carried out the data collection and they then ranked the test scores in ascending order from the lowest to the highest score

If 33 per cent of the highest marks and 33 per cent of the lowest marks from the tests were selected, in order to demonstrate the tests ability to distinguish between the 65 pupils (the development sample), the t-test for independent samples was used between the two extreme groups each comprising 22 pupils to determine the differences between the two groups, as shown in Tables 3 and 4. The test difficulty coefficient also represents one of the key factors in determining the extent to which the tests are appropriate for the sample's level.

'That is, the results of the tests on the study sample should be normally distributed' (Ahmed Aouda/ 2000, p. 20). To verify that the test results of the research sample were normally distributed the skewness coefficient was used as an indicator the results showed that they fell within the normal distribution and did not exceed (1+-) The less skewed the sample results are and the closer they are to a normal distribution, the more this indicates that the tests designed achieved a normal distribution, as shown in Tables (5) and (6).

Statistical Methods Used

The researchers used the Statistical Package for the Social Sciences (SPSS) to process the data and derive the results.

Results

Table3. *shows the mean, standard deviation and t-value for the upper and lower groups, and their significance in calculating the discriminant validity of the composite motor patterns tests and the technical performance test for the overhead pass skill*

Test Name	group	mean	SD	T	Sig	significance
Walking and tapping the ball with your fingers from above	Upper Group	5.545	0.509	6.508	0.000	**Significant**
	Lower Group	4.545	0.509			

Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Running and tapping the ball with your fingers from above	Upper Group	5.409	0.503	5.656	0.000	**Significant**
	Lower Group	4.545	0.509			
Bend_ Extend both legs and tap the ball from above with your fingers	Upper Group	5.454	0.509	5.656	0.000	**Significant**
	Lower Group	4.590	0.503			
Pass from above	Upper Group	5.136	0.351	5.993	0.000	**Significant**
	Lower Group	4.363	0.492			

Table4. *shows the mean, standard deviation and t-value for the upper and lower groups, and their significance in calculating the discriminant validity of the results of the compound motor patterns tests and the technical performance test for the overhead pass skill*

Test Name	Group	mean	SD	T	Sig	significance
Walking and flicking the ball upwards with your toes	Upper Group	1.863	0.710	12.309	0.000	**Significant**
	Lower Group	0.000	0.000			
Running and flicking the ball upwards with your toes	Upper Group	1.818	0.795	10.727	0.000	**Significant**
	Lower Group	0.000	0.000			
Bending and straightening your legs whilst flicking the ball upwards with your toes	Upper Group	1.954	0.785	11.672	0.000	**Significant**
	Lower Group	0.000	0.000			
Passing from above	Upper Group	7.590	0.590	16.667	0.000	**Significant**
	Lower Group	4.954	0.485			

Table5. *shows the ease and difficulty coefficients for the motor skills tests and the technical performance test for the overhead pass skill*

Test Name	mean	SD	Median	Skewness

Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Walking and flicking the ball upwards with your toes	5.03	0.585	5.00	0.002
Running and flicking the ball upwards with your toes	4.98	0.545	5.00	0.012
Bending and straightening your legs whilst flicking the ball upwards with your toes	5.02	0.545	5.00	0.012
Passing from above	4.83	0.486	5.00	0.420

Table6. *shows the ease and difficulty coefficients for the motor skills test and the technical performance test for the overhead pass skill*

Test Name	mean	SD	Median	Skewness
Walking and flicking the ball upwards with your toes	0.89	0.904	1.00	0.742
Running and flicking the ball upwards with your toes	0.89	0.904	1.00	0.873
Bending and straightening your legs whilst flicking the ball upwards with your toes	0.91	0.964	1.00	0.838
Passing from above	4.40	0.806	4.00	0.126

Table7. *sets out the scientific basis for the tests of complex movement patterns and the technical performance test for the overhead pass skill*

Test Name	Unit of measurement	Stability	validity	Objectivity
Walking and flicking the ball upwards with your toes	Degree	0.231	0.480	0.501
Running and flicking the ball upwards with your toes	Degree	0.101	0.317	0.403
Bending and straightening your legs whilst flicking the ball upwards with your toes	Degree	0.051	0.225	0.335
Passing from above	Degree	0.468	0.684	0.588

Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Discussion

The results show that the four tests developed and standardized by the researchers achieved their objective of assessing the passing skill performance of third-grade elementary school students from the highest level and resulted in individual differences that were for the most part normally distributed among the students The researchers attribute these results to their adherence to sound scientific principles methodological procedures and statistical analyses in the development and standardization of the tests The validity of the tests in measuring what they were designed to measure their suitability for the target sample of students on which the measurement specifications in all tests are based as well as the objectivity and accuracy in obtaining results, since the concept of standardization precisely defining the conditions for administering the measure so that a single method is used in its administration, in scoring, and in interpretation This means controlling for all variables that could affect the measure's results so that differences among individuals can be reliably attributed to their own characteristics rather than to other variables. (Faraj, 2012) Researchers also agree with Sami that "tests do not measure or evaluate people as individuals, but rather measure and evaluate specific characteristics at a given time and then compare responses." (Al-Khatatna, 2013) "The use of standard scores becomes necessary when the primary goal is to interpret an individual's score in light of the performance of a large normative sample; for this reason, large normally distributed samples that are representative of the population are used and their design takes into account the necessary statistical considerations of randomness and adequate representation. (Al-Obaidi, 2011) Researchers agree with (Wesley) There is a strong relationship between the results of physical tests measuring ability, strength and speed and the results related to skill-based aspects." (Wesley, 2006) Furthermore "motor coordination is the athlete's ability to coordinate the individual movements of his or her body with one another in terms of space and time, and to demonstrate this coordination when facing an opponent or using equipment." (Hoffmann, 2012)

Conclusions

Through the procedures and data analysis the researchers reached the following conclusions:

1-The composite motor skills tests demonstrated apparent validity an objectivity coefficient difficulty and ease indices discriminatory power stability and a normal distribution with values acceptable according to the scientific criteria and coefficients for test acceptance in physical education and sports science.

Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

2- The complex motor pattern tests serve their purpose in assessing the overhead passing skill specific to youth volleyball.

Recommendations

1- The researchers recommend applying the findings of this study by using the measurement tool comprising four tests of complex motor patterns to assess overhead passing skills in young volleyball players.

2- The researchers recommend focusing on conducting such tests, which can identify whether young players are talented in a particular sport at an early stage so that they can be selected.

3- Conducting similar studies on other sports and activities particularly for these age groups.

Journal of Physical Education
Volume 38 – Issue (Special Issue) – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

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Journal of Physical Education

Volume 38 – Issue (Special Issue) – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Constructing and Standardizing a Mental Stress Scale During Competition for Iraqi Professional Basketball League Players

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DOI:

https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2358

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Article history: Received 9/September/2025; Accepted 26/ September /2025; Available online 28/October/2026

Abstract

The current research aims to constructing and standardizing a scale for mental stress during competition for Iraqi Professional Basketball League Players, season 2024-2025. Mental stress is considered one of the most prominent psychological challenges related to cognitive processes such as perception, attention, and memory. High levels of stress lead to decreased concentration and reduced ability to make quick decisions, negatively impacting competitive performance. Given the lack of specialized scales in this field within the local arena, the need arose to design a scientific instrument with accurate psychometric properties that would serve as a reliable reference for assessing mental stress levels. The research population consisted of 120 players representing league clubs (Air Defense, Dijlah University, Police, Zakho, Popular Mobilization Forces, Al-Karkh, North Gas, Hilla, Electricity, Trade, and Darbandikhan). They were divided into pilot and standardization samples. The research resulted in the successful constructing and standardizing of the scale, revealing a clear variation in mental stress levels among the players. The study concluded that the scale could be used by the Iraqi Basketball Federation as an accurate diagnostic tool to measure mental stress and differentiate between its levels (low, medium, and very high), which would contribute to designing psychological programs and preparing training plans that respond to the individual needs of players and enhance their competitive performance.

Keywords: Mental Stress, Competition, Basketball Players, Scale Standardization

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

Mental fatigue is one of the most prominent manifestations of cognitive processes, as it is linked to perception, attention, and memory, and affects them in an interconnected way that can lead to poor concentration, reduced decision-making ability, incorrect responses, or disruptions in cognitive processing. In the sports field, mental fatigue is considered one of the most complex psychological phenomena. It arises from the multitude of thoughts during competition, the pressures of matches, and impaired recall of past skills, which affects the player's ability to execute tasks and perform as required. Its symptoms can also extend to the physical aspect due to pressures and surrounding environmental conditions.

Basketball competitions are an environment full of physical and psychological challenges, where players face high levels of mental fatigue due to the pressure of high expectations from coaches and management, the pressure of the audience, and the rapid decisions required in game situations. These factors make mental fatigue a key factor that can limit players' ability to concentrate and lead to a decline in their competitive performance, negatively impacting the level of basketball locally.

Despite the importance of this variable, the literature in the Iraqi environment shows a clear lack of scientific measures specialized in studying mental stress during competition in basketball, as most of the available measures were either designed for different environments or for other sports fields, which reduces their accuracy in diagnosing stress levels among Iraqi professional league players who have special cultural and environmental characteristics. Hence, the research problem emerged in the need to build a local and standardized measure to measure mental stress during competition among Iraqi professional basketball league players, which includes accurate psychological dimensions that are appropriate to the nature of the Iraqi player, and has scientific psychometric properties that make it an approved and reliable tool in assessing mental stress levels and developing training and psychological programs aimed at improving competitive performance.

Methodology and Tools

The methodology chosen by the researcher is assumed to be suitable for solving the research problem. Therefore, the researcher chose the descriptive survey method using correlational analysis, as it is appropriate to the nature of the research problem.

The current research population was defined as the players of the Iraqi Professional Basketball League clubs for the 2024-2025 season, distributed as (12) players per club. The clubs were: Air Defense, Dijlah University, Police, Zakho, Popular Mobilization Forces, Karkh, North Gas, Hilla, Electricity, Trade, and Darbandikhan. The total number of players was (120), after excluding professional players, leaving a final number of (98) players. The researcher used 100% of the current research population and divided the sample into (3) samples (exploratory, constructive, and standardization):

The first exploratory sample included (3) players, randomly selected by lottery, representing (2.5%) of the total research sample. The researcher conducted a preliminary pilot test on this sample.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The sample used to develop the scale (the Mental Stress During Competition Scale) consisted of 75 players, representing 62.5% of the total research sample. The researcher developed the scale.

Scale Construction Procedures

These are a set of basic steps that can be followed when constructing a test or scale, and how to link the scale's units to measure the overall aspects of a skill, trait, characteristic, or ability. The scale is considered one of the most important tools used in research that relies on measuring psychometric properties, as it provides data and information that help the researcher address and evaluate the existing problem (Awais, 2003, p. 151).

1- Defining the Concept of the Mental Stress Scale

To define the phenomenon to be measured, it must be clear, precise, and measurable. Based on this, the researcher defined his scale as the Mental Stress Scale during Competition for Players of Iraqi Professional Basketball League Clubs. Given the lack of previous scales for this variable, the researcher constructed and standardized the scale according to scientific principles, relying on a theoretical and an operational definition (Ahmed, 2006, p. 28). After reviewing previous studies and conducting personal interviews, the researcher finalized the scale.

2- Defining the Objective of the Mental Stress Scale During Competition

The objective of the mental stress scale should be... Clear, understandable, and consistent with the nature and characteristics of the scale, which vary according to the objectives it is designed to achieve. The objective is the cornerstone and the first building block in the process of constructing scales. This objective should be linked to the importance of the phenomenon under study, the motivations for studying it, and the researcher's inclinations and interests. The objective must be precisely defined and measurable (Ali et al., 2015, p. 26).

3- Defining the theoretical framework of the phenomenon to be measured

By reviewing sources, references, and studies related to the topic of mental stress, the researcher becomes familiar with the nature, importance, dimensions, and domains of this phenomenon. This helps in preparing the theoretical content of the scale. This aspect is a fundamental step in constructing scales, as the measured phenomenon must be based on a clear theoretical framework that is used to accurately define and interpret the subdomains (Ahmed, 2006, p. 50).

4- Defining the domains of the mental stress scale

Based on the theoretical definition of the concept of mental stress during competition, and after reviewing relevant literature and studies, it was proposed The researcher identified seven main areas and prepared an open-ended questionnaire, which was presented to a group of experts in sports psychology, measurement and testing, and basketball. The aim was to

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

determine the most important areas contributing to the development of the scale and its reference framework. The following core areas were adopted: sense of responsibility, competitive environment, sense of the importance of competition time, inability to cope with competitive problems, feeling fatigued, self-confidence, and feeling tense. These areas represent states of mental strain during competition and facilitate application and discussion. Twenty-one experts participated in the evaluation, assessing the validity of the areas and their operational definitions. They provided feedback on additions, mergers, deletions, or modifications as needed. Using percentages as a statistical measure to gauge the level of agreement among the experts, five areas were adopted: sense of responsibility, competitive environment, sense of the importance of competition time, feeling fatigued and tense, and self-confidence. These five areas achieved a very high percentage, exceeding75%. Two areas, inability to cope with competitive problems and feeling tense, were excluded because their percentages were unacceptable, falling below 75%. For any field to be accepted, the percentage of agreement on it must exceed (75%), as indicated by(Zoukan et al., 2004),and as shown in Table(1).

Table 1. *shows the percentages of expert agreement on the areas of the mental stress scale during competition*

No.	The nominated areas	Number of experts agreeing	Number of experts disagreeing	Percentage of agreement	Type of indication
1	Sense of responsibility	21	0	%100	acceptable
2	Competitive environment	20	1	%95	acceptable
3	Sense of the importance of competition time	19	2	%90	acceptable
4	. Inability to cope with competitive problems	14	7	%66	unacceptable
5	Feeling mentally tired and stressed	19	2	%90	acceptable
6	Self-confidence	18	3	%85	acceptable
7	Feeling stressed	15	6	%71	unacceptable

Preparing the Initial Formulations of the Mental Stress During Competition Scale Items

The scale items must have a specific and clear meaning, represent the domains under investigation, be related to the study objectives, and be formulated in correct and understandable language, using short, unambiguous, and neutral statements. Based on these conditions, the researcher followed the scientific method in formulating the initial statements in a manner appropriate to the specificities of the sample. Each item accurately reflects the

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

content of its respective domain, based on the theoretical definition of each domain. The items were then distributed across the domains, and suitable answer choices were determined.

The initial wording of the items was presented to a group of experts and specialists in sports psychology, measurement and evaluation, and basketball to determine its suitability for measuring the phenomenon and its appropriateness to the designated domain, in addition to evaluating the proposed answer choices. Based on their opinions and the established criteria, the items that received their approval were retained for inclusion in the initial version of the scale before conducting the statistical analysis, as shown in Table (2).

Table 2. *Show the answer choices according to the Likert scale*

Alternatives	Always	Sometimes	Rarely	Often	Absolutely
Score	5	4	3	2	1

The scale was scored by assigning a score to each player's response and to each item. These scores were then totaled to calculate the total score for each item. To determine the score obtained by the sample for each of the 44 items on the scale, the highest possible score for each item was 5, and the lowest was 1. The highest possible score for the scale was 220, the lowest was 44, and the hypothetical mean was 132.

The scale was scored in the highest possible way by assigning a score to each item. Main Experiment for Developing a Mental Stress Scale During Competition:

The purpose of this experiment was to apply the preliminary version of the Mental Stress Scale During Competition. The objective was to statistically analyze the items, determine their discriminatory power, and identify the discriminating and non-discriminating items. To achieve this, the main experiment (construction sample) was conducted from Thursday, April 3, 2025, to Friday, April 11, 2025. This involved administering the scale to a construction sample of 75 players from Iraqi professional basketball clubs for the 2024-2025 season. After completing the final distribution of questionnaires and collecting responses from the sample, which took nine days due to the clubs being located in several governorates, requiring additional time to reach them and obtain accurate data, the researcher obtained 75 questionnaires. The items were arranged sequentially without specifying the scale's domains (see Appendix 1). The Mental Stress During Competition Scale consisted of (51) items distributed across five main domains: sense of responsibility, competitive environment, sense of the importance of competition time, sense of mental fatigue and tension, and self-confidence. The items were arranged sequentially without indicating their domains to avoid influencing the participants' responses.

Following the completion of the main experiment, the researcher sorted and corrected the response forms for the research sample (the construct sample). The data were then compiled in preparation for statistical analysis with the assistance of the research team.

Statistical Analysis of the Items of the Mental Stress During Competition Scale:

One of the most important steps in constructing scales and tests is conducting statistical analysis of their items after presenting the questionnaire to a group of individuals, then correcting and statistically analyzing it. Furthermore, this improves the quality of the scale by identifying weaknesses in the items and then working to either reformulate or discard them if they are not valid (Alian & Ghoneim, 2000, p. 44).

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Table 3. *Shows the descriptive characteristics of the construct sample for the Mental Stress During Competition Scale*

Characteristics	Mean	Meaning	S.D	S.E	Seq.	Lowest Score	Highest Score
Mental stress	168.68	1670.00	8.33	.277	.739	154.00	196.00

First: (Discriminatory Ability) The two extreme groups

"Discriminatory ability refers to the ability to differentiate between individuals who score highly and those who score low" (Al-Kubaisi, 2010, p. 276). Based on this, the researcher followed these steps:

• The total scores were arranged in descending order. Then, the highest and lowest 27% of the total scores were selected. The upper group represented 27% of the highest scores on the statements obtained from the players, and the lower group represented 27% of the lowest scores on the statements obtained from the players. The total number of players was (75) from the clubs.

• The scores were statistically analyzed using the SPSS statistical package, and the distinctive items were extracted using a t-test to examine the significance of the differences between the means of two independent (uncorrelated) samples from the upper and lower groups. The researcher used items whose significance value was less than the established significance level (0.05).

Second: Internal Consistency Coefficient

The researcher used the internal consistency coefficient to measure the extent to which an item belongs to the scale or domain. This was done by calculating the correlation coefficient between each item and the total score for the scale and domain, as well as the correlation coefficient between the domain and the scale as a whole. Using the internal consistency method adds the following advantages to the scale (Al-Samarrai & Al-Baldawi, 1987, p. 90):

1) It highlights the correlation between the items.
2) It is considered a construct validity aspect.
3) It establishes the reliability of the items.
4) It makes the scale consistent in its scope, as each item measures the same behavioral dimension that the entire scale measures. The researcher employed three types of internal consistency to achieve this:

a) The relationship between item score and total scale score

This procedure involves establishing a correlation between each item and the total scale score for all participants in the sample. The aim is to verify whether the responses to the items are appropriately consistent with the behavioral or personality traits reflected in the scores. A correlation between an item score and the total scale score indicates that the item represents the concept or trait targeted for measurement. This correlation serves as evidence that the item actually measures the behavioral dimension the scale seeks to assess. To ensure

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

the consistency of the scale items in measuring the phenomenon, Pearson's correlation coefficient was used between the score of each item and the total scale score for all participants in the sample. The results showed that 46 items were statistically significant and 5 were not.

b) Relationship between item score and total domain score

The researcher determined the correlation between item score and total score for each of the five domains using Pearson's Law.

c) Relationship between total domain score and total scale score

The researcher determined the correlation between total domain score and total scale score using Pearson's Law, as shown in Table (4).

Table 4. *The correlation coefficient between the domain and the overall scale score is shown*

No.	Dominance	Pearson	Significance Value	Type of Significance
1	Sense of responsibility	0.849**	00.000	Sig.
2	Competitive environment	0.621**	00.000	Sig.
3	Sense of the importance of competition time	0.710**	00.000	Sig.
4	Feeling mentally tired and stressed	0.649**	00.000	Sig.
5	Self-confidence	0.462**	0.002	Sig.

Presentation and analysis of the determination of standard levels for the mental stress scale during competition.

To achieve the second objective of standardizing the (standards and levels) of the mental stress scale during competition among players in Iraqi professional basketball league clubs, and after determining that the sample is normally distributed via the skewness coefficient, in addition to obtaining the standardized scores, it was necessary to use Gauss's normal distribution method. This is one of the most common distributions in the field of physical education because many of the qualities and characteristics measured in this direction are almost normally distributed. The normal distribution curve is a bell-shaped normal curve, dividing the curve into two equal parts, to the right and left of this line. Furthermore, the characteristics of the normal distribution represent (99.73%) of the population (the research sample), as there are three standard deviations to the right of the arithmetic mean and three to the left of it. This mean that there are six standard scores corresponding to six standardized levels, meaning that each standard score corresponds to ten adjusted (t) standard scores, which certainly correspond to one standardized level. In other

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

words, the upper limit of the standard scores represents the arithmetic mean. Added to it are three deviations to the right. The minimum is represented by the arithmetic mean plus three standard deviations to the left, as (68.26%) of the sample are spread over two standard deviations distributed between (+C1 and -C2). In light of this, the percentage will be determined in the two levels (average and acceptable). As for the level (good and weak), the percentage is spread over (27.18%), and it is certainly distributed equally between the two levels, meaning that the percentage of each of them is (13.59%). As for the range between the two standard deviations (±C3), as we mentioned earlier, it is (99.73) if we subtract from it the deviations between (±C2), which amount to (95.44%), and it corresponds to the levels (high, average, acceptable, moderate). The remaining percentage is (4.28%), and it is distributed equally between the two levels (very high and low), and each of them has a percentage of (2.14%). (Saloum, 2016).

Therefore, each pair of adjacent deviations represents a stage of psychological stress during competition that the player reaches. For example:

The levels (low and acceptable) represent the stage of high motivation and initial stress. The player is in a state of excessive physical and mental readiness. This stage is characterized by a significant increase in focus and attention, rapid decision-making, and the beginning of the load on cognitive processes (Wilson, 2007).

The levels (moderate and average) represent the stage of escalating mental stress, characterized by an increasing cumulative mental load and a decrease in mental efficiency, especially in reading the game, evaluating options, and reaction speed (Badin, 2016).

Meanwhile, the levels (high and very high) represent acute stress, mental exhaustion, and collapse. This is characterized by a loss of mental organization (forgetting tactics), slow perception of spaces and areas, and constant distraction (Fardal, 2020), as explained. Table (5)

Table 5. *Levels and their corresponding percentages in the normal distribution, raw and standardized scores (Z and T), number of practices, and percentage of the standardization sample for the mental stress scale during competition*

Normal distribution proportion	Crude score	Standard score z	Standard score T	Sample	percentage
Very High %2.14	193 and above	2.03707and above	70.37and above	5	%5.263
High%13.59	192-182	1.53267-1.11233 -	65.33 -61.12	7	%7.368
Moderate %34.13	169-181	0.86013-0.01947 -	58.60-50.19	30	%31.578
Moderate %34.13	157-168	0.06460-0.98933 -	49.35-40.11	45	%47.368
Acceptable%13.59	164-156	1.07340-1.91406 -	39.27-30.86	7	%7.368
Low 2.14 %	and below 145	3.76353-	12.36	1	%1.052
	TOTAL			95	%99.99 (%100)

From the above, we observe that the sample results fell within the following levels: very good, good, average, acceptable, weak, and very weak. The table above shows the number of participants in the sample according to their scores and standard levels, and the percentages of the research sample distributed across these levels in terms of mental stress during competition. The percentage was 5.263% in the first level (very good), 7.368% in the second level (good), which is lower than the normal distribution, 31.578% in the third level (average), 47.368% in the fourth level (acceptable), which is higher than the normal distribution, 7.368% in the fifth level (weak), and finally, 1.052% in the sixth level (very weak).

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Thus, we achieve the second objective of the research by standardizing the (standards and levels) of the mental stress scale during competition for Iraqi professional basketball players.

Presentation and discussion of the results of the mental stress scale during competition

Table 6. *Shows the arithmetic mean, standard deviation, hypothetical mean, t-value, significance level, and type of statistical significance for the mental stress scale during competition*

Scale	A.M.	S.D.	T-value	Sig. Level	Sig. Type
Mental Stress During Competition	173.4667	31.4674	11.412	0.000	Sig.
Hypothetical Mean			132		

Table (6) presents the results of the mental stress scale during competition. The scale as a whole achieved a mean of (173.4667), a standard deviation of (31.4674), and a calculated t-value of (11.412). Comparing the mean to the hypothetical mean of (132), we find that the difference was statistically significant, favoring the mean, which is higher than the hypothetical mean.

The research evidence indicates that mental stress in basketball is not caused by a single factor, but rather by the accumulation of several cognitive, psychological, and tactical pressures interacting with a fast-paced, competitive sporting environment where the outcome is decided in mere seconds, as will be explained in the discussion of the scale's components.

Conclusions

1. The constructing and standardizing of the mental stress scale during competition for players in Iraqi professional basketball league clubs was successful.
2. By applying the mental stress scale during competition to the sample group, it was found that its items were clear, indicating its potential use by coaches and researchers to measure this variable.
3. Reliance on a normal distribution reflects the quality of the scale's psychometric construction. It indicates that the scale avoids bias towards any particular group and offers high reliability for future use.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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Volume 38 –Special Issue– 2026 Open Access
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Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Identifying Classroom Control Skills in Postgraduate Teaching Staff at The College Of Physical Education and Sports Sciences, University of Baghdad

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DOI:

https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2272

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Article history: Received 27/March/2025; Accepted 30/April/2025; Available online 28/ October/2026

Abstract

The research aimed to identify the possession of classroom control skills by instructors at the College of Physical Education and Sports Sciences, University of Baghdad. by developing a classroom control skills scale from the students' perspective. The study sample included 33 students, representing 73.33% of the total number of graduate students at the college. The researcher used the descriptive methodology due to its suitability for the study. The results indicated that instructors possess classroom control skills. The conclusions were as follows: Instructors' adherence to regulations motivated students and enhance self-discipline and commitment to rules, Instructors' ability to manage activities effectively allowed for optimal time management, minimizing idle time that could lead to disruptive behaviors, The main recommendations included: The need to enhance instructors' classroom control skills to ensure a well-disciplined learning environment, Studying the relationship between classroom control skills levels and student learning outcomes.

Keywords: classroom control skills, Postgraduate studies, methods of teaching.

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Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Introduction

The instructional and educational process for students represents the essential means for attaining academic objectives. The Teacher acts as the direct agent responsible for translating values and ideals into behavioral action that students emulate. Teaching, much like other specialized professions, encompasses a numerous sub-skill, a professional cannot reach a success unless he masters each of these individual skills. Class control refers to regulating student behavior during the teaching process in accordance with established class systems and rules, which eases the flow of the progression with the active participation of all instructional elements. Historically, the concept of classroom control revolved around punishment or intimidation to enforce discipline. Conversely, the modern concept of classroom control is rooted in democratic principles that avoid forcing or stifling students. Instead, it focuses on providing appropriate activities and employing proper methods to enhance motivation and encourage student engagement (Al-Dweik, Adas, Al-Dweik , & Hussein, 2009) .

Researchers have also pointed out that the process of classroom control is highly critical and constitutes a fundamental component of the educational structure. It involves a complex set of behaviors used to cultivate a suitable classroom environment that facilitates effective teaching and learning; thus, discipline and education go hand in hand. Consequently, classroom control is indispensable for executing quality work in the field of education (Adas & Mosleh, 1998) . Furthermore, classroom control serves as a benchmark for the success of educational activities in the academic domain by establishing order within the classroom, forming a central pillar and foundation for the educational process's success and objective achievement. For classroom learning to be successful, it must be regulated by an appropriate educational environment provided by the high performance competence of instructors and their capacity to interact effectively with students. (Al-Harahsheh & Khawaldeh, 2009) say that the Classroom control is an essential component of the teacher’s role and responsibilities, and it is manifested through the behaviors employed to facilitate the teaching and learning process effectively.

A study by (Haqqar & Saada Muhammed, 2021) highlighted the significance of strengthening classroom control skills among teachers, encouraging the adoption of teaching styles that boost student interaction, and preparing an adequate classroom environment to achieve discipline. Meanwhile, a study by (Al-Taani, 2011) recommended employing modern educational technologies to enhance learning, including educational activities which ranked first in practice, indicating teachers' awareness of their importance in classroom control and attracting classroom interaction.

Similarly, a study by (Dalal & Hamnah, 2014) illustrated the importance of utilizing appropriate control methods and their direct impact on increasing compliance among students. A study by (Fawzi, 2015) concluded that the integration of technology by instructors significantly helped improve their control skills. Furthermore, a study by (Jessup, 1995) proved that a teacher's classroom control skills must be multidimensional-encompassing philosophical knowledge, communication, and positive relationship building and noted that these skills are easily acquired.

The research problem manifests in the absence of a specialized scale for classroom control skills alongside the need to identify these skills among postgraduate faculty members. Moreover,

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

evaluation from the students' perspective is a crucial measure of an instructor's control skills, emphasizing the student as the primary beneficiary and driver of the instructor's methods and choices. Instructors also face various classroom management challenges that directly influence the learning environment and student performance. In light of this, the study sought to identify classroom control skills among postgraduate faculty members at the College of Physical Education and Sports Sciences from the students' perspective by developing a dedicated measurement scale.

Methodology and research samples

The researcher adopted a descriptive methodology due to its suitability for the research procedures. This approach ensures the provision of adequate data regarding the investigated phenomenon and aids in reaching a scientific explanation for it (Al-Jadri, 2015, p. 219)

The research target population consisted of postgraduate students (Ph.D. and Master's) for the academic year 2024/2025 at the College of Physical Education and Sports Sciences, University of Baghdad, totaling (45) students. The participants comprised postgraduate students at the University of Baghdad, totaling (33) male and female, representing a percentage of (11.38%), distributed as (15) Ph.D. students and (18) Master's students. They were divided as shown in Table (1) as follows:

Table 1. *Details of The Research Sample*

Total sample size	Males	Females	Ph.D	Master's	Pilot study sample	Application sample
45	16	17	15	18	3	33

Scientific Foundations of the Scale

The researcher designed the scale based on proper scientific. The scale's fields totaling (12), were presented to (11) experts. They were requested to evaluate suitability of the presented fields along with their definitions, with the option to delete, combine or modify any domain.

The experts agreed on accepting (6) fields and rejecting (6) fields. The item phrasing relied on the three-alternatives (Likert scale) to simplify the answering process without utilizing too many alternatives. This also reduces ambiguity and response bias found in scales with numerous choices. Furthermore, it is deemed the most appropriate format as it is commonly used to measure general satisfaction and attitudes toward a specific topic (Al-Jarjawi, 2010).

The scale consisted of (41) items. Each item faced three response alternatives: (Applies, Neutral, and Does not apply). The scores were assigned respectively as (3,2,1) the highest score a respondent can obtain is (123) and the lowest score is (41).

Statistical Analysis of the Scale

First: The Extreme Groups Method (Discriminatory Power)

The researcher used the extreme groups method to detect the distinctive items in the scale. This method involves dividing the sample members representing the research population into two

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

extreme groups. To achieve this, the responses of the sample consisting of (33) students were arranged from highest to lowest. Subsequently, the two extreme groups were determined, with each group representing (27%) a ratio of (0.27) of the construction sample. This resulted in (9) students in the high-scoring group and (9) students in the low-scoring group, while the middle group included (15) students.

The discriminatory power was obtained using the T-test for two independent, uncorrelated samples to find the significance of differences between the arithmetic means of the upper and lower groups. The researcher accepted the items whose significance value was less than (0.05) with a degree of freedom of (16).

Table 2. *Discriminatory power of each item in the classroom control scale*

Item No.	Lower group		Upper group		Calculated t-value	significance value	Result
	m	sd	m	sd			
1	1.6452	0.48637	3.0000	0.00000	-15.510	0.000	significance
2	1.7419	0.44480	3.0000	0.00000	-15.748	0.000	significance
3	1.6774	0.47519	3.0000	0.00000	-15.497	0.000	significance
4	1.5806	0.50161	3.0000	0.00000	-15.755	0.000	significance
5	1.8065	0.40161	3.0000	0.00000	-16.547	0.000	significance
6	1.8387	0.37388	3.0000	0.00000	-17.294	0.000	significance
7	1.8065	0.40161	3.0000	0.00000	-16.547	0.000	significance
8	1.9032	0.39622	3.0000	0.00000	-15.412	0.000	significance
9	2.0000	0.57735	3.0000	0.00000	-9.644	0.000	significance
10	2.0323	0.48193	3.0000	0.00000	-11.180	0.000	significance
11	2.2903	0.73908	3.0000	0.00000	-5.346	0.000	significance
12	2.1613	0.68784	3.0000	0.00000	-6.789	0.000	significance
13	2.1935	0.60107	3.0000	0.00000	-7.470	0.000	significance
14	2.2258	0.56034	3.0000	0.00000	-7.693	0.000	significance
15	1.9032	0.30054	3.0000	0.00000	-20.319	0.000	significance
16	2.0323	0.48193	3.0000	0.00000	-11.180	0.000	significance
17	2.2581	0.63075	3.0000	0.00000	-6.549	0.000	significance
18	2.2258	0.56034	3.0000	0.00000	-7.693	0.000	significance
19	2.1935	0.54279	3.0000	0.00000	-8.272	0.000	significance
20	2.0000	0.44721	3.0000	0.00000	-12.450	0.000	significance
21	2.0323	0.40693	3.0000	0.00000	-13.241	0.000	significance
22	1.6452	0.48637	3.0000	0.00000	-15.510	0.000	significance
23	1.8065	0.40161	3.0000	0.00000	-16.547	0.000	significance
24	1.8710	0.34078	3.0000	0.00000	-18.447	0.000	significance
25	1.9355	0.57361	3.0000	0.00000	-10.333	0.000	significance
26	2.0323	0.60464	3.0000	0.00000	-8.911	0.000	significance
27	1.7097	0.46141	3.0000	0.00000	-15.570	0.000	significance
28	2.0000	0.51640	3.0000	0.00000	-10.782	0.000	significance
29	2.2258	0.49730	3.0000	0.00000	-8.668	0.000	significance
30	2.1613	0.37388	3.0000	0.00000	-12.490	0.000	significance
31	1.9032	0.30054	3.0000	0.00000	-20.319	0.000	significance
32	1.8710	0.34078	3.0000	0.00000	-18.447	0.000	significance
33	2.0000	0.44721	3.0000	0.00000	-12.450	0.000	significance

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

34	1.7097	0.46141	3.0000	0.00000	-15.570	0.000	significance
35	1.7742	0.42502	3.0000	0.00000	-16.058	0.000	significance
36	1.9677	0.54674	3.0000	0.00000	-10.512	0.000	significance
37	1.7742	0.42502	3.0000	0.00000	-16.058	0.000	significance
38	1.7742	0.42502	3.0000	0.00000	-16.058	0.000	significance
39	1.6774	0.47519	3.0000	0.00000	-15.497	0.000	significance
40	1.9032	0.39622	3.0000	0.00000	-15.412	0.000	significance
41	2.0323	0.54674	3.0000	0.00000	-9.855	0.000	significance
42	1.8387	0.37388	3.0000	0.00000	-17.294	0.000	significance
43	1.7097	0.46141	3.0000	0.00000	-15.570	0.000	significance
44	2.4839	0.67680	3.0000	0.00000	-4.246	0.000	significance
45	1.6452	0.48637	3.0000	0.00000	-15.510	0.000	significance
46	2.0968	0.59749	3.0000	0.00000	-8.417	0.000	significance
47	1.9355	0.24973	3.0000	0.00000	-23.733	0.000	significance
48	1.7742	0.42502	3.0000	0.00000	-16.058	0.000	significance
49	2.1613	0.58291	3.0000	0.00000	-8.011	0.000	significance
50	1.8065	0.40161	3.0000	0.00000	-16.547	0.000	significance

The significance value is statistically significant if it is > 0.05 with 16 degrees of freedom. It is found that all items of the scale are statistically significant at the 0.05 significance level.

Second: Internal Consistency Coefficient

The internal consistency coefficient is used to determine the homogeneity of the items in measuring the phenomenon and their ability to highlight the correlation between the scale's items (Amer & Ayman, 2016). The researcher utilized three types of internal consistency:

A- Correlation of Item Degree with the Overall Score

This process aims to find the homogeneity relation between each individual item and the total score of the scale. The main goal of this procedure is to determine whether the responses to the items are consistent and logically interrelated with the behavioral tendencies or personality traits assumed by the scores. Furthermore, the correlation of the item score with the overall score of the scale signifies that the item accurately reflects the concept or trait intended to be measured. This is because the item-total correlation serves as a clear indicator that the item indeed measures the specific behavioral dimension that the scale is designed to evaluate.

Table 3. *Correlation of Item Degree with the Overall Score*

Item No.	Pearson correlation coefficient	significant	Result	Item No.	Pearson correlation coefficient	significant	Result
1	0.650**	0.000	significance	26	0.528**	0.000	significance
2	0.747**	0.000	significance	27	0.553**	0.000	significance
3	0.743**	0.000	significance	28	0.587**	0.000	significance
4	0.644**	0.000	significance	29	0.572**	0.000	significance

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

5	0.571**	0.000	significance	30	0.645**	0.000	significance
6	0.569**	0.000	significance	31	0.560**	0.000	significance
7	0.596**	0.000	significance	32	0.556**	0.000	significance
8	0.589**	0.000	significance	33	0.529**	0.000	significance
9	0.576**	0.000	significance	34	0.612**	0.000	significance
10	0.723**	0.000	significance	35	0.629**	0.000	significance
11	0.587**	0.000	significance	36	0.558**	0.000	significance
12	0.561**	0.000	significance	37	0.684**	0.000	significance
13	0.706**	0.000	significance	38	0.656**	0.000	significance
14	0.627**	0.000	significance	39	0.591**	0.000	significance
15	0.671**	0.000	significance	40	0.567**	0.000	significance
16	0.585**	0.000	significance	41	0.621**	0.000	significance
17	0.532**	0.000	significance	42	0.681**	0.000	significance
18	0.611**	0.000	significance	43	0.652**	0.000	significance
19	0.630**	0.000	significance	44	0.574**	0.000	significance
20	0.650**	0.000	significance	45	0.566**	0.000	significance
21	0.543**	0.000	significance	46	0.638**	0.000	significance
22	0.584**	0.000	significance	47	0.641**	0.000	significance
23	0.659**	0.000	significance	48	0.590**	0.000	significance
24	0.617**	0.000	significance	49	0.717**	0.000	significance
25	0.631**	0.000	significance	50	0.588**	0.000	significance

The significance value is statistically significant if it is > 0.05

The factor analytical aims to study phenomena and extract factors that have been influenced by analyzing multiple data whose components correlate with each other in varying degrees in an independent descriptive form based on qualitative foundations for classification. (Hani, 2018) Factor analysis is "a statistical method that aims to interpret positive correlation matrices that have statistical significance between different variables included in the analysis" (Thaer, 2015). After factor analytical procedures and analyzing the outcomes of the Classroom Control Skills Scale, the researcher reached a final version consisting of (41) items. This final set represents a percentage of (82%) of the total items initially subjected to factor analysis, which originally numbered (50) items, as clearly illustrated in Table (4).

Table 4. *The item numbering and sequence within each factor, as well as their factor loadings*

Factor (1)		**Factor (2)**		**Factor (3)**		**Factor (4)**		**Factor (5)**		**Factor (6)**	
item	loadings	item	loadings	item	loadings	item	loadings	item	loadings	item	loadings
2	0.609	1	0.503	33	0.622	11	0.738	35	0.578	7	0.528
6	0.537	4	0.545	34	0.656	18	0.669	36	0.587	8	0.685
13	0.572	22	0.668	37	0.617	21	0.513	43	0.545	9	0.724
14	0.552	23	0.670	38	0.588	29	0.587	47	0.689	17	0.510
15	0.601	24	0.611	39	0.530	44	0.622	48	0.570	20	0.565
16	0.541	27	0.615	41	0.580	46	0.569	50	0.701		
25	0.552	28	0.514			49	0.505				
26	0.580										
30	0.538										

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

31	0.504

Results

Table 5. *The statistical data for the classroom control skills scale*

Result	statistical data
105.9824	Mean
112.0000	Median
15.88326	Std. Deviation
-0.771	Skewness
0.186	Std. Error of Skewness
63.00	Minimum
123.00	Maximum

Table 6. *Descriptive statistics of the classroom control skill scale*

Scale	Arithmetic Mean	Standard Deviation	Mean difference	t-value	p-value
classroom control skill	105.982	15.883	23.982	19.687	0.000
	hypothetical mean		82		

The data in the table (6) shows that the calculated arithmetic mean value reached (105.9824), is greater than the hypothetical mean value (82), with a statistical significance level of (0.00). This confirms the existence of statistically significant differences in favor of the calculated arithmetic mean. Consequently, this proves that the instructors possess classroom control skills

The researcher attributes this result to the instructors' possession of skills that enable them to introduce creative approaches to break routine, eliminate boredom, and establish new activities. These practices help provide an enjoyable and productive engaging learning atmosphere that enhances students' thinking capabilities and intellectual skills This view is supported by (Ali , 2005), who stated that classroom control comprises the skills and competencies that instructors use to organize classroom activities. Additionally, the clear communication of expectations and goals by the instructors grants students greater freedom of expression and participation. This is further reinforced by effective communication and the solid relationships established with the students. Moreover, reaching a mutual agreement with students reduces their stress or lowers tension levels and assists in maintaining control over classroom activities. The instructor's compliance with rules also fosters commitment among the students themselves, as they view the instructor as an exemplar to emulate. At times, this requires the instructor to be firm in enforcing guidelines and maintain authority without negotiation, which ultimately enhances a stable learning

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

environment. In this context, (Zain El-Din, 2018) noted that the primary pursuit of any instructor is to find ways to regulate student behavior and provide an appropriate educational atmosphere that motivates them to engage in various activities.

The results indicated that instructors relatively succeed in motivating students, sparking their enthusiasm, and drawing their attention to the learning material. They also succeed in inspiring students, encouraging their active participation, addressing their inquiries, and fostering a love for collaborative learning. This goes hand in hand with the instructors' compliance with guidelines and rules, which motivates students to model the same behaviors. This finding aligns with (Marzano, 2007), who asserted that an instructor's implementation of classroom systems helps students develop self-regulation skills

Conclusions

1. The instructors' adherence to rules motivated students and boosted their self-motivation for discipline and rule compliance.
2. The instructors' possession of full understanding of the teaching content helped them manage all queries that might cross students' minds. This reduced the resulting minimized confusion that could potentially cause classroom disruptions.
3. The instructor's capability in managing activities enabled efficient time management, which in turn minimized free time that often leads to disruptive actions.

Recommendations

1. Enhancing classroom control skills among instructors to maintain a disciplined learning environment.
2. Focusing on integrating technology into education within teacher training curricula at colleges of education.
3. Investigating the relationship between classroom control skill levels and students' academic outcomes.
4. Searching for other variables that might influence classroom control skills, such as student numbers.
5. Conducting a comparative study to demonstrate the impact of classroom control skills in public versus private colleges.
6. Carrying out similar studies on the current research variables from the perspective of the instructors themselves or educational supervisors.

Appendices

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Appendix 1. *the classroom control skills in its final form*

No.	Consensus and expectation	Applies	Neutral	Doesn't apply
1	The instructor's educational goals are precise, clear, and consistently comprehensible.			
2	The instructional mechanisms align with the students' diverse needs and individual differences.			
3	Grading and assessments are conducted fairly, accurately reflecting students' actual performance levels.			
4	The instructor provides equal opportunities for students to engage and interact in the lecture hall.			
5	The instructor emphasizes authentic experiences that integrate concepts clearly.			
6	The instructor gives individualized evaluations to each student to foster their performance.			
	modeling	Applies	Neutral	Doesn't apply
7	The instructor is exemplifies moral behavior and principles.			
8	The instructor treats students with fairness and professional integrity.			
9	The instructor simulates the qualities they want students to embody, such as commitment to time.			
10	The instructor fosters a spirit of collaboration and harmony among students.			
11	The instructor's commitment to regulations encourages students to compliance with them.			
12	The instructor is considered an example in their desire for exploration and knowledge.			
13	The instructor motivates the adoption of positive behavior through sharing personal experiences.			
	Commitment and assertiveness	Applies	Neutral	Doesn't apply
14	The instructor ensures they arrive on time for scheduled lecture.			
15	The instructor commits to finishing all their duties as soon as possible.			
16	The instructor adheres to professional standards when interacting with students.			
17	The instructor tends to be firm regarding rules and regulations.			
18	The instructor tends to stay away from discrimination among students.			
19	The instructor makes decisive decisions when necessary while maintaining respect for students.			
20	The instructor effectively balances between following regulations and firmness in applying them.			
21	The instructor possesses the ability to impose control without affecting students' freedom.			
	Activity leadership	Applies	Neutral	Doesn't apply

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

22	The instructor considers available capabilities to organize classroom activities.			
23	Organized activities are characterized by variety and renewal.			
24	The instructor possesses high skill in organizing activities which all students participate.			
25	The instructor's high capabilities enable them to lead the activity effectively.			
26	The instructor possesses high flexibility in dealing with unexpected problems that disrupt the activity..			
27	The instructor gives feedback and directives to participating students based on their performance.			
	Inspiration and motivation	Applies	Neutral	Doesn't apply
28	The instructor is an inspiring personality who motivates you to seeking your goals.			
29	The instructor mentions inspiring experiences and stories to enhance creative mind abilities.			
30	The instructor is considered passionate about the specialization they teach.			
31	The instructor possesses necessary skill to engage you in activities and events.			
32	The instructor tends to use different reinforcement methods such as rewards and verbal praise.			
33	The instructor helps students to cross difficulties they face through psychological support.			
	Relationship building	Applies	Neutral	Doesn't apply
34	The instructor seeks to build a motivating supportive relationship with students.			
35	The instructor provides time to talk with students to understand their desires and needs.			
36	Understanding between you and the instructor helps you progress in your study.			
37	The instructor’s active listening builds and encourages exchange of opinions			
38	The instructor is characterized by smoothness in dealing with students and colleagues.			
39	The instructor shows appreciation for the different cultures of students.			
40	The instructor enhances mutual respect among students.			
41	The instructor possesses high listening skills.			

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

An Examination of Social Integration Among Physically Disabled Players in Paralympic Volleyball

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DOI:
https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2286
https://creativecommons.org/licenses/by/4.0/
Article history: Received 23/April/2025; Accepted 30/April/2025; Available online 28/October/2026

Abstract

The importance of the study lies in social integration in disabled players in Paralympic volleyball. Integrations entitles enhancing self-confidence as well as trusting in team mates that can be activated through guidance sessions that develop psychological and behavioral aspects for disabled volleyball players. The problem of the study lies in the lack of social integration among teammates in general a matter that affect their psychology and behavior. This lack of integration causes a problem in the players' psychology and performance. The study aimed at the following: Constructing a scale for social integration in disabled volleyball players. Identifying the level of social integration in disabled volleyball players. Designing a psychological and behavioral guidance program for social integration in disabled volleyball players. Identifying the effect of guidance program for social integration in disabled volleyball players. The researcher hypothesized that there are statistical differences between pre and posttests of the experimental group in the level of social integration in disabled volleyball players. The researcher used the experimental method on disabled volleyball players of the international league season 2024 – 2025 in the Iraqi Paralympic committee / Paralympic volleyball federation. The researcher constructed a scale for social integration, distributed a questioner on experts followed by a pilot study and the main experimental group, and guidance program. The guidance program consisted of (14) guidance sessions with two sessions per week. Each session lasts for 40 – 60 minutes including psychological – cognitive – behavioral aspects.The researcher concluded that the designed guidance program have a positive effect on improving social integration in disabled volleyball players. Finally the researcher recommended the necessity of generalizing the results of the current study on the Iraqi Paralympic volleyball federation.

Keywords: Guidance programme, Social integration, Physical disability, Paralympic volleyball

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

The social inclusion of people with physical disabilities through Paralympic volleyball reflects the significant progress made by societies in promoting inclusivity and recognizing the value of individuals regardless of their physical challenges This sport which offers people with disabilities the opportunity to take part in competitive physical activity is more than just a match a training session or a form of entertainment it is an effective means of boosting self-confidence building relationships and fostering positive social interaction (Al-Amir, 2024) Furthermore, the social inclusion of people with physical disabilities means fully integrating them with one another and providing them with equal opportunities to take part in sports training and competitions on an equal footing with people without disabilities this includes providing the appropriate infrastructure and the necessary support to enable them to realise their full potential and achieve success in their various sporting disciplines (Al-Abd, 2024)

Previous studies

1.study: (Al-Jubouri, Ammash and Sabri, 2022)

The aim of this research is to: Investigate the impact of certain physical games on the social integration of pupils aged between 6 and 8 Investigate the impact of certain physical games on reducing aggressive behaviour among pupils aged between 6 and 8 The researchers chose the experimental approach as the most appropriate method for addressing the research problem and defined the research population as pupils in the first and second stages of primary school aged 6–8 years (boys). The research population comprised 230 pupils The sample was selected at random and comprised 30 pupils comprising 15 from the control group and 15 from the experimental group, to serve the purposes of the study the selection and division were based on scientific criteria.

2. Study: (Ismail and Fahad, 2021).

Title of the study (The effectiveness of a recreational counselling programme in reducing academic failure and psychological disorders amongst first-year female students at the Faculty of Physical Education and Sports Sciences for Women University of Baghdad). The research problem was identified through interaction and observation of the students during the first stage. We found that most of the students admitted to the Physical Education programme did so because of their academic average or because they were pressured by their parents, as the faculty is for women only they were not keen to attend the programmer which led to feelings of failure and psychological distress thereby affecting the course of their lives and their various activities across different fields. A guidance and recreational programmer was therefore developed to reduce their sense of failure and psychological distress.

3. Study: (Ahmed Ben Ghazala) (Ben Ghazala, 2016).

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Title of the study: (The role of physical education and sport lessons in psychological and social development).

Title of the study: The role of physical education and sport lessons in psychological and social development (secondary school pupils in the municipality of Sidi Khaled, Biskra Province). The aim of the study is to determine the extent to which physical education and sports lessons can influence the psychological and social well-bein

4. Study: (Mohamed Salem Al-Sayed Salem) (Al-Sayed Salem, 2020, pp. 217–250)

Title of the study: (Social integration and its relationship to levels of ambition and self-confidence among players of certain team sports).

The aim of this research is to identify the nature of the relationship between social integration and its relationship to levels of ambition and self-confidence among players of certain team sports. In light of the research objective, the researcher formulated the following hypotheses: There is a statistically significant correlation between social integration and the level of aspiration amongst players of certain team sports there is a statistically significant correlation between social integration and self-confidence amongst players of certain team sports there is a statistically significant correlation between the level of aspiration and self-confidence amongst players of certain team sports social integration can be predicted on the basis of the level of aspiration and self-confidence amongst players of certain team sports.

5. Study: (Hamed Suleiman Hamad, Mohammed Majid Mohammed) (Hamad and Mohammed, 2023)

Study title: (The impact of a cognitive-behavioural counselling programme on reducing negative behaviour among volleyball players in Jalosah, Anbar Governorate)

The researcher aims to identify the level of negative behaviour among volleyball players in Anbar Governorate by developing a cognitive-behavioural counselling programme, and to determine the greater effectiveness of the training included in the counselling programme compared with the training currently in use. The researcher employed an experimental approach using a two-group design with pre- and post-tests. The research problem stemmed from the scarcity of available studies in this field, and the approach to addressing the problem by monitoring the players according to their coaches views namely that players with disabilities generally suffer from a lack of integration within the team as a whole as the players experience poor social integration amongst themselves, which affects their psychological state and behaviour in this context in other words,

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

there is a problem within the team and this problem affects on the players psychological state and, at the same time on their performance.

Research objectives

To develop a scale measuring the social integration of players with physical disabilities in Paralympic volleyball.

To identify the level of social integration of players with physical disabilities in Paralympic volleyball.

Method and Tools

The researcher employed a descriptive, survey-based approach, which is a method of studying scientific phenomena or problems by providing a scientific description, thereby arriving at a logical conclusion supported by evidence and proof that enables the researcher to establish specific frameworks for the problem; this is used to determine the research findings (Omar and Saad, 2009).

The research sample comprised 100 Paralympic volleyball players, distributed across three clubs in Anbar (with a total of 8 players) Diyala (with a total of 8 players) and Mosul (with a total of (8), (6) committees from Muthanna with a total of (8) players Nasiriyah (8) players, Karbala (8), Babil (8) Anbar (8) and Diyala (8) all of whom are taking part in the Iraqi League for the 2024/2025 season. The research sample consisted of 28 players 14 representing the national team and 14 from the national reserve team for Paralympic volleyball accounting for 28 per cent of the research population.

The research instrument—a scale developed by the researcher—consists of 32 items distributed across five domains: the first domain introversion, comprising 6 items; the domain of effective communication, comprising 8 items; the domain of aggression comprising 8 items; the domain of self-esteem comprising 4 items; and the domain of low comprising 6 items.
The scale exhibits high reliability and validity with a Cronbach's alpha coefficient of 0.949.

Results

Table 1. *shows the level of social integration and the T-value between the arithmetic mean and the hypothetical mean for the application sample*

Scale	Mean	SD	D M	df	T	SIG	Significance
Social Integration	106.1429	7.38497	10.14286	27	8.125	0.000	Significant
	Hypothetical Mean		96				

Significant at (0.05) with 27 df

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Table 2. *shows the level of introversion and the value of (T) between the arithmetic mean and the hypothetical mean for the study sample*

Variable	Mean	SD	D M	df	T	SIG	Significance
Introversion	16.1714	4.38236	1.82857	27	2.469	0.019	Significant
	Hypothetical Mean					18	

Significant at (0.05) with 27 df

Table 3. *shows the level of effective communication and the value of (T) between the arithmetic mean and the hypothetical mean for the application sample*

Variable	Mean	SD	D M	df	T	SIG	Significance
Effective	30.8286	2.70605	6.82857	27	14.929	0.000	Significant
communication	Hypothetical Mean					18	

Significant at (0.05) with 27 df

Table 4. *shows the level of aggression and the value of (T) between the arithmetic mean and the hypothetical mean for the application sample*

Variable	Mean	SD	D M	df	T	SIG	Significance
Aggression	28.4571	3.31079	4.45714	27	7.965	0.000	Significant
	Hypothetical Mean					24	

Significant at (0.05) with 27 df

Table 5. *shows the level of self-esteem and the (T) value between the arithmetic mean and the hypothetical mean for the application sample*

Variable	Mean	SD	D M	df	T	SIG	Significance
Self-esteem	15.3429	1.58936	3.34286	27	12.443	0.000	Significant
	Hypothetical Mean					12	

Significant at (0.05) with 27 df

Table 6. *shows the level of low self-confidence and the T-value between the observed mean and the hypothesised mean for the application sample*

Variable	Mean	SD	D M	df	T	SIG	Significance
Low self-confidence	15.3429	4.57579	2.65714	27	3.435	0.002	Significant
	Hypothetical Mean					18	

Significant at (0.05) with 27 df

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Discussion

Assessing the reality of social integration. This objective was achieved by presenting the post-test results of the social integration scale developed by the researcher through a comparison of the actual mean and the expected mean as shown in the table above The sample demonstrates a good level of social integration.

The researcher attributes this to the use of the counselling programme developed by the researcher. This improvement enhances team cohesion amongst team members, enabling them to achieve their objectives and reach the required standard, as well as demonstrating the progress made by the group through the implementation of counselling sessions and the key elements of these sessions namely social integration a sense of belonging, ambition, self-esteem, goal attainment, perseverance social participation behavioural modelling respect, self-confidence and effective communication.

This indicates that the guidance programme was correctly implemented with the sample Examining the reality of the introversion dimension: this objective was achieved by presenting the post-test of the Social Integration Scale which was developed by the researcher by comparing the arithmetic mean with the hypothetical mean. The study's results indicate that the sample's mean score on the introversion dimension was 16.1714, with a standard deviation of 4.38236 which is 1.82857 points lower than the hypothesised mean of 18. When using the t-test for a single sample It was found that the calculated t-value was 2.469 at 34 degrees of freedom, and the p-value was 0.019, which is less than 0.05, indicating that the difference between the observed mean and the hypothesised mean is statistically significant.

This result implies that the level of introversion amongst Paralympic volleyball players who underwent the cognitive-behavioural counselling programme is lower than expected suggesting that the programme has a positive effect on promoting their social integration. These results can be explained by the role played by the psychological and behavioural counselling programme in reducing the players levels of introversion.

This type of programme aims to improve social integration and enhance their communication skills, which in turn helps to reduce feelings of isolation and introversion.

Through behavioural therapy techniques such as social skills training – which was discussed during the counselling sessions shown on Data Show – the players gain confidence in interacting with others helping them to integrate better both within and outside the team. This is achieved through the counselling sessions focusing on introversion, as discussed by the researcher. He succeeded in reducing the level of introversion as much as possible amongst Paralympic volleyball players. The researcher attributes the progress made by the players to the effectiveness and correct implementation of the counselling programme, which the counselling programme (Zahran) as the process of helping an individual to understand and analyse their aptitudes, abilities,

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

potential inclinations available opportunities problems and needs and to use this knowledge to make choices and decisions that achieve harmony enabling them to live happily. (Zahran, 2005).

To examine the reality of effective communication. This objective was achieved by presenting the post-test results of the Social Integration Scale which was developed by the researcher by comparing the real-world and virtual environments.

The results indicate that Paralympic volleyball players who underwent the behavioural counselling programme demonstrate a higher level of effective communication than expected. These results can be explained by the role played by the behavioural counselling programme in enhancing the players' communication skills; this type of programme, which helped to develop and improve their ways of interacting with others both within and outside the team. The aim of the counselling programme was to help players improve the quality of their communication with teammates and others outside the team Furthermore providing a supportive environment during counselling sessions encourages players to develop skills in the context of communicating with their team and the wider community in which people with disabilities live, thereby boosting their self-confidence and reducing any anxieties relating to social interaction. The researcher attributes the positive impact of the cognitive-behavioural counselling programme on enhancing effective communication amongst Paralympic volleyball players This supports the idea that combining psychological and behavioural programmes with physical activity is an effective strategy for improving social skills and promoting the social inclusion of people with disabilities.

The level of aggression amongst Paralympic volleyball players is significantly high, suggesting that disability was not a factor leading to reduced aggression in them; on the contrary, there may be other factors leading to an increase in this behaviour amongst them. The researcher notes that the players' aggression was not reduced by the counselling programme; in other words, the programme was not effective. On the contrary the programme was effective across all dimensions, and the reason for the failure to reduce aggression levels amongst people with disabilities is the disability itself.

The guidance programme has helped to reinforce the positive self-image that players have of themselves and boost their confidence in their abilities. The researcher adds that improved self-esteem can be a direct result of enhanced social skills and interaction with others within the sporting environment; when a player succeeds in building positive relationships with their teammates and feels a sense of belonging to the team, this can reduce any negative feelings associated with their disability

It boosts their self-confidence and their ability to interact naturally with others. Based on these findings it can be concluded that the cognitive-behavioural counselling programme had a clear positive impact on improving self-esteem amongst Paralympic volleyball players This

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

highlights the importance of integrating such programmes into sporting environments to ensure the promotion of mental health and social inclusion for athletes with disabilities.

who underwent the behavioural psychological counselling programme was lower than expected, reflecting the programme's positive impact in reducing feelings of low self-confidence and boosting the players' confidence in their abilities. The researcher attributes this to the counselling programme, which, through its sessions, helped to reduce the level of low self-confidence by virtue of the role played by the behavioural psychological counselling programme in developing personal skills and fostering a positive self-image amongst the players. The programme aims to reduce low self-esteem by encouraging participants to think positively about their ideas and beliefs so that they become better prepared to face sporting and social challenges with greater confidence. As defined by (Al-Khalidi, 2019) is an internal feeling that diminishes an individual's self-esteem and causes them to doubt their abilities and skills, leading to hesitation in decision-making, a fear of failure and being overly influenced by the opinions of others. Participating in Paralympic volleyball itself can help build self-confidence, as it gives players the opportunity to test their abilities in an environment that is both competitive and supportive. Successfully performing sporting skills and interacting with team-mates and coaches enhances players' sense of competence and achievement. Furthermore constant encouragement from coaches and team-mates and the ability to make tangible progress in sporting performance help to reduce feelings of low self-confidence and increase the player's awareness of their true abilities and potential. (Zahran defines it as the process of helping an individual to understand and analyse their aptitudes, abilities, potential, inclinations, the opportunities available to them, their problems and needs and to use this knowledge to make choices and take decisions in order to achieve harmony so that they may live happily. (Zahran, 2005).

Conclusions and Recommendations

The study sample accepted the scale due to the clarity of its statements and the ease of responding. The social integration scale revealed that the sample enjoyed an acceptable level of social integration and that the guidance programme developed by the researcher had a positive impact on the development of social integration amongst Paralympic volleyball players. As for the recommendations the researcher recommends that the current scale as a research tool by researchers in their studies and research. The researcher also recommends that the findings of the present study be disseminated to the Iraqi Paralympic Volleyball Federation. It is possible to conduct studies similar to the present one on different samples and in both able-bodied and Paralympic sports.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Appendix (1)

The final version of the scale

Items	I agree very strongly	I agree very	I agree to a moderate extent	I agree to a small extent	I agree to a very small extent
My isolation from the rest of the team affects my performance					
I find it difficult to participate fully in group activities with my colleagues					
I feel that my team-mates do not listen to me properly when I speak					
I feel that my team-mates do not offer me support when I need it					
I tend to isolate myself from my team-mates in social situations					
I prefer spending time on my own rather than taking part in group activities					
I feel that good communication with the coach helps me to engage better with the rest of the team					
I feel that my team-mates communicate with me in a clear and understandable way					
I feel comfortable communicating with my team-mates about matters relating to the game or training					
I feel that communication between me and my team-mates helps to improve my integration into the team					
The encouragement I receive from my teammates motivates me to take part in the team's social activities outside of training					
The team management takes my specific needs seriously.					
I feel that good communication with the team management helps me to improve my social integration within the team					
The team management provides psychological and social support alongside the team's support					
The way the coach treats me affects my performance in training and matches					
Not feeling that I have the necessary support from my coach and teammates triggers aggressive behaviour in me					

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

I feel that the aggression I face from others may drive me into isolation or reduce my social interaction					
I feel that the team management are not interested in hearing my views and ideas unless I express them in a confrontational manner\					
I feel humiliated by the team management during matches					
I feel under pressure and stressed because of the behaviour of the team management					
The team manager's negative behaviour affects my performance and self-confidence					
Harsh criticism from my teammates and coaches has a negative impact on my performance and self-confidence					
I feel at ease when socialising with my teammates					
I feel that my teammates rely on me during matches and training sessions					
I feel that my participation in the match plays an important role in enhancing the performance of the whole team					
I feel at ease when my coach provides me with emotional and moral support to help me achieve my goals as a player					
My confidence wanes when my teammates do not speak to me					
I hesitate to speak to my teammates for fear of criticism					
I feel that my teammates do not trust my sporting abilities					
I feel that my teammates' opinions affect my self-confidence					
I feel nervous when playing in front of my teammates.					
I feel that the coach isn't giving me enough support to achieve my sporting goals					

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Validity and Reliability of Specific Basketball Motor Skill Simulation Protocol for Inducing Fatigue Based on Some Physiological Indicators

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DOI:

https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2453

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Article history: Received 6/March/2026; Accepted 29/March/2026; Available online 28/ October/2026

Abstract

The aim of the study was to verify the validity and reliability of a basketball-simulated physical exertion test designed to induce fatigue, by measuring heart rate (HR), lactate concentration (LA) and the Rating of Perceived Exertion (RPE). The study sample consisted of 20 basketball players from leading teams in the Iraqi Premier League, with an average age of (21.50 ± 3.67) years, With a body mass of (80.50 ± 11.71) kg and a height of (189.00 ± 7.75) cm, the basketball-simulated physical exertion test protocol to induce fatigue consisted of four exercises performed consecutively following a warm-up. Heart rate was measured remotely before, during and after the exercise using a Polar Verity Sense remote heart rate monitor, whilst lactate levels were measured before the exercise and five minutes afterwards using a Lactate Pro2 device. from Arcray; the perceived exertion (RPE) was also assessed upon completion of the test using the modified Borg scale (CR-10). SPSS V22 was used to analyse the research results. The results demonstrated the validity and reliability of the protocol, as all experts agreed that the protocol was suitable for basketball players and that it was able to distinguish between high and low levels of performance. The results also demonstrated the reliability of the test, with the correlation coefficients between groups for all fatigue indicators being higher than 0.70, Furthermore, the Bland-Altman plot also demonstrated the reliability of the protocol, as the differences between the first and second tests were distributed around the mean difference and fell within the upper and lower limits of the 95 per cent confidence interval for the three fatigue indicators.

Keywords: neuromuscular fatigue, exercise simulation protocol, fatigue induction, fatigue in basketball.

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Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Introduction

Basketball is considered one of the most enjoyable team sports due to its speed, excitement and the aesthetic appeal of the skills performed, as well as its reliance on tactical manoeuvres characterised by changes of direction and position and the use of various skills (dribbling, passing, shooting, and others). What sets this team sport apart is the player's freedom of movement and the fact that players from the opposing team cannot make direct physical contact with them which allows players to showcase their individual skills and move freely within the specified time limits. A regulation basketball court measures 15 × 28 metres, on which five players from each team compete to score as many points as possible over the course of the match, which consists of four quarters, each lasting 10 minutes of actual playing time. Furthermore the rules of the game prohibit passive play by setting limits on the duration of an attack the time the ball may be in the opposing team's half the time a player may hold the ball, the time spent in the restricted area, and the time taken to bring the ball into play from the sidelines.It therefore requires a high level of both aerobic and anaerobic fitness to enable players to complete the four quarters of the match.

Basketball is characterised by high-intensity performance interspersed with periods of lower exertion or rest, and its movements and skills are characterised by rapid running and repeated jumping (Abian-Vicen et al., 2014) (Qarouach et al., 2024) (Stojanović et al., 2018). This requires repeated physical exertion at high speed and intensity, involving explosive movements which in turn necessitates complex physiological and biomechanical requirements (Andreyo et al., 2023). In high-intensity basketball matches players perform high-intensity movements for 15 per cent of the match duration, at a heart rate of 169 ± 9 bpm, which is approximately 90 per cent of the maximum heart rate (García et al., 2020) (Vázquez-Guerrero et al., 2019). As mentioned above, basketball relies heavily and primarily on the anaerobic energy system for the performance of movements the technical skills required and the demands of the game this does not mean that aerobic training is of no use or should be neglected. Indeed, the anaerobic system accounts for 90 per cent of the energy required in basketball compared with 10 per cent for the aerobic system (Powers & Howley, 2018). From a bioenergetic perspective, exercise and physical fitness can be categorised according to the predominant metabolic pathways for the production of adenosine triphosphate (ATP). Both the anaerobic phosphagen system and the anaerobic glycolytic system produce ATP at high rates, but in relatively small and limited quantities whilst aerobic metabolism (or the aerobic energy system) produces ATP at a slow rate but in large quantities. The phosphagen energy system predominates in strength and power movements that require anaerobic capacity and maximum instantaneous effort lasting for a few seconds (less than 15 seconds). Meanwhile, the phosphagen and anaerobic glycogenolysis energy systems together contribute significantly to activities requiring a combination of anaerobic power and endurance, which last for approximately 15–30 seconds, and the closer the duration of the exercise gets to 30 seconds the greater the contribution of the anaerobic glycogenolysis system Basketball is one of the fastest team

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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sports and is characterised by exceptional movements such as sprinting, changes of direction, quick shots, rebounds and blocked shots (Gottlieb et al., 2014). This means that basketball players need a high level of ability to demonstrate the speed, strength and capacity required to perform successfully in a match (Delextrat and Cohen, 2008). Many of the key movements performed by basketball players during a match rely on horizontal movements (sprinting and changes of direction) vertical movements (jump shots and rebounds) and combinations of movements within each of these planes; these high-intensity movements are typically performed intermittently throughout the match (Gottlieb et al., 2014).

Scientific studies indicate that basketball requires explosive strength in both the upper and lower limbs, as well as the rate of force development (RFD) – which provides an indication of the speed at which muscular force is generated and transmitted – agility, coordination and speed (Read et al., 2014). Furthermore, basketball requires a high level of technical skills such as shooting, dribbling, passing, rebounding and defensive movements, amongst others; these are essential skills for successful performance and require continuous training to master. Research indicates that technical, tactical, psychological and physiological abilities are all crucial to performance in basketball (Luo et al., 2023).

The above requires measurement during a basketball player's actual performance in order to assess their physical and functional efficiency whilst playing, as well as to measure the neuromuscular fatigue resulting from physical exertion. However, teams or tournament regulations often do not permit the monitoring and measurement of players during or immediately after performance. Researchers therefore design tests or movement protocols that simulate basketball in terms of performance and timing. These protocols are an effective way of assessing players both during matches and outside competitive tournaments (Williams et al., 2010) (Waldron et al., 2013) In this context, previous studies have highlighted the importance of various types of measurements in assessing basketball players; for instance, a study by Fox et al. (2017) examined movement analysis, timing, and cardiovascular and respiratory parameters. Meanwhile, the study by Boddington et al. (2019) investigated the validity and reliability of a modified jump-shooting accuracy test. Meanwhile the study by Kostopoulos et al. (2004) utilised a protocol consisting of a 10-minute high-intensity exercise session simulating a basketball game to assess exercise-induced muscle damage. Basketball-specific simulation protocols are the most common and widely used in scientific research; they consist of 12 minutes of physical exertion simulating a basketball match (Scanlan et al., 2012). Ferioli et al. (2024), on the other hand, proposed a protocol simulating a basketball match, lasting a total of 63 minutes and comprising periods of exercise at varying intensities and rest periods. It is clear from the above that, whilst the protocols described are reliable and valid, they may not be suitable for inducing fatigue in order to record certain variables, such as the occurrence of transient neuromuscular fatigue using an electromyograph (EMG) or other motion-synchronized

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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devices as it is impractical to keep the device attached and carry out the protocol for a very long period exceeding 3 minutes.

Method and Tools

The study sample consisted of 20 basketball players from teams in the Iraqi Elite League who were selected using a purposive sampling method. Their mean age was (21.50 ± 3.67) years, mean body mass was (80.50 ± 11.71) kg, and mean height was (189.00 ± 7.75) cm. A basketball-simulated physical exertion test protocol was administered to induce fatigue. The test consisted of four exercises performed sequentially following a warm-up that included light jogging, stretching, direction changes, and long-range shooting for a duration of (8–10 minutes) as follows:

• Exercise 1 (Defensive Moves): Start by running from the baseline in the center toward the far three-point line, stop, take defensive steps to the right along the far three-point line, and return to the starting point. Then repeat the same movement but from the left side. Repeat the exercise twice without a break (2 repetitions).

Exercise 2 (Side-to-Side Movements Toward the Board): Perform the movement from the right side twice in a row, followed by two steps to the left; then perform the movement from the left side twice in a row. Repeat 3 times on each side without a rest.

Exercise 3 (High dribble with change of direction): The half-court is divided into three lines. The first line is under the basket (the baseline) starting on the right-hand side and 2 metres from the touchline. The second line divides the half-court in half, 7 metres from the baseline (with the first marker placed 2 meters beyond it). Then, bounce the ball whilst changing direction between the three markers continuing to bounce it until you reach the centre line then bounce it back quickly and high to the starting point (the bas Exercise 4 (Back-and-forth running): Half the court is divided into three lines: a first line under the basket in the center to start from (the baseline) a second line dividing the half-court into two equal halves at a distance of 7 meters and a third line at the centre of the court at a distance of 14 meters (the center line) The drill is performed by starting with a run from the baseline towards the second line 7 metres away and returning to the baseline, and then running from the baseline towards eline), and then repeat the same movement a second time. Run from the centre line to a point 14 metres away and back to the baseline (under the basket) the exercise is repeated twice without stopping.

To ensure that the basketball-simulated exercise test protocol brings players to the point of fatigue remote heart rate measurements were taken before during and after the exercise using a Polar Verity Sense remote heart rate monitor. as the player must reach a heart rate of at least 80 per cent of their maximum heart rate (HRmax) whilst performing the game-simulation test. Lactic acid levels were also measured before the exercise and five minutes afterwards using the Lactate Pro2 device from Arcray, whilst the perceived exertion (Rating of Perceived Exertion – RPE) after completion of the test. The modified 10-point Borg scale (CR-10) was used to determine the intensity of the basketball-simulated exercise. The

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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main experiment for this research was conducted in the indoor basketball hall at the Faculty of Physical Education and Sports Sciences, University of Baghdad, at 9.00 am. The statistical package SPSS V22 was used to analyse the research results.

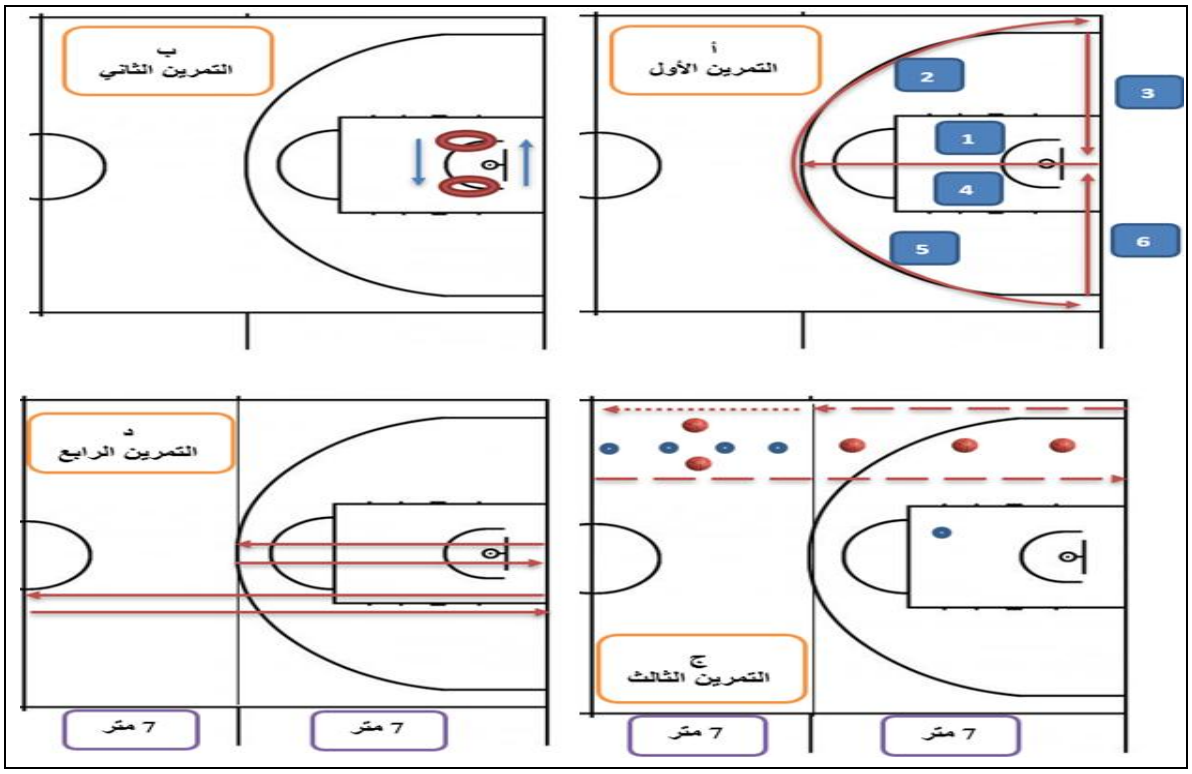


Figure1. shows a diagram of the protocol for the basketball-simulated physical fitness test

Results

Table1. *shows the experts' agreement on the basketball-simulated physical exertion test designed to induce fatigue*

Test	Number of experts	Suitable	Not suitable	Agreement Rate
A Basketball-Simulated Physical Stress Test to Induce Fatigue	5	5	0	%100

Table2. *shows the results of the differences between the lower and upper groups in terms of heart rate measurements, perceived exertion and lactate concentration*

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

SIG	T	Upper Group		Lower Group		Variable
		SD	mean	SD	mean	
0.001	5.583	3.507	183.600	3.286	171.600	Heart rate (bpm)
0.000	7.155	0.224	8.400	0.447	6.800	Effort rating (points)
0.001	7.186	2.248	18.160	0.980	10.280	Lactic acid (mmol)

n = 20. significant at the 0.05 significance level. DF (8).

Table 3. *shows the stability coefficients for the test method and its repeatability in measuring heart rate, assessing exertion and determining lactate concentration*

correlation coefficient (ICC)				Variable
Measurement Mean	Single measurement	Kornbach	correlation	
0.814	0.686	0.815	0.765	Heart rate (bpm)
0.820	0.694	0.822	0.728	Effort rating (points)
0.711	0.552	0.787	0.765	Lactic acid (mmol

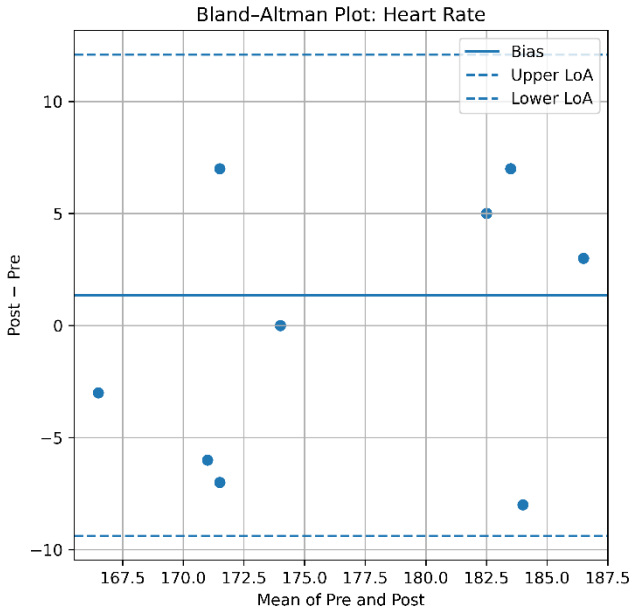


Figure2. *shows a Bland-Altman plot for the heart rate variable*

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

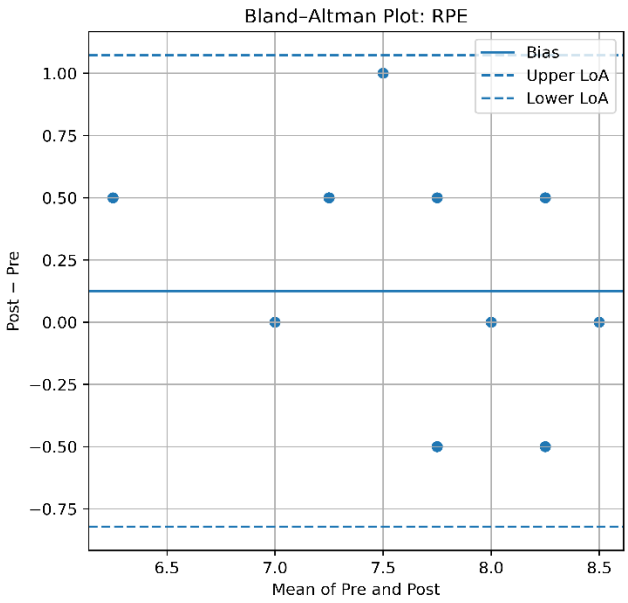


Figure3. *shows a Bland-Altman plot for the RPE (Rated Perceived Exertion) variable*

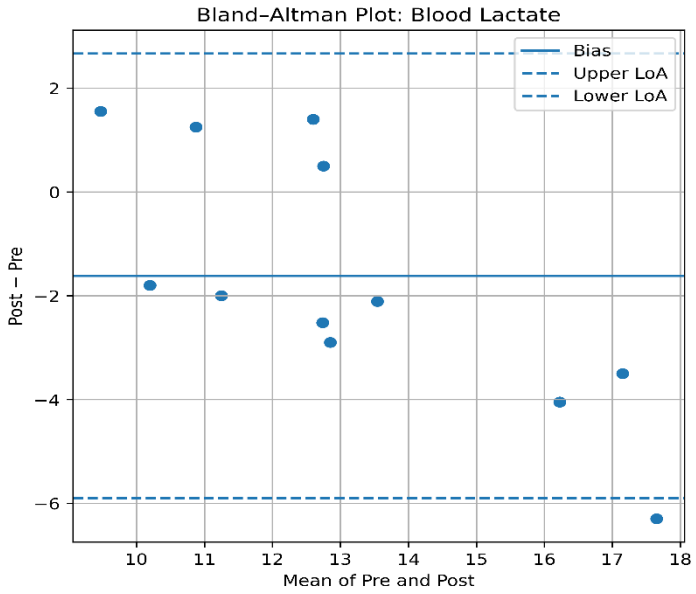


Figure 4. *shows a Bland-Altman plot for the blood lactate variable*

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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Discussion

Table (1) shows that the test has face or logical validity, as it clearly measures the required skill or ability (Miller, 2006). This is the basis on which the basketball-simulated physical exertion test was designed to induce fatigue, as it involves genuine physical and skill-based exertion at a high intensity which is logical for inducing genuine fatigue in the players The exercise performed led to a significant rise in blood lactate levels and the heart rate reaching sub-maximal levels, at no less than 85 per cent of the maximum heart rate for each player. As shown in Table 2 the validity of the cross-sectional comparison between the minimum and maximum values of the indicators of fatigue—namely, heart rate, lactate concentration and the assessment of exertion—which reflect the intensity of physical exertion used in the basketball-simulated exercise test to induce fatigue, In addition, the significant differences between the minimum and maximum values demonstrate the reliability of the test in distinguishing between low and high measurements and scores.

Table (3) illustrates the reliability of the test using the test method and its repetition for the purpose of verifying the physical exertion test simulating a basketball game to induce fatigue, and presents the simple correlation coefficient and the inter-group correlation coefficient (Intraclass Correlation – ICC) for the indicators of fatigue, namely heart rate, lactate concentration and perceived exertion.

It appears that the inter-class correlation coefficients for all three variables were greater than 0.70, which supports the reliability of the test; furthermore, the simple correlation coefficients and the Cronbach's alpha values were also greater than 0.70, which further reinforces the reliability of the test (Alkazaly & Altay, 2023).

As shown in the Bland-Altman plot (Figures 1–2–3) verifies the reliability of the basketball-simulated exercise test designed to induce fatigue in measuring heart rate, lactate concentration and the assessment of exertion, showing the distribution of differences between the first and second tests in terms of the mean difference and its confinement within the upper and lower limits of the 95 per cent confidence interval.

The increased demand placed on the circulatory system is to meet metabolic requirements in order to sustain performance; in fast-paced, intermittent sports such as basketball, where players perform rapid, explosive and repetitive movements at high intensity, this leads to stimulation of the sympathetic nervous system, resulting in an increased heart rate to boost cardiac output in order to ensure that oxygen reaches the working muscles whilst increasing the removal of metabolic waste products

The maximum heart rate (HRmax) of the players following physical exertion simulating a basketball match reached 198.5 bpm which is equivalent to 88 per cent of maximum intensity. Furthermore, during a basketball match lasting 40 minutes players cover a distance of 5–6 km at lactate levels above the lactate threshold and at a heart rate exceeding 85 per cent of their maximum heart rate (Stojanović et al., 2018) (Berkelmans et al., 2018). As demonstrated in a study (Scanlan et al., 2018). Furthermore, basketball

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

places very high functional demands on the body, with the heart rate reaching (180 ± 5.7 bpm), which is equivalent to (90.8 ± 4.0 per cent) of the maximum heart rate (HRmax).

The maximum heart rate reached by adult basketball players (88% HRmax) falls within the 'Vigorous' category, according to the American College of Sports Medicine (ACSM) classification. The ACSM classifies heart rates as follows: above 95 per cent of maximum is 'near maximum', 77–95 per cent is 'vigorous', 64–76 per cent is 'moderate', 57–63 per cent is 'light', and below 57 per cent is 'very light' (Garber et al., 2011).

This lends validity and credibility to the basketball simulation test, as it was able to physiologically stimulate the body and bring it to a state of neuromuscular fatigue. Indeed, as heart rates rise to their maximum limits as a result of physical exertion, there is a reduction in muscle glycogen, muscle damage or injury, an increase in core body temperature, and insufficient resynthesis of high-energy phosphates (Scanlan et al., 2015).

Furthermore, elevated blood lactate levels were observed following physical exertion simulating a basketball match, indicating a high demand by the body for anaerobic energy to sustain performance. Blood lactate levels rise due to increased reliance on the anaerobic breakdown of glycogen (anaerobic glycolysis) – whether from muscle glycogen or blood glucose – in order to rapidly produce energy without relying entirely on the aerobic system, given that basketball is characterised by high-intensity, intermittent exertion and rapid, explosive movements on the court.

Measurement of blood lactate concentration is often used as an indicator of anaerobic energy production via anaerobic glucose breakdown. Lactate production by working muscles is a consequence rather than a cause, as the anaerobic breakdown of glycogen produces pyruvic acid, which is converted to lactate due to the high availability of hydrogen ions (+H) that bind to pyruvic acid, converting it into lactic acid, thereby increasing blood acidity and lowering blood pH.

As glucose (sugar) is broken down in the body to produce energy, lactic acid is produced as a by-product; when the rate of glucose breakdown increases rapidly as a result of high-intensity physical exertion, blood lactic acid concentrations rise, This allows the body to sustain energy production for a longer period, even under conditions of oxygen deprivation. (Soultanakis et al., 2012).

According to scientific studies, the lactate concentration during a basketball match ranges between (4–7 mmol); a study by Rodriguez-Alonso et al. (2023) found the concentration to be (6.60 ± 1.22) mmol, whilst a study by Dragonea et al. (2019) (6.5 ± 1.27) millimoles, a study by (Gomes de Araujo et al., 2014) (5.2 ± 2.0), and a study by (Ben Abdelkrim et al., 2007) (6.22 ± 1.34) millimoles.

The fact that lactate concentrations in this study reached very high levels is because the aforementioned studies measured lactate either at the end of the match or between quarters – that is, during rest periods that could reduce its concentration, whereas the present study measured lactate after the completion of a basketball-simulated physical exertion, which was performed at high intensity and lasted no more than 2.5 minutes. This is consistent with the study by Figueira et al., 2021), in which lactate concentration reached

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

(13.02 ± 2.28) during a physical exercise specific to basketball players, consisting of running (10 × 30 metres).

As for the increased perceived exertion, this indicates high-intensity physical exertion, which is consistent with what was mentioned earlier regarding the increased heart rate and concentration of lactic acid in the blood.

Conclusions

The basketball-simulated exercise test protocol is suitable for inducing fatigue in basketball players

- Fatigue indicators—namely heart rate, lactate concentration and perceived exertion—showed high reliability, indicating that the protocol is suitable for inducing fatigue.
- The fatigue indicators—heart rate, lactate concentration and perceived exertion—remained consistently high, indicating that the protocol is suitable for inducing fatigue.

To conduct more extensive studies using anaerobic capacity measures, such as the countermovement jump test, to assess the onset of muscle fatigue.

- To conduct more extensive studies using aerobic capacity measures (VO_2 max) to assess the onset of muscle fatigue.

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The Effect of Super Set Training in Agilitz and Some Attacking Skills of Futsal for Femals

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DOI:
https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2264

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Article history: Received 16/March/2025; Accepted 25/March/2025; Available online 28/October/2026

Abstract

The current study addressed the impact of super set training on the level of agility and some offensive skills of women's futsal. The research sample included players of the Iraqi national futsal team participating in the qualifiers for the Asian Cup China 2025, Group One, which was held in Thailand. The researcher used the experimental method with a single sample design with pre- and post-tests to suit the nature of the research. The researcher conducted the tests after ensuring the suitability of the tests to the research sample. The tests were applied to the research sample consisting of (20 players). The research variables included the skills of rolling, handling, suppression and scoring, in addition to the kinetic variable, which is agility. After extracting and processing the results, it became clear that there was a positive impact on the research sample and that there was effectiveness in using super set training.

Keywords: futsal, superset training, attacking skills

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Introduction

The achievements being made in many countries and across various sports are nothing but genuine evidence of these countries' commitment to sport at all levels, and this stems from ongoing efforts to develop the attributes required to achieve these achievements – whether these attributes are physical technical, tactical or psychological – in accordance with the requirements of each sport, as well as the application of various modern sciences Such as sports training science sports biomechanics, and the anatomical and physiological characteristics of the human body as well as other sciences that contribute positively to the training process as well as the use of equipment, tools aids and all training resources that support the training process, thereby helping to advance the technical aspects of the sport and take it to the highest sporting levels Modern training simulates the individual and collective abilities of female players; on this basis, researchers and coaches are focusing on the training methods and techniques used to develop female players in futsal, as this sport is characterized by high physical exertion, which requires specialized training and programmed to develop the physical technical tactical and psychological requirements of the game, using methods and techniques suited to each player's ability as well as developing the motor skills associated with skill development Abilities are defined as a set of coordinated abilities one of which is the ability to respond quickly to motor stimuli which Mathews (Mathews, 2012, p. 126) as the ability to perform movements rapidly after hearing or seeing signals (auditory, visual) with the aim of completing a motor task as quickly as possible. Meanwhile, As'ad Lazim and Samer Sa'ad define skilful performance (As'ad Lazim, 2023, p. 49) as the player's ability to link skills together with a high degree of fluidity accuracy and speed during performance.

The researchers reviewed a number of previous studies which provided valuable insights; one study (Al-Deen, 2021, pp. 134–158) found that the quality of technical and tactical performance among young footballers depends to a large extent on their cooperative abilities, whilst a study by Mahdi Fadel Mohsen and Sadiq Ja'far Sadiq (2023, pp. 272–286) demonstrated the effectiveness of developing coordination abilities in the research sample using a training programmed furthermore a lack of coordination exercises affects players' performance.

Research Objectives

to investigate the effect of superset training on fitness levels and certain offensive skills in women's futsal. Based on previous studies this research highlights the importance of examining the impact of such training on female futsal players.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Method and Tools

A methodology is the means or approach a researcher takes to solve a research problem the nature of the problem dictates a specific methodology that the researcher uses to arrive at the truth (Nouri Ibrahim Al-Shouk, Rafi' Saleh Fathi, 2004, p. 51). Therefore the researcher employed the single-sample experimental design as an appropriate method for achieving the study's objectives and given its suitability for the nature of the study. The research sample was selected using a purposive sampling method, as noted by Al-Maghribi (2009, p. 136) "that part of the population that is carefully selected according to sound scientific rules and principles such that it accurately represents the study population." The research sample consisted of the players on the Iraqi women's national futsal team for the current sports season, totaling 20 players after 6 players were excluded for having participated in the pilot study.

The researcher drew upon a large number of Arabic and foreign sources and references as well as field tests through which she measured the variables under study.

Table1. *shows the study population and the number of players on the Iraqi women's national futsal team*

NO	Research Sample	Total Number	Exploratory Sample	Main Experiment
	Iraqi Women's National Futsal Team	26	6	20

Table2. *shows physical and motor abilities and the percentages of opinions expressed by experts and specialists*

NO	Variables	Agreed	Percentage	Disagree	Percentage
.1	Impact Force	11	% 100	0	---
.2	Force Endurance	11	% 100	0	---
.3	Speed-Specific Strength	11	% 100	0	---
.4	Maximum Strength	5	% 45.45	6	% 54.54
.5	Transitional Speed	11	% 85.71	3	% 14.28
.6	Speed Endurance	4	% 36.36	7	% 63.63
.7	Reaction Speed	4	% 36.36	7	% 63.63
.8	Agility	11	% 100	0	---

Percentage%75

The researcher used a number of tests to measure the required variables

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

A scoring test on a target divided into zones from a distance of 10 metres (Kamel, 2007, p. 83).
A 4-against-2 ball possession test lasting 45 seconds (Salwa, 2022, p. 78).
Firefighting Skills Test (Al-Azzawi, 1991, p. 77).
Illinois Rolling Test (Davis, 2000, p. 129)

Results

The researcher drew her conclusions after collecting the data through the tests and analyzing it statistically using the SPSS statistical package, as shown in the following tab

Table3. *shows the descriptive statistics for the tests carried out on the research sample*

NO	Variable	Unit of measurement	mean	SD	Maximum value	Minimum value	Skewness
1	Extinguishing test	Degree	9.10	1.119	10	7	0.716
2	Handling test	Degree/time	12.05	1.849	15	9	-0.081
3	Rolling test	Time	25.836	2.671	30.64	21.28	0.387
4	Scoring test	Degree	5.00	1.214	8	3	0.785
11	Agility	Degree	18.168	1.117	20.16	16.38	0.210

Table4. *shows the arithmetic means standard deviations and calculated T-values for the pre- and post-tests in the offensive skills tests*

variables	Pre-tests		Post-tests		ES	SEd	T	SIG
	mean	SD	mean	SD				
Extinguishing test	9.100	1.119	9.450	0.759	0.587	0.131	2.665	0.015
Handling test	12.050	1.848	13.150	1.268	1.410	0.315	3.487	0.002
Rolling test	25.836	2.671	23.086	2.066	2.844	0.636	4.323	0.000
Targeting test	5.000	1.213	5.800	1.507	1.151	0.257	3.106	0.005
Agility	18.168	1.117	17.150	0.883	0.920	0.205	4.945	0.000

significant at the 0.05 significance level with 19 df

Discussion

Table 3 which details the pre- and post-tests for offensive skills in the research sample, shows that the results of the statistical analysis indicate that the arithmetic means and the (Sig) values for the offensive skill tests – namely, ‘blocking’ ‘handling’ ‘dribbling’ and

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

'scoring' – are all below the significance level of 0.05 indicating that the differences are statistically significant, and in favour of the post-tests for the aforementioned skills. Based on these results the researcher explains that the relative change in these skills is attributable to several key factors which in her view include the intensity of the training sessions used during the national team's special preparation period—which comprised two training sessions per day one in the morning and one in the evening—as well as the training methods employed by the researcher including endurance training based on the 'Super C' method which are primarily aimed at developing physical and motor abilities that directly influence the development of skills and abilities in general as noted by As'ad Lazim and Samer Sa'ad (2023, p. 66) Physical abilities have a direct impact on the performance of fundamental skills in futsal. Clarke (2023, p. 8) that 'consistent strength training is effective and has an impact on the performance of football players, particularly strength endurance training'. The researcher concurs with this view, as strength training provides players with a high degree of stability and body control during performance as well as the ability to withstand physical demands whilst playing. Table 4 shows the details the pre- and post-tests for the agility test shows that the results of the statistical analysis indicate that the arithmetic means and the significance level (Sig) are below the significance threshold of 0.05 suggesting that the differences are statistically significant and in favor of the post-test.

The researcher attributes the improvement in fitness levels to the effect of the independent variable namely the superset training programmer used in the main experiment of the study which was implemented with the players of the national futsal team over a period of 8 weeks in addition to the specific training programmed employed by the coaching staff. All of these abilities contribute to varying degrees to the overall effective performance of a futsal player during matches and competitions. A player whose physical indicators are at a good level will see an improvement in both her technical and psychological indicators at the same time as all these abilities are directly linked to performance and this is reflected in the development of all these abilities.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Simple Attack Performance in Relation to Emotional Intelligence in Women's Foil Fencing

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DOI:

https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2625

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Article history: Received 9/September/2026; Accepted 20/September/2026; Available online 28/October/2026

Abstract

The current study aimed to identify the impact of both emotional intelligence and cognitive curiosity on the performance of the simple attack in female fencing using the foil. The research problem lies in the clear deficiency in understanding the complementary relationship between these psychological and cognitive variables and precise skill performance. Students exhibit difficulties in maintaining emotional stability and controlling feelings of anxiety and tension during the attack, leading to poor timing or misjudgment of movement, despite similar levels of physical and technical training. To achieve the research objectives, the researcher adopted a descriptive approach using correlational and predictive studies. The study was conducted on a population of 100 third-year female students from the College of Physical Education and Sports Sciences and the College of Physical Education for Girls at Al-Qadisiyah University during the academic year 2025-2026. The research sample was selected using simple random sampling. The researcher utilized two scales developed and based on sound scientific principles: the Emotional Intelligence Scale and the Cognitive Curiosity Scale. The statistical analysis revealed significant positive correlations between emotional intelligence and self-awareness on the one hand, and personal score on the other. It also showed that both variables possess good predictive power in explaining the variance of personal score overall score, and performance level. Emotional intelligence outperformed self-awareness in predicting technical performance level in regression models, contributing more significantly than it did to technical performance. Furthermore, the F-test results confirmed the validity and scientific significance of the predicted models used. In light of these findings, the researcher recommends focusing on developing emotional intelligence and self-awareness among female athletes through training and guidance programs. She also recommends adopting the derived predictive models as a scientific tool to assist coaches in predicting performance levels, and conducting future studies on different age groups and samples that integrate other psychological and cognitive variables.

Keywords: Emotional intelligence, Cognitive curiosity, Simple attack, Fencing

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Introduction

Modern sport has seen significant development as a result of the integration of sports training science and sports psychology excellence is no longer limited to physical and technical preparation alone, but is now dependent on integration with psychological and cognitive aspects that ensure the ability to adapt to the pressures of competition in order to make appropriate decisions.

Fencing (with the foil) is a sport that demands quick thinking, perceptual accuracy and emotional control, with the 'simple attack' technique forming the cornerstone of scoring valid hitswhich requires precise timing, speed and technical execution.

The psychological aspect plays a pivotal role in a fencer's success. This is evident in emotional intelligence—which refers to a player's ability to recognise and regulate their emotions in order to harness them for improved concentration and self-confidence—and in cognitive curiosity, a cognitive variable that drives the individual to explore skilful solutions to changing situations. Despite the importance of these variables previous studies have largely focused on physical and technical aspects with a lack of research linking emotional intelligence cognitive curiosity and technical performance amongst female students at faculties of physical education and sports science.

The importance of this research lies in the following aspects

- Enriching scientific knowledge regarding the relationship between emotional intelligence, cognitive curiosity and skill performance in the sport of fencing.
- To provide fencing teachers and coaches with scientific indicators to assist them in developing educational and training programmes.
- To direct attention towards the development of psychological aspects alongside physical and technical aspects.
- To open the way for researchers to conduct further studies addressing various psychological variables in the sport of fencing:

Fencing is a sport that requires a balance of physical, technical, tactical and psychological aspects; a fencer's success in executing offensive skills—particularly the simple attack—depends on speed of perception, precision in decision-making and the ability to control emotions during competition and training. Although fencing training programmes focus heavily on developing technical and physical aspects, attention to psychological and cognitive variables such as emotional intelligence and cognitive curiosity, remains limited, despite the role these two variables play in enhancing technical performance. Through her review of the scientific literature and her observation of the students' performance the researcher noted variations in the level of

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

performance in simple attacks despite differences among the students in their level of mastery of attacking skills; this suggests that certain psychological and cognitive variables may influence these variations. Furthermore studies examining the relationship between emotional intelligence, cognitive curiosity and technical performance in fencing remain limited, highlighting the need for a scientific investigation of this relationship. The research problem is therefore defined as **answering the following question**

Is there a statistically significant relationship between performance in the simple attack and both emotional intelligence and cognitive curiosity amongst female students practising shish fencing? Do emotional intelligence and cognitive curiosity contribute to predicting the level of performance in the simple attack amongst these students?

Research Objectives

1. To develop scales measuring emotional intelligence and cognitive curiosity amongst female shish fencers.
2. To determine the levels of emotional intelligence and cognitive curiosity amongst female shish fencers.
3. To determine the level of performance in basic attacking techniques amongst female shish fencers.

Method and Tools

The process of selecting an appropriate research methodology to address the research problem or achieve the research objective is one of the most important steps determining the success of a researcher's work. From this perspective defining and determining the methodology is considered a crucial step in the research requirements. The methodology is defined as 'the approach devised by an individual to achieve a specific objective' (Akram Khattabi, 1997, 19) Accordingly the researcher adopted the descriptive approach using the method of reciprocal and correlational relationships, due to its suitability for the research objectives and its ability to address the problem. The descriptive research approach is defined as 'a precise understanding of the reciprocal relationships between society, trends, tendencies, desires and development such that the research provides a picture of real-life circumstances establishes indicators and makes future predictions' (Ali Saloum Jawad & Mazen Hassan Jassim, 2014,113).

The researcher defined the study population as third-year female students on the morning programme at the Faculty of Physical Education and Sports Sciences Al-Qadisiyah University (56), and the Department of Physical Education and Sports Sciences at the Faculty of Physical Education for Women (48) Al-Qadisiyah University, for the academic year (2025–2026) totalling 104 female students. The research sample will be selected using simple random sampling.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Methods, tools and equipment used

Arabic and foreign sources and references; personal interviews an expert questionnaire for the scale; the Emotional Intelligence Scale; a technical performance assessment form for certain basic fencing skills one (1) computer (HIP model) a high-definition video camera an electronic stopwatch, test result recording forms, a fencing hall, six shish weapons, six training vests and six fencing masks.

Field Research Procedures

In order to arrive at the findings of the present study, it was essential to achieve its planned objectives, the first of which was to develop scales measuring emotional intelligence and cognitive curiosity. To this end, the researcher followed the steps outlined below during the development process in order to produce scales with a sound scientific basis.

Emotional Intelligence Scale

Having reviewed the literature and previous studies addressing the concept of emotional intelligence, the researcher decided to use her own Emotional Intelligence Scale (Nihaya Abdul-Rahim Hassan, 2015) and to draw upon the domains presented in her theory, which comprise four areas:
(optimism, social skills, appreciation, and utilisation).
To verify the validity of these domains (Appendix 1) in measuring emotional intelligence, they were presented to a group of experts and specialists in the field of sports psychology (Appendix 3), and their opinions were sought regarding:
1. The validity of the domains for measuring emotional intelligence specific to female fencers.
2. The comprehensiveness of the domains and any appropriate additions to the research.
All 15 experts and specialists agreed on the aforementioned areas, with a percentage of 86.66 per cent for the measurement of emotional intelligence. The percentage and chi-squared (χ^2) values were calculated for those who agreed with the scale's domains; the calculated χ^2 values ranged from 5.4 to 15 which is higher than the table value of (3.84) at two degrees of freedom and a significance level of (0.05) indicating that the differences are statistically significant and consequently, that all four domains are acceptable. Table (1) illustrates this.

Table 1. *shows the (chi-square) values*

NO	Scale Domains	Agreement	Not Agreement	Percentage	chi-square	chi-square	Significance
1	Optimism	15	0	%100	15	3.84	Significant
2	Social skills	14	1	%93.33	11.26	3.84	Significant

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

3	Appreciation	13	2	%86.66	8.06	3.84	Significant
4	Benefit	12	3	%80	5.4	3.84	Significant

At (DF) 2 and a significance level of 0.05

The Cognitive Curiosity Scale

After reviewing the literature and previous studies addressing the concept of cognitive curiosity, the researcher opted for the Cognitive Curiosity Scale developed by Habib Mohammed Gouda and based it on the domains he outlined in his theory which comprise three domains, namely:
(the desire to investigate, the pursuit of knowledge, and a love of exploration).
To verify the validity of these domains (Appendix 2) in measuring cognitive curiosity, they were presented to a group of experts and specialists in the field of (sport psychology) and they were asked to state their opinions.
1. The validity of the domains for measuring cognitive curiosity among female fencers.
2. The comprehensiveness of the domains and any appropriate additions to the research.
All 15 experts and specialists agreed on the aforementioned domains with 86.66 per cent supporting their use to measure the concept of cognitive curiosity. The percentage and the chi-squared (χ^2) value for those agreeing with the scale's domains were calculated; the (chi-square) values ranged from 5.4 to 15 which is higher than the table value of 3.84 at 2 degrees of freedom and a significance level of 0.05 indicating that the differences are statistically significant and consequently that all three domains are accepted. Table 2 shows this.

Table 2. *shows the calculated values of (ka2) and their implications for the experts' consensus on the dimensions of the cognitive curiosity scales*

NO	Scale Domains	Agreement	Not Agreement	chi-square	chi-square	Significance
1	Excitement and motivation	15	0	15	3.84	Significant
2	Novelty	14	1	11.26		Significant
3	Research and exploration	13	2	8.06		Significant

Validating the items of the Emotional Intelligence and Cognitive Curiosity scales:

In order to verify the validity of the items in the Emotional Intelligence and Cognitive Curiosity scales, the researcher presented the 33 items of the Emotional Intelligence scale and the 36 items of the Cognitive Curiosity scale to a group of experts and specialists in the field of sports psychology comprising 15 experts and specialists to seek their views on the validity of the items and their suitability for measuring the intended constructs. Following the necessary amendments in light of their feedback the items were finalised, and Tables 3 show the results.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Table 3. *shows the experts' ratings of the items on the Emotional Intelligence Scale and the chi-squared (χ^2) value*

items numbers in the scale	items numbers	Number of experts Agreement	Percentage	Not Agreement	Percentage	chi-square	Significance
،2،3،4،7،10،14،16،17 20،23،24،27،28،31	14	15	% 100	0	%0	15	Significant
1،5،15،18،25،29،32،3 3	6	14	%93.33	1	6.667	11.26	Significant
8،9،12،19،21،22	8	13	%86.66	2	13.333	8.06	Significant
6،11،13،26،30	5	15	% 100	0	%0	15	Significant

Development of response instructions for the Emotional Intelligence and Cognitive Curiosity scales:

The instructions for completing the scale serve as a guide for the examinee or respondent. The researcher took care to prepare instructions that implicitly conveyed the purpose of the scale 'as psychological scales if their purpose is made explicit to the respondent may lead to falsified responses' " (Ahmed Fa'iq and 'Abd al-Qadir Mahmoud, 518, 1973)

1. Do not state the students' names.
2. All items must be answered.
2. Answers are not assessed according to true/false criteria as there are no correct or incorrect answers.
3. Answers must be provided by the student alone, without interference or consultation.
4- Place a tick (√) in the box that corresponds to your answer for each item on the scale.
5- The results are to be used for scientific purposes only and the students' privacy must be maintained.
6- The researcher presented an illustrative example to the students as a model for answering the items on the two scales.

Preliminary experiment

To avoid practical errors during the test the researcher conducted a preliminary experiment with the aim of verifying the clarity of the instructions provided in the questionnaire and the scale items, and assessed the suitability accuracy and time taken to complete them this helped to identify errors in advance before conducting the main experiment.

The experiment was conducted on Monday/ 27 October 2025 on a sample of third-year female students from the Faculty of Physical Education and Sports Sciences at Al-Qadisiyah

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

University comprising 24 students. Through this trial the researcher concluded that the instructions and scales were clear to all students and that the time taken to complete the two scales ranged from 15 to 20 minutes. The scales were thus ready for application to the main sample for the purpose of statistical analysis.

Main Study

After the researcher had verified the suitability of the scale in the pilot study, the main study was conducted using both scales in their entirety on a sample of 100 third-year female students from the Faculty of Physical Education and Sports Sciences at Al-Qadisiyah University. This took place from Monday/ 2 November 2025 to Thursday/ 6 November 2025 in the lecture theatres.

The researcher emphasised to the students the need to read the instructions for the scales carefully and thoroughly and to answer all questions thoughtfully and truthfully. The time taken to complete the two scales ranged from 15 to 20 minutes which corresponds to the time observed in the pilot study.

Marking the two scales

The researcher assigned the appropriate mark to each item on the questionnaire to mark the two scales in accordance with the marking key which is 'the tool by which the examiner identifies the answers that indicate the presence of the outcome being measured' (Salah al-Din Mahmoud Allam, 2000,184). The emotional intelligence scale comprises 33 items divided into four domains (3 negative items and 30 positive items) as shown in Table 4. The scale features a five-option multiple-choice format as illustrated in Table 4.

Table4. *shows the positive and negative items for each domain of the Emotional Intelligence Scale*

NO	Scale Domains	Positive Items	Negative Items	Totel
1	Optimism	31-27-24-23-20-17-16-14-10-7-3-2	28	13
2	Social skills	32-29-25-18-15-1	33-5	8
3	Appreciation	22-21-19-12-9-8	-	6
4	Benefit	30-26-13-11-6	-	5

Table 5. *shows the answer options and the marks for positive and negative paragraphs*

Item Weight	Does Not Apply	Rarely	Sometimes	Mostly Applies	Strongly Applies
Positive	5	4	3	2	1
Negative	1	2	3	4	5

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The Cognitive Curiosity Scale (36) consists of items divided into three domains (5 negative items and 31 positive items), as shown in Table (5). It features a five-point response scale, as shown in Table (6).

Table 6. *Shows the response options and the scores for positive and negative items*

Item Weight	Does Not Apply	Rarely	Sometimes	Mostly Applies	Strongly Applies
Positive	5	4	3	2	1
Negative	1	2	3	4	5

Statistical analysis of the items in the Emotional Intelligence Scale

This analysis aims to calculate the discriminant validity and internal consistency of the scale's items, "as discriminant validity refers to the ability to distinguish between individuals who score highly and those who score low on the same scale whilst internal consistency refers to the extent to which the items are homogeneous in their measurement of the trait that is item analysis involves retaining the good items in the test" (Matanius, Michael, 1999, 25) The researcher employed two methods in analysing the items of the emotional intelligence scale: discriminative power (the two extreme groups) and internal consistency.

The two-extreme groups method (discriminatory power)

To determine the discriminant validity of the items in the Emotional Intelligence Scale, the researcher employed the two-extreme-groups method as this method is considered suitable for assessing item discrimination. The researcher verified the items' discriminant validity using a statistical analysis sample comprising 52 female students, To calculate the discriminatory power of the items, the researcher followed the steps below:

1. Ranking the scores in descending order from highest to lowest.
2- Selecting 27 per cent of the questionnaires with the highest scores and 27 per cent of those with the lowest scores, as this proportion yields two groups of maximum possible size and distinctiveness with 14 questionnaires in each group and excluding the middle-scoring questionnaires.
3. The discriminant power of each item in the two scales was calculated using a t-test for two independent samples via SPSS the 'sig' value was taken as a statistical indicator of the item's discriminant power. The following tables show the results

Table7. *shows the discriminant validity of the Emotional Intelligence Scale*

Scale Domains	Item	Upper Group		Lower Group		T	SIG
		Mean	SD	Mean	SD		

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Optimism	1	3.481	1.189	2.407	1.083	3.470	0.001
	2	4.000	1.330	2.741	1.228	3.615	0.001
	3	3.741	1.259	2.630	0.926	3.695	0.001
	4	4.444	0.751	2.444	1.476	6.274	0.000
	5	3.074	1.299	2.407	1.047	2.076	0.043
	6	3.407	0.844	2.741	1.196	2.367	0.022
	7	3.889	1.155	2.593	1.010	4.391	0.000
	8	4.444	0.892	2.556	1.553	5.482	0.000
	9	3.926	1.269	2.630	1.079	4.044	0.000
	10	4.370	0.967	3.148	1.537	3.498	0.001
	11	4.148	1.134	2.630	1.523	4.156	0.000
	12	4.111	1.013	2.593	1.047	5.416	0.000
	13	4.000	1.109	2.593	1.118	4.642	0.000
	14	4.370	0.967	2.370	1.363	6.219	0.000
Social skills	1	4.333	0.734	2.852	1.231	5.371	0.000
	2	4.815	0.483	3.074	1.357	6.281	0.000
	3	4.519	0.893	2.852	1.199	5.791	0.000
	4	4.481	0.802	2.593	1.647	5.358	0.000
	5	4.037	1.285	2.926	1.591	2.822	0.007
	6	4.630	0.565	2.370	1.334	8.102	0.000
Appreciation	1	3.926	1.107	2.519	1.424	4.054	0.000
	2	4.111	1.188	2.630	1.275	4.417	0.000
	3	4.593	0.931	2.926	1.328	5.341	0.000
	4	4.259	1.130	2.074	1.357	6.432	0.000
	5	4.333	1.144	2.593	1.366	5.077	0.000
	6	4.481	0.935	2.481	1.528	5.800	0.000
	7	4.148	1.134	2.889	1.311	3.776	0.000
	8	4.259	1.059	2.407	1.448	5.363	0.000
Benefit	1	4.111	0.847	2.667	1.519	4.315	0.000
	2	4.148	0.818	2.889	1.528	3.776	0.000
	3	4.074	1.107	2.259	1.347	5.409	0.000
	4	4.074	1.107	3.148	1.322	2.791	0.007
	5	4.000	1.109	2.593	1.448	4.009	0.000

Significance level (0.05) and df (n + n – 2) = (27 + 27 – 2) = 52 = 2.007

Internal consistency

This is considered the most common form of reliability in the field of physical education assessment as it is achieved when the ability or trait to be measured comprises multiple tests, and the sum of the scores from these subtests provides an indication of the overall test score The higher the correlation coefficient between the subtest scores and the total test score, the greater the internal consistency of the test as a whole (Mohammed Hassan Alawi, 2000 p. 271).

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Statistical Methods

The researcher used SPSS Version 24 to analyse the results using the following statistical measures:

- Arithmetic mean.
- Standard deviation.
- Skewness coefficient.
- Spearman's correlation coefficient.
- Chi-squared (χ^2) test.
- Simple correlation coefficient (Pearson).
- Factoronbach's formula.
- t-test for a single sample and for two independent samples.

Results

Table 8. *Statistical description of the research variables based on the Kolmogorov–Smirnov test for the model-building sample*

NO	Variables	Mean	SD	Error (SE)	k-s K–S Calculated	SIG
1	Emotional intelligence	112.014	20.333	2.448	0.013	0.321
2	Straight attack	8.522	1.183	0.142	0.017	0.301
3	Attack with a change of direction	9.000	1.150	0.138	0.009	0.324
4	Cutting attack	9.565	0.717	0.086	0.284	0.127

Table 9. *shows the quality indicators for the linear regression model*

The model	Variables Predictability	results	(R)	(R^2)	(R^2)	SD Error
1	Emotional intelligence	The attack changes direction	0.695	0.483	0.467	0.840

Table (9) shows that the correlation coefficient was (0.695) and that the coefficient of determination was (0.483), which represents the percentage of variation in the dependent variable (direct straight-line attack) attributable to the independent variable (emotional intelligence) The regression equation's contribution represents the total variance and variation in the outcome (performance of the direction-change attack skill) explained by the model derived from the sample

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

The adjusted coefficient of determination (R^2) indicates the proportion of variation in the dependent variable (change in direction of attack) that the model explains, assuming it were derived from the population from which the sample was drawn.

Table 10. *shows the quality indicators for the linear regression model*

The model	Variables Predictability	Spike Attack	R	Coefficient of DeterminationR^2	AdjustedR^2	SD Error
1	Emotional intelligence	Spike Attack	0.606	0.368	0.349	0.579

Table (10) shows that the multiple correlation coefficient was (0.606) and that the coefficient of determination (proportion of variance explained) was (0.368) this means that 'emotional intelligence explains (36.8 per cent) of the decisive attack This suggests that the prediction of 'cutting attack' does not depend solely on the emotional intelligence variable, but also on other factors not included in the model.

Discussion

The results of the statistical analyses revealed a statistically significant positive correlation between emotional intelligence and cognitive curiosity on the one hand and performance in basic attacking skills (straight attack, attack with a change of direction and cutting attack) with the shish on the other as well as confirming the predictive validity of these psychological variables in determining the level of skill performance.

This finding is scientifically attributed to the nature of foil fencing as a sport that demands a high level of proficiency in rapid mental processing and emotional control during high-pressure competitive situations. Emotional intelligence is a key determinant that enables the fencer to regulate levels of anxiety and psychological stress, and to control rapid emotional responses, which in turn has a positive impact on timing and the accurate assessment of the distance between the fencers Those required to carry out the simple attack as quickly and smoothly as possible without hesitation.

On the other hand, cognitive curiosity represents an exploratory cognitive drive that prompts the player to carefully analyse the playing environment and process the complex visual and skill-based cues emitted by the opponent. Possessing a high level of cognitive curiosity enhances the accuracy of sensorimotor perception and the speed of making appropriate decisions to overcome close-quarters combat and outmanoeuvre the opponent particularly in indirect attacks (such as changes of direction and cut-offs) which require adaptation to changing tactical gaps.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

These findings are consistent with theoretical frameworks which emphasise that the integration of affective regulation and cognitive-exploratory motivation forms the cornerstone for developing field performance competence and sound decision-making in complex motor situations. Thus, the findings demonstrate that skilful excellence in simple attacking play is not limited to physical and technical competence alone, but depends fundamentally on the functional integration of affective and cognitive variables.

Conclusions

1. There is a statistically significant correlation between emotional intelligence and performance in simple attacks, suggesting that the ability to regulate and recognise emotions directly influences performance in simple attacks in shish fencing amongst the research sample.
2. The results show a statistically significant correlation between cognitive curiosity and performance in simple attacks, reflecting that the female students' desire to explore their environment and process information contributes to improving the accuracy and timing of their attacks.
3. The multiple regression model explains the proportion (R^2) of the variance in simple attack performance, indicating that the two variables (emotional intelligence and cognitive curiosity) are significant predictors.

Recommendations

The researcher recommends the following:
1. Emotional intelligence training (relaxation techniques, mental imagery cognitive restructuring) should be integrated with technical training in basic attacking skills within training and educational programmes for both students and players.
2.Encouraging female students to study types of attack in fencing during game situations that require rapid offensive decision-making under emotional pressure to enhance the integration between the two variables.
3. Using measures of emotional intelligence and cognitive curiosity as part of the periodic assessment of female students for the early identification of psychological needs.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

The Effect of Specific Exercises Using the Blazepod Device on Developing Some Motor Abilities of Basketball Players Under 18 Years Old

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DOI:
https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2377
https://creativecommons.org/licenses/by/4.0/
Article history: Received 2/November/2025; Accepted 18/November/2025; Available online 28/October/2026

Abstract

The study aimed to design specialized exercises using the Blazepod training device for young basketball players and examine their effectiveness in developing selected motor abilities . The research sample consisted of 12 players from the Adhamiya Club participating in the Iraqi Summer Youth Basketball League for the 2024 / 2025 season. The players were randomly assigned into two equal groups: an experimental group (n=6) that trained using Blazepod based exercises and a control group (n=6) that followed traditional training. The researcher employed the experimental method with two equivalent groups and developed a training program consisting of 24 units each lasting 26–35 minutes implemented over eight weeks at a frequency of three sessions per week. The findings indicated that the Blazepod exercises led to significant improvements in the motor abilities of young basketball players as shown by the differences in mean scores between the pre- and post-tests . Furthermore , the results demonstrated the superiority of the Blazepod based program over the conventional training methods used by the coach in enhancing motor performance. Based on these results , the researcher recommends integrating Blazepod specific exercises into training programs for basketball players across all age categories as well as designing additional individual and group exercises with varied formations and complexities to further develop motor abilities .

Keywords: exercises, motor skills, blazepod, basketball.

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

Basketball is considered one of the sports that require high physical, motor, and skill-related demands, which are reflected in the beauty and speed of performance. Its skills take various forms in terms of movement paths, which have rapidly evolved, and this development has certainly aligned with the speed requirements of the game. It necessitates the player to exert significant offensive effort to overcome the opponent's defensive strategies (Abdulhussain et al., 2025).

Most international basketball teams and national squads have turned to training using devices and auxiliary tools for age groups, especially the youth category, to a greater extent. This category is the foundation for preparing and developing a distinguished player with high skills in the future, capable of representing advanced clubs and national teams. The execution of these exercises mimics the performance and nature of muscle work in regular basketball training thereby optimizing movement performance and enhancing and developing motor abilities and offensive skills more effectively(Abdulkareem & Hameed, 2017; Abdulkareem & Sattar Jabbar, 2025) .

Motor skills play a significant role in most offensive basketball skills, which requires players to maintain a high level of neuromuscular coordination throughout the game, in addition to performance accuracy. Therefore, it is essential to use tools and devices that assist in exercises similar to the skills and movements that occur in the game, so that the player can cope with the continuous defensive changes of the opponent. This is what the researcher will attempt to find on one of the training devices, specifically the (Blazepod) training device, by applying special exercises with this device (Moody et al., 2020; Zhang et al., 2019).

The importance of the research is highlighted by applying a set of interactive exercises using the training device (Blazepod) and demonstrating the extent to which these exercises affect the development of certain motor skills (coordination and agility) among young basketball players. These interactive exercises with this device are considered one of the auxiliary means used to facilitate the training process, which increases speed, accuracy, coordination, and direction changes at a high level among young players throughout the duration of the game (Laursen, 2010; Pan et al., 2022).

The research problem emerged from the researcher’s observation of many club training sessions and some matches of the age-group league accompanying the premier basketball league. He noticed that there is a problem represented in the weakness of motor skills (coordination and agility) and the inability to cope with changes in the individual and collective defensive positions of the opponent, which negatively affected the teams' results and the effectiveness of most young basketball players.

The novelty of devices and tools provides researchers with valuable information and helps convey the coach's ideas to the player in the form of exercises that align with the flow of the game,

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

raising the level of athletic performance to achieve high performance levels during matches and the ability to outperform the opponent (Maqableh et al., 2023; Pekas et al., 2023) . This has led coaches to choose or select the most beneficial and time saving auxiliary devices and tools and to optimally use these tools that help improve technical performance on one hand and develop motor skills on the other . This has prompted the researcher to envision the need for a study and research to prepare interactive exercises using the training device (Blazepod) which works on developing motor skills and enhancing the player's ability to cope with changes in the opponent's defensive position at a high level for the longest possible duration giving it a greater role in the training process (Hassan & Abdulkareem, 2026; Howard et al., 2016) .

The study aims to: Preparing special exercises using the (Blazepod) training device for young basketball players. Identifying the impact of exercises using the (Blazepod) training device on developing certain motor skills in young basketball players.

As for the research hypotheses, they are: There are no statistically significant differences between the pre-test and post-test for the experimental and control groups in developing some motor skills of young basketball players. There are no statistically significant differences between the post-tests of the experimental and control groups in developing some motor skills of young basketball players.

The research was conducted on the players of the Al-Adhamiya Sports Club for youth basketball, totaling 12 players, in Baghdad at the Al-Adhamiya Sports Club for Indoor Games from 05/07/2025 to 27/08/2025.

Methodology

The researcher chose the experimental method with the method of two equal groups (experimental and control), with pre and post tests, as “experimental research is one of the most sufficient means of reaching reliable knowledge” (Mahjoub, Physical and physiological analysis of sports movements, 1990, page 83), and the researcher identified the research community with the players of the Adhamiya Club (12) players participating in the Iraqi Summer Youth Basketball League for the 2024/2025 sports season, and the sample was selected by the random method, which consists of (12) players representing the Adhamiya Sports Club for basketball, due to the availability of the sample, ease of control and commitment to daily training, as well as the availability of the training hall, and the sample percentage reached (66. The sample was divided by lottery method into two groups, one experimental and the other control (6) players for the experimental group, and (6) players for the control group, and for the purpose of ensuring the start of the same line of action between the two groups and to verify that the results are moderately

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

distributed between the two research groups, the researcher performed equivalence in the research variables as shown in table (1).

Table 1. *Equivalence of the Experimental and Control Groups in the Research Variables*

Variables	Unit of Measurement	Experimental Group		Control Group		T value	Sig. value
		M	SD	M	SD		
Coordination	Seconds	8.596	0.396	8.636	0.367	0.181	0.859
Agility	Seconds	12.248	0.204	12.278	0.204	0.253	0.804

(*) Degrees of freedom (12 – 2 = 10)
(*) Significant if the significance level is less than (0.05).

Table (1) above shows that the error level values for the research variables are greater than the significance level (0.05), indicating that there are no significant differences in the variables between the experimental and control groups, which suggests the equivalence of the research groups and the initiation of a single starting line for both groups.

The researcher chose the compatibility test (Shaba, 2016, p. 29) and the agility test (Shaba, 2015, p. 458), and the researcher conducted the pre-test for the research sample, on Wednesday 02/07/2025 at 5 pm at Al-Adhamiya court, and the researcher prepared the exercises, which consisted of (24) training units and the time of each unit (26 - 35 minutes) for a period of (8) weeks with (3) units per week (Saturday, Monday, and Wednesday), and the exercises were applied on Saturday 05/07/2025 on the experimental group. 35) minutes for a period of (8) weeks with (3) units per week (Saturday, Monday and Wednesday), and the exercises were applied on Saturday on 05/07/2025 on the experimental group, and was completed on Wednesday 27/08/2025, and the researcher made sure that the conditions in which the post-test will be conducted are similar to the conditions of the pre-test in terms of tools, the place and time of conducting the pre-test, the method of implementation and the sequence of tests, as well as the calculation of grades and with the help of the same assistant work team the post-test was implemented on Saturday 30/08/2025.

Statistical Methods

The statistical package (SPSS) was used to process the results of the research using the following rules: The arithmetic mean, the standard deviation, the median, the skewness coefficient, the paired sample t-test, the independent sample t-test.

Results

Table 2. *Means and Standard Deviations of the Research Variables Between the Pre- and Post-Tests for the Experimental Group*

Variable	Unit of Measurement	Pre-test		Post-test	
		M	SD	M	SD
Coordination	Seconds	8.596	0.396	6.223	0.151

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Agility	Seconds	12.248	0.204	10.276	0.103

Table 3. *Differences in Means, Standard Deviations, Calculated (t) Value, and Significance of Differences for the Research Variables Between the Pre- and Post-Tests for the Experimental Group*

Variable	Unit of Measurement	Mean Difference	SD of Difference	Calculated *t*	*p*-value
Coordination	Seconds	2.373	0.378	15.367	0.000
Agility	Seconds	1.971	0.278	17.362	0.000

(*) Degrees of freedom (df = 6–1 = 5).
(*) The result is considered significant if the p-value is less than the significance level (0.05).

Table 4. *Means and Standard Deviations of the Research Variables Between the Pre- and Post-Tests for the Control Group*

Variable	Unit of Measurement	Pre-test M	Pre-test SD	Post-test M	Post-test SD
Coordination	Seconds	8.636	0.367	7.430	0.101
Agility	Seconds	12.278	0.204	11.281	0.142

Table 5. *Differences in Means, Standard Deviations, Calculated t-Values, and Significance Levels of the Research Variables Between the Pre- and Post-Tests for the Control Group*

Variable	Unit of Measurement	Mean Difference (MD)	SD of MD	Calculated *t*	p-value
Coordination	Seconds	1.206	0.395	7.472	0.001
Agility	Seconds	0.996	0.153	15.950	0.000

(*) Degrees of freedom (df = 6–1 = 5).
(*) The difference is considered significant if the p-value is less than the significance level (0.05).

Table 6. *Means, Standard Deviations, Calculated t-Values, and Significance Levels of the Research Variables Between the Experimental and Control Groups in the Post-Test*

No.	Variable	Experimental Group (Mean ± SD)	Control Group (Mean ± SD)	Calculated *t*	p-value
1	Coordination	6.223 ± 0.151	7.430 ± 0.101	16.224	0.000
2	Agility	10.276 ± 0.103	11.281 ± 0.142	13.945	0.000

(*) Degrees of freedom (df = 12 – 2 = 10).
(*) The difference is considered significant if the p-value is less than the significance level (0.05).

Discussion

The researcher attributes this to the effectiveness of the specific and varied exercises using the (Blazepod) device, as the exercises were graduated from easy to difficult, individual to

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

compound, with the progression of the training units. Additionally, they included elements of excitement, thrill, and competition among the players, which significantly and effectively developed their motor skills. Therefore, we need to diversify the exercises and introduce a new element during training to increase the players' motivation.

In addition to adopting the correct and codified scientific principles in terms of (intensity, volume and rest), it lasted for two months (eight weeks), as the exercises prepared by the researcher using the Blazepod device worked to develop physical abilities effectively and significantly, which is what a basketball player needs in most individual and collective defensive skills that are consistent with the nature of the situations faced by basketball players from the offensive game situations of the opposing team and the speed of response to changes in the offensive situation. The researcher made the exercises more difficult as the training units progressed by increasing the number of pods so that the player performs the maximum number of motor responses without knowing where the light is on in order to be fully prepared to defend, assist and cover during the game for the opponent's offensive situations, and this forced the player during the exercises to increase the speed of performance, which worked to develop agility and coordination.

The researcher attributes it to the effectiveness of the defensive drills prepared by him, which were chosen in a similar way to the offensive game situations of the opposing teams, as well as the development of motor abilities and the link between them and the movements of the defender and the different game situations in terms of assisting, covering and stopping shots from different areas to serve the required motor performance.

This requires “the player to be able to execute these skills with mastery and integration so that he executes them correctly in all conditions of the game” (Hassan, 2000), and that the choice of exercises should be according to the motor path of the skills (focusing on the working muscles), and diversify the exercises and be similar to the different game situations, This all gives the player opportunities to deal with difficult and changing game situations that occur through competition, and this is what the researcher did through his exercises using the (Blazepod) device, which works to give different signals to the player to perform different and varied defensive movements according to the type of lighting and its location to suit the nature of the variables of the game, as the goal of training on basic defensive skills is to diversify its options and situations "that the success of the player's skill performance depends on the degree of mastery of motor skills regardless of the change of circumstances, which leads to the player reaching a high degree of performance mechanism and its effectiveness so that the inevitable result is to achieve the goal. The inevitable result is the implementation of the desired goal (Mohammed, 2000), as well as the quality of the exercises prepared by the researcher worked to develop all the muscles working on skill performance through continuous repetition of defensive skills in terms of leg movement, assistance, coverage and stopping the shot from different areas, and this requires continuous

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

movement and alertness from the player, thus improving the speed of response, the physical aspect and the compatibility between vision and foot movements “Exercises inevitably lead to improved neuromuscular coordination and adequacy of working muscles to improve their performance capabilities” (Al-Harouri, 1993, page 101).

Conclusions

1. The specialized exercises prepared by the researcher using the (Blazepod) training device significantly improved the motor skills of young basketball players, as evidenced by the differences in the means between the pre-test and post-test.
2. The effectiveness of the special exercises prepared by the researcher using the (Blazepod) training device compared to the traditional exercises prepared by the coach in significantly developing the motor skills of young basketball players is evident from the differences in the arithmetic means between the pre- and post-tests.

Recommendations

1. Using specific exercises with the (Blazepod) training device to develop motor skills in basketball players of all age groups.
2. Preparing more exercises with varied formations and greater complexities, both individually and collectively, using the (Blazepod) training device to develop motor skills and offensive and defensive techniques.
3. Using the (Blazepod) training device individually by the player who wishes to develop their offensive and defensive skills, due to its ease of carrying and use.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
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Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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The Effect of Using an Assistive Device in Learning the Walkover backward Skill on the Floor Exercises in Women's Artistic Gymnastics

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DOI:

https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2364

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Article history: Received 7/October/2025; Accepted 30/November/2025; Available online 28/ October/2026

Abstract

The aim of the study was to identify the effect of using an assistive device in learning the Walkover backward Skill on the floor exercise in women's artistic gymnastics. The hypothesis of the research is that there are statistically significant differences in the use of an assistive device in learning the Walkover backward Skill on the floor exercise apparatus in artistic gymnastics. The researchers used an experimental approach with two equivalent groups, a control group and an experimental group, to suit the nature of the problem to be solved. The research community was defined as 10 female athletes aged 9-12 years (junior athletes) in Baghdad al-Karkh who train at the Al-Nusoor Hall in the Workers' Sports Club. The research sample was set at 8 athletes, constituting 80% of the research sample. The researchers used a design of two equivalent groups, a control group and an experimental group, to suit the research procedures. The most important conclusions are that the assistive device plays a major role in helping players learn the back arch skill on the floor exercise apparatus. The use of the assistive device aims to provide safety and protection for players, enabling them to perform the skill with confidence and reassurance, and thus focus on improving their performance without fear of injury. The researchers also recommended the adoption of the device in teaching the skill under study. The device should be used in teaching the Walkover forward Skill on the balance beam and placed in the gymnastics hall for use

Keywords: assistive device, Walkover backward, floor exercise.

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Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

Teaching basic skills in individual or team sports is a big task for coaches, because what is built on a mistake will affect the training process later and it will be difficult to correct the mistake at advanced stages (Akbar et al., 2024).

Therefore, the use of all the scientific and technical knowledge of the trainers in communicating the correct way to learn any basic skill with its technical requirements and the required path for its technical performance is very important (ahmed et al., 2026), so it is necessary to use everything that facilitates the correct learning method based on a good foundation that qualifies for the continuation of development in the most difficult performance, and by using devices and aids that add to the learning process suspense and facilitate performance in its early stages of skill learning is very important, as it raises the psychological factor, reduces the injury and reduces the load on the trainer. It accelerates the learning time for skills

Artistic gymnastics is one of the important sports that needs a long period of psychological and physical preparation to learn basic skills, so coaches must use all training and educational methods and methods in it, and artistic gymnastics for women is considered one of the types of gymnastics for women (Rahim and Abdulredha, 2025), as some of its devices are different from other types of gymnastics, including the balance beam and parallel of different heights, and the floor movement mat is considered one of the four types of artistic gymnastics for women, which needs a long time to learn its basic skills. It is considered a key to the rest of his other devices, and the skill of the back bow is considered one of the most important skills on the mat of ground movements, because if the player reaches a good level, she will perform it on the rest of the devices, such as the balance beam and in some stages of the jumping platform.

As for the purpose of the research, it is to use an aiding device in learning the skill of the back arch on the floor movement mat in artistic gymnastics for women, and the research problem is the difficulty of performing basic skills on the floor movement mat device, as the skill needs special positions and correct paths for the arms, torso, shoulders and legs, and that any mistake in these parts of the body that occurs in the learning process will delay the learning time, and therefore this delay will be at the expense of the time of learning another skill and manifest The problem is to raise the process of learning the skill of the back arch and overcome the difficulties and the path of skill performance through the design and use of an assistive device.

Many studies have dealt with devices and assistive devices, which the researchers agree with, including a study (Salma and Lama, 2021), as the study aimed to identify the differences between the results of the pre- and post-tests of the experimental and control groups, as well as to know the differences between the experimental and control groups in the post-tests of the circular waving skill to know the role of the designed mechanical auxiliary mushroom device in learning the skill under study. The study (Mohamed et al., 2022) aimed to design an assistive

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

device in learning to perform a skill from the back-weighted attachment to the snatch to stand on the hands, and to identify the effect of the assistive device on learning to perform the skill, and the researchers assumed that there are statistically significant differences between the pre- and post-tests of the research group. As for the study (Habib and Amin, 2022), the study aimed to design an auxiliary device to improve the performance of the straight posterior reverse decoupling skill on a parallel device. As for the study (Anmar, 2016), the study aimed to use the assistant device to develop the skill of the Russian on the throat horse device, and the research hypothesized that the assistant device has a positive effect on the development of some of the skill of the Russian on the throat horse device, while the study (Amira et al., 2019) aimed to manufacture an assistant device. To develop flexibility and improve the performance of my skills (cartwell and back arch) on the floor movement mat - to identify the effect of the use of an auxiliary device in developing flexibility and improving the performance of the cartwell and back arch skills on the floor movement mat of women's artistic gymnastics. The research imposed a statistically significant difference in the use of a device that helps in developing flexibility and improving the performance of the cartwell and back arch skills on the floor movements mat of women's artistic gymnastics.

The aim of the research is to identify the effect of using an assistive device in learning the skill of the back arch on the floor movement mat in women's artistic gymnastics

As for the hypothesis of the research, there are statistically significant differences in the use of the assistant device in learning the skill of the back arch on the floor movement mat in artistic gymnastics

Method and Tools

The researchers used the experimental method to fit the research problem, as the research population was identified as (10) young female players aged 9-12 years (juniors) in Baghdad Al-Karkh who train in the Eagle Hall in the Workers Sports Club, while the research sample settled on (8 players) and the research sample constituted (80%). The researchers used the design of the equal control and experimental groups to suit the research procedures.

The researchers used research methods Arabic sources and references, observation and analysis, tests and measurement, the Internet, as well as tools and devices such as a stopwatch, a camera, a floor mat, and an assistive device

How to design the device

The design of any device or aid is a challenge for the trainer or any designer or researcher to solve a research problem, as it reduces 50% of the learning process to simulate the correct paths of skill performance for any skill on any device, so after identifying the problem by the researcher and presenting it to the supervisor from here, special designs were developed by them, which would help in the process of support and assistance and provide the

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

elements of physical and psychological safety necessary for the process of skill performance of the front and back arch on the mat of movements floor.

After reviewing a large group of designs used by the researchers, firstly, in the training halls and through their scenes through social media sites and international search engines, secondly, the researcher found that all the designs are similar and serve the motor duty, but there is a simple part in each design, and this part serves a specific point or part of the three parts of the skill, whether it was primary, main or final. From this point of view, the researcher sought to design an auxiliary device for some physical abilities and learn the skill of the bow. The back of the floor movement mat in women's artistic gymnastics.

The most important thing in the device is to give the player the physical support and psychological support for the performance, when the player stands in the front direction of the device to perform the back arch, the player stands on her hands and descends on her back on the device, and then pushes her arms to support her back on the sliding platform, which first the device will rotate forward, and when the center of gravity of the body moves from the front area of the device to the second area, the platform will help and through the moving foam rollers, reduce friction with the device and transfer it to the The other side is smooth and a good path to performance. As shown in figure 1.

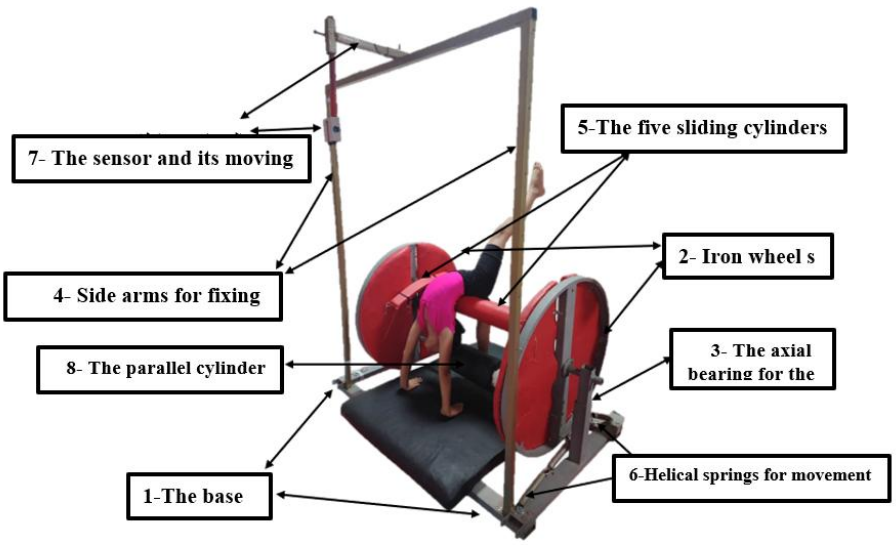


Figure 1. *Shows the parts of the Device*

Procedures

The researchers conducted a reconnaissance experiment to find out the effectiveness of the ulcerative assistant device's work, as the exploratory experiment was conducted in the gymnastics hall of the Baghdad Workers' Club on a sample of two players outside the research

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

sample, and its goal was to test the work of the device initially on the female players, as well as to find out whether the device tolerates and agrees to perform education. The skill of the back arch skill on the mat of floor movements in artistic gymnastics It became clear after taking the opinions of the specialized experts from the trainers that the device agrees with the performance of the skill tracks.

Pre-test of the back arch skill on the floor movement mat
Skill Test
Objective of the test: to measure the performance capability and to know the final score that the player obtains for performing the back arch skill on the floor movement mat
Test instruments: floor movement mat, clock.
Test Evaluation: The test is evaluated according to the technical performance according to what the referees agreed on in calculating the player's errors, as the highest score obtained by the player on the device is (10) marks.
Test Procedures: The tester takes the preparation position by standing at the beginning of the mat and the arms upwards and starts performing the skill first by leaning on the left leg and lifting the right leg from the hip joint at an angle of 90 D and making an arch with the torso while maintaining the straightness of the hands without flexion and the position of the head is by leaning on the hands and reaching the body to the position of standing on the hands and the hip angle with the legs 180 D and the player starts by leaning on the free leg and maintaining the opening of the legs and descending the other leg with the leg
To register: The evaluation is done by four gymnastics referees according to their internal evaluation, and the average of the two grades is taken and divided by (2) for the purpose of extracting the final grade of the female athlete, and the performance evaluation is of (10) grades according to the agreement and as shown in the following figure

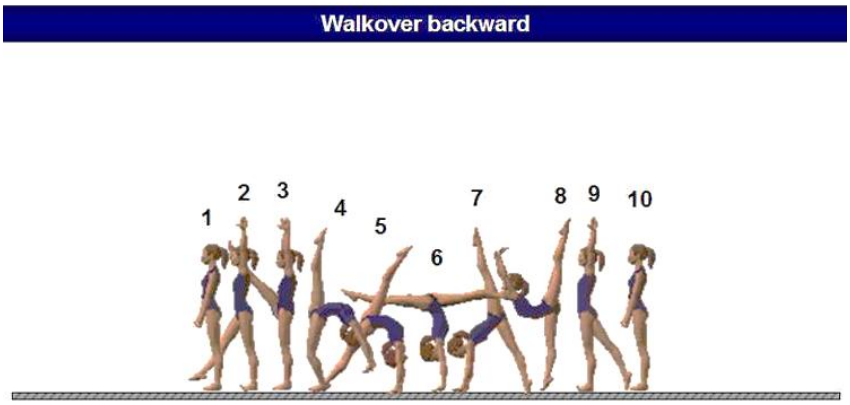


Figure 2. *Shows the performance of the Walkover backward Skill on the Floor Exercises*

Reward of the research sample

The researchers conducted a sample equivalence test in the posterior arch skill as shown in the following table 1

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Table 1. *It shows the arithmetic mean, standard deviation, calculated (t) value, error level, significance, differences in arithmetic media, and deviation of differences in the pre-test of the skill of the control and experimental research sample.*

Features Statistics Research Variables	n	Unit	Control Group		Experimental Group		T	value	Sig
			M	±SD	M	±SD			
Walkover backward	8	degree	3.22	.221	3.30	.258	.441	.675	non sig

Note. Significant at the confidence level (0.05) if the error rate is ≤ (0.05).

The researchers relied on the vocabulary set by the Central Gymnastics Federation on the floor movement mat device , and the assistant device was used in the curriculum set for the sample, and the experiment lasted for (8) weeks and included (16) educational units at a rate of (2) two units per week, and the total unit time reached (120) minutes divided into two devices for each educational unit (floor, beam) and (Floor, Jump) and applied the educational curriculum with a period of time of (35) minutes for the floor movement mat device , and the researchers relied on the principle of (repetition and rest), and they were keen to ensure that the educational curriculum developed by them for the assistive device is in accordance with scientific foundations and principles.

Table 2. *Shows a daily learning module of the educational device designed to teach the skill of the back bow*

Daily Educational Module					
First Week/Day 1					
reiteration	Course Time (90) minutes			day	unit
What Module Time Allows	Explanation of the skill and how it is performed Knowing all the skill requirements to perform it correctly and explaining to the players the mistakes that hinder their performance. He explained the components of the assistive device that they will perform and learn to perform the skill on, while giving time to the performance of the players and exploring the mechanism of the assistive device's work	Public and private warm-up	25 m	Sunday	The first
		Floor Exercises	35 m / 75 m		
		Another device	35 m		
		Recovery exercises	10 m		

After completing the application of the vocabulary of the educational curriculum using the auxiliary device for the skill of the back bow skill on the mat of ground movements, the

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

post-test was conducted in the same manner as in the pre-test, where two researchers created the atmosphere and conditions in which the pre-tests themselves were conducted. After that, the skill was photographed, and then it was converted to a calculator and then to laser disks, and then presented to the competent referees The evaluation grade was approved with a range of (10) points for skill. The referees adopted the International Law of Artistic Gymnastics by excluding the highest and lowest grades and adopting the arithmetic mean of the two intermediate grades from their grades. Divide it into two to extract the player's final score.

Results

Table 3. *It shows the arithmetic mean, standard deviation, calculated t(t) value, error level, significance, differences in arithmetic media, and deviation of differences in the pre- and post-tests of the control sample skill.*

Variables	n	Unit	Pre-test		Post-testing		F	FD	T	Value
			M	SD±	M	SD±				
Walkover backward	8	reiteration	3.22	.221	5.80	.182	2.57	.287	17.9	.000

Significant at the confidence level (0.05) if the error rate is ≤ (0.05).

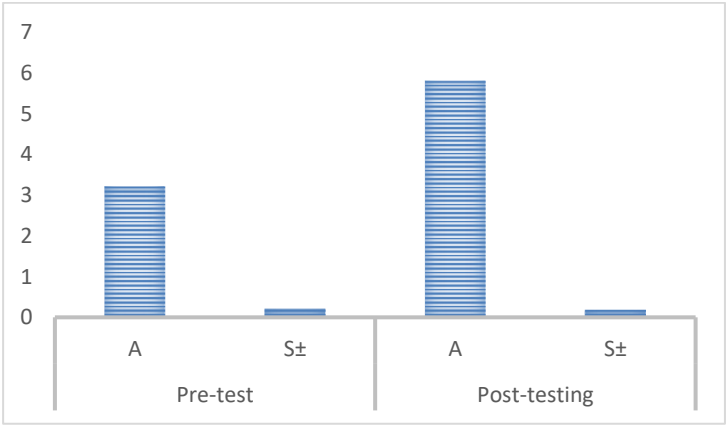


Figure 3. *The histogram shows the medians and standard deviations of the pre- and post-test of the control group*

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Table 4. *It shows the arithmetic mean, standard deviation, calculated t(t) value, error level, significance, differences in arithmetic media, and deviation of differences in the pre- and post-tests of research skill for the experimental research sample*

Variables	n	Unit	Pre-test		Post-testing		F	FD	T	Value
			M	SD±	M	SD±				
Walkover backward	8	reiteration	3.30	.258	6.65	.129	3.35	.173	38.6	.000

Significant at the confidence level (0.05) if the error rate is ≤ (0.05).

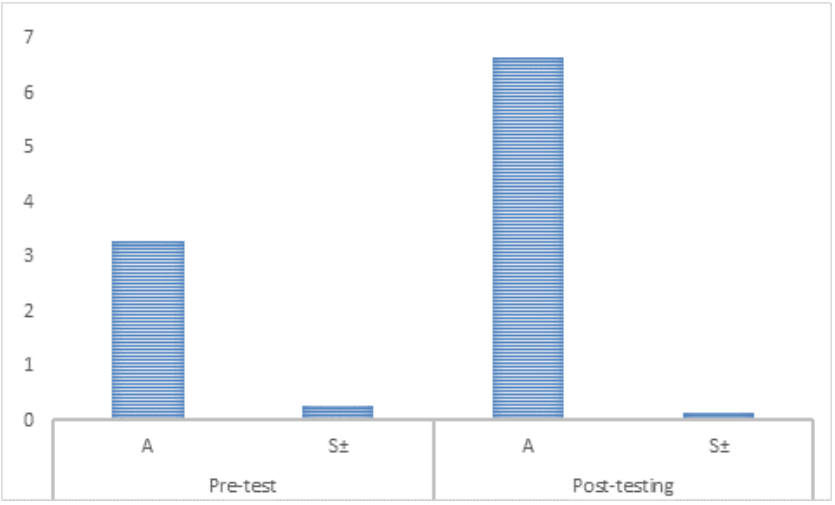


Figure 5. *The histogram shows the medians and standard deviations of the pre- and post-test of the experimental group*

Table 5. *Shows the arithmetic mean, standard deviation, calculated t-value, error level, significance, differences in arithmetic media, and deviation of differences in the two dimensional tests of the control and experimental research samples*

Features Statistics Variables	n	Unit	Control Group		Experimental Group		T	value
			M	±SD	M	±SD		
Walkover backward	8	degree	5.80	.182	6.65	.129	7.60	.000

Significant at the confidence level (0.05) if the error rate is ≤ (0.05).

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

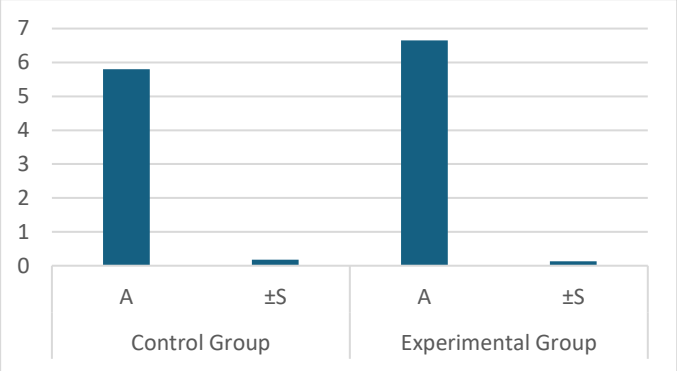


Figure 6. *The histogram shows of the medians and standard deviations of the post-test of the two research groups*

Discussion

The results presented in Table (4) and Figure (6) of the posterior arch skill in the post-test of the control and experimental groups showed that there were significant differences between the pre- and post-tests The researchers attribute this to the use of the assistive device, which has proven to be effective in teaching a skill. The back arch on the floor movement mat. This was the reason why the player was put on the right track for skill performance, so that it gave the player a sense of the center of gravity of the body when performing, as well as the range of motion for the flexibility of the torso, the straightness of the arms, and the correct position to pull the body back.

Artistic gymnastics is considered one of the difficult games because it needs physical and motor abilities and in proportion to the age of each player, each stage of the game is a key to the next stage, because its difficult skills are complex movements, depending on basic skills (Nada et al. 2021, p. 155).

The sport of gymnastics depends on the correct technical performance of skills to a great extent, especially skills on the mat of floor movements (Nizar et al., 2014, p. 3).

The assistive devices used in the learning process in the early stages of performance are very necessary for the player and the coach, as they help the player understand the correct path and position that he needs in the performance.

The use of special assistive devices and placing them in basic exercises with special motor paths according to a gradient in the teaching of performance stages plays a major role in simplifying the learning process (Abdul Redha et al., 2021, p. 155)

Assistive tools play a great role in the learning process and mastering many gymnastics skills, as many rely on them in the first steps of learning, as they work to overcome many factors that hinder performance such as the factor of fear and anxiety, as well as facilitating movements by lifting part of the burden on the player in the learning process (Abdul Kazim, 2012, p. 33).

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The researchers agree with many studies that praise the role of assistive devices and their presence in the process of learning and training, and this is what Al-Karimi, 2019, p. 20 pointed out, that assistive tools and devices play a great role in improving and developing technical performance and helping the player to understand the motor path that the player goes through, as well as providing the necessary strength to accomplish the main part of the movement, as well as being good safety means.

(Hammadi et al., 2025, p. 196) points out that the skills of the ground movement apparatus are one of the skills that have reached high degrees of difficulty and complexity, so mastering it requires great potentials and abilities from the player, and this in itself has been a burden on the player and the coach because manual assistance is almost unsuccessful in such skills, so the use of training devices and tools can be the best solution to this problem, as it is one of the most important means to achieve this in the sport of gymnastics because it is one of the factors In addition to accelerating the process of player development if used well, in addition to simplifying the training process and facilitating the performance of skills, in addition to having an important and essential role in the process of developing the skill aspect, as (Abdul-Ridha, 2016, p. 76) emphasizes that the use of the proposed device and the variety in the use of exercises on it led to removing boredom from the players and pushing them seriously towards better performance, because the various exercises on the device make the player eager to learn and stimulate different muscle groups according to the type of exercise.

Therefore, sports skills in some individual games require physical and motor qualities to facilitate the process of performing the skill. It also requires the teacher or coach to use more than one strategy, method and method to reach the level of mastery and avoid injury (Shehab et al., 2025, p. 292)

Conclusions

According to the results, the researchers concluded the following:

1. The assistive device plays a great role in helping the players to quickly learn the skill of the back bow on the floor movement mat
2. The use of the assistive device aims to provide the factor of safety and protection to the female players, enabling them to perform the skill with confidence and confidence, thus focusing on improving their performance without fear of being exposed to injuries.

Recommendation

1. The need to adopt the device in teaching the skill under study
2. Use the device to teach the skill of the front arch on the balance beam device and place it in the gymnastics hall to benefit from it.

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

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P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Construction and Standardization of a Static Balance Test for Body Muscle Strength during the Preparatory Phase in the Shot Put Event for Female Students of the College of Physical Education and Sport Sciences

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DOI:
https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2419
https://creativecommons.org/licenses/by/4.0/
Article history: Received 26/January/2026; Accepted 8/March/2026; Available online 28/ October/2026

Abstract

The present study aimed to construct and standardize a static balance test for body muscle strength during the preparatory phase of the shot put event for female students of the College of Physical Education and Sport Sciences. The researchers adopted a descriptive research approach using the survey method. The study population consisted of first-year female students from the Colleges of Physical Education and Sport Sciences at the University of Baghdad (Women's College and Al-Jadriya Campus) for the academic year (2024–2025), totaling (203) students. Prior to data collection, (7) students from the Women's College and (10) students from the Al-Jadriya College were excluded due to reasons that did not meet the purposes of the study, including failure in the previous academic year, irregular attendance, and sports injuries. Accordingly, the remaining population comprised (186) students, who represented the construction and standardization sample. After completing the procedural and statistical processes of test construction and standardization, the data were analyzed using the Statistical Package for the Social Sciences (SPSS). The conclusions and recommendations indicated that the static balance test for body muscle strength is valid for its intended purpose of measuring the ability of first-year female students in the College of Physical Education and Sport Sciences to maintain static balance and withstand specific muscle strength from a stationary position during the preparatory phase (initial position) of the shot put. The test demonstrated appropriate scientific bases and measurement coefficients in accordance with accepted measurement and evaluation criteria. It can be used to assess first-year female students through six criterion-referenced normative levels achieved by the test. The study also emphasized the importance of benefiting from the construction and standardization of specialized tests for physical and motor abilities related to the technical performance phases of the shot put, and of adopting such tests in evaluating female students in track and field courses within colleges of physical education and sport sciences. Furthermore, greater attention should be given to training faculty members through continuing education programs on the application of the test and the calculation of its scores.

Keywords: Static Balance, Body Muscle Strength, Preparatory Phase in the Shot Put Event.

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

Reaching scientific facts requires researchers to set aside personal experience when presenting evidence and proofs that substantiate those facts. Results derived from sports tests constitute one of the fundamental pillars of accuracy and objectivity in providing such evidence. Therefore, it is essential to ensure that tests are appropriate to the specific disciplinary field within Physical Education and Sport Sciences in which they are applied. In other words, sports tests that support the educational process possess a particular specificity, as they are designed to measure the knowledge students possess or the level of their physical abilities. Tests represent an essential component of plans aimed at improving physical and motor performance, and the construction of new tests to measure basic skills in the shot put event has become an urgent necessity that must be addressed throughout the educational process.

It has been indicated that one of the most important contributions of tests for teachers is the ability to monitor learners' evaluation levels as they acquire knowledge through curricula during lessons, identify educational problems, and determine appropriate means to address them (Abdulwahid, 2022, p. 10). Furthermore, the practical performance component is considered the most critical element of skill execution, as it requires speed, accuracy, efficiency, minimal effort, and low cost (Al-Hayek, 2018, p. 144).

Standardized test criteria classify students into measurement categories through which their level of performance on test items can be judged. These normative levels serve as benchmarks for interpreting the numerical scores obtained by students in response to test requirements, in accordance with their capacities for success or failure following interaction with the curriculum within the teaching and learning process (Al-Manizel, 2024, p. 201).

The investigators also claim that to increase performance in any kind of sport or event the internal variables and association factors which are related, contributing, associating with natural behaviour patterns should be analysed. These factors may be many, complex to capture in a single variable and, for this reason it is necessary to focus the attention on the main factors that are ab ovo recognized as having relationship effects on performance. This is the first step in the study of such factors and presents evidence based on the proper selection and use, within a sport arena, of sports tests with the nature of event for which it was designed and its application to a target population. Long-term, the goal is to improve performance by allowing players to attain a high level of skill through an on-going process of refining these interdependent factors that cumulatively shape optimal technical execution.

As physical education classes represent one of the applied fields for sports testing, they seek to achieve educational and instructional objectives and focus on developing learners' various abilities in accordance with individual differences, thereby enabling them to accomplish lesson tasks. This is achieved through the application of selected physical and motor tests to assess and develop their performance levels.

The justification and significance of the present study stem from the absence of a test that measures static balance of body muscle strength during the preparatory phase of the shot put event. Accordingly, the importance of this research lies in constructing and standardizing

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

such a test and establishing normative scores and levels that are compatible with the abilities and performance levels of female students.

Therefore, the study aims to construct and standardize a static balance test for body muscle strength during the preparatory phase of the shot put event for female students of the College of Physical Education and Sport Sciences.

Methods and Procedures

The researchers adopted the descriptive approach, as it is appropriate for the procedures involved in constructing and standardizing the various measurement tools addressed in the present study. This approach is defined as the study of phenomena as they exist in reality, without researcher intervention that may influence their natural state, using methodologies based on measurement and survey within a specified time frame, and describing these phenomena in an objective, unbiased numerical manner (Al-Saleh, 2024, p. 181).

In line with the specificity of the research problem, the survey method of the descriptive approach was employed. This method is defined as an approach that relies on quantitative and qualitative description to identify the levels of variables by examining phenomena as they are, without any researcher interference that might affect their levels (Al-Shafei, 2024, p. 109).

The researchers adhered to the boundaries of the research problem, which comprised first-year female students from the Colleges of Physical Education and Sport Sciences at the University of Baghdad (Women's College and Al-Jadriya Campus) for the academic year (2024–2025). The total population consisted of (203) female students, distributed as follows: (70) students from the Women's College of Physical Education and Sport Sciences and (133) students from the College of Physical Education and Sport Sciences at the Al-Jadriya Campus. The researchers selected this population for the following reasons:

- The population fully corresponded to the characteristics of the research problem.
- The students belonged to accessible populations, ensuring continuous availability during official academic days and facilitating consistent communication.
- The population was capable of fulfilling the objectives and methodological procedures of the study.
- The cooperation of the two colleges facilitated the completion of the research tasks.

Prior to the sampling procedures, (7) students from the Women's College and (10) students from the Al-Jadriya College were excluded due to reasons that did not meet the objectives of the study, including failure in the previous academic year, irregular attendance, and sports injuries. Accordingly, the remaining population consisted of (186) female students.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

To meet the requirements of constructing and standardizing the measurement tools in this study, all remaining (186) students were deliberately selected, representing (91.626%) of the original population. They constituted the total research sample for the construction and standardization processes and were treated as a single comprehensive sample. In addition, an exploratory sample was randomly selected from within this group, consisting of (10) students from both colleges in equal numbers, representing (4.926%) of the population. No statistical analyses were conducted on the data of the exploratory sample, and these students were not excluded from the total sample so as not to affect the research procedures or the specificity of each methodological step.

The researchers conducted a detailed examination of the shared characteristics of the targeted sample used for construction and standardization, comprising (186) female students from both colleges, in order to prepare for effective interaction with them. This was achieved through reviewing relevant theoretical literature and available academic studies addressing their characteristics. Given the nature of the present study, which does not involve external environmental variables outside the college context and applies equally to all participants, this procedure enabled the researchers to design the test in a manner consistent with the students' ability levels and age-related capacities on one hand, and the requirements of the shot put event on the other. The following characteristics were identified:

1. The students were admitted to the two colleges according to the academic grade requirements of the preparatory stage across its various branches, in addition to passing the required physical fitness tests for admission.
2. All students were enrolled in the same academic stage, were female, and ranged in age from (19–21) years.

To avoid assumptions regarding normal distribution based solely on enrollment in the same academic stage, homogeneity of the sample was statistically verified for selected anthropometric variables that might contribute to extreme values in the test under investigation. The results are presented in Table (1).

Table 1. *Homogeneity of the Total Research Sample in Selected Anthropometric Variables*

Variable (Unit)	N	Mean	Standard Deviation	Skewness	Coefficient of Variation
Total Body Height (cm)	186	163.59	1.45	−0.399	0.886%
Body Weight (kg)	186	62.66	1.698	−0.508	2.71%
Chronological Age (years)	186	19.41	0.565	0.979	2.911%

The values of the skewness coefficient fell within the acceptable range for normal distribution (±1), and the coefficient of variation was less than (39%), indicating acceptable homogeneity of the sample.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

To provide support and assistance for faculty members in fulfilling their educational duties, and for the purposes of measurement and evaluation of the static balance test for body muscle strength during the preparatory phase of the shot put event for female students, these considerations constituted the rationale for constructing and standardizing the test. Accordingly, the principle of qualitative analysis was adopted to examine the nature of the movements involved in the execution of this event, specifically during the preparatory phase of the shot put, and the physical and motor abilities embedded within it. This procedure was conducted from Sunday (20/10/2024) to Thursday (24/10/2024), avoiding randomness and improvisation, and eliminating personal judgments in determining the relevant abilities, as follows:

- Consultation with subject-matter instructors in the Colleges of Physical Education and Sport Sciences at the University of Baghdad regarding the nomination of physical and motor abilities to be measured by the static balance test for body muscle strength during the preparatory phase of the shot put event for female students.
- Reviewing numerous available sources and academic studies, particularly those related to static balance and body muscle strength in the preparatory phase of the shot put event for female students, in order to ensure accurate and specialized identification of the relevant abilities.
- Based on the outcomes of the aforementioned procedures, the researchers identified the physical and motor abilities to be measured by the static balance test for body muscle strength during the preparatory phase of the shot put event, and accordingly determined the test name and objectives as follows:
  - **Test name:** Static Balance of Body Muscle Strength during the Preparatory Phase of the Shot Put.
  - **Test objective:** To measure the ability of the tested female student to maintain static balance and withstand specific muscle strength from a stationary position during the preparatory phase (initial position) of the shot put.

Target population: First-year female students in the Colleges of Physical Education and Sport Sciences at the University of Baghdad.

The researchers ensured that the test adhered to conditions guaranteeing the physical and health safety of the students, and that it did not include complex, excessive, or irrelevant movements unrelated to the technical performance of the shot put. The test was designed to closely resemble the actual technical performance, thereby ensuring specificity while maintaining economy in terms of equipment and tools. This allows for practical application during instructional sessions and enables its adoption for measuring and evaluating female students in practical track and field classes at the colleges under study.

Accuracy was emphasized in designing and presenting the initial form of the test in accordance with measurement and evaluation standards in Physical Education Sciences. The test included the following components: test name, test objective, equipment and tools, procedures and conditions, scoring, and unit of measurement.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

For the purpose of piloting the test, it was applied in an exploratory trial to a previously identified sample of (10) female students. The researchers conducted this pilot application at the Colleges of Physical Education and Sport Sciences, University of Baghdad (Women's College and Al-Jadriya Campus), on Sunday and Monday (6–7/4/2025), at a rate of (5) students per day. The objectives of this pilot study were to:

- Verify the suitability of the specified equipment and tools.
- Ensure students' familiarity with the equipment and tools and the clarity of instructions.
- Train the assisting research team on application procedures and data recording.
- Identify potential obstacles or procedural errors that might arise during the main study in order to minimize them subsequently.

No noteworthy observations were recorded during the exploratory trial.

The revised version of the test was then applied at the two colleges under study at a rate of (15) female students per day from the construction and standardization sample, totaling (186) students, with the remaining (6) students tested on the final day. This process was carried out over the period from Sunday (13/4/2025) to Monday (28/4/2025). Objectivity was established through inter-rater validity by using two evaluators (Appendix 7), each positioned on one side during test administration. Their scores were statistically analyzed using the Pearson simple correlation coefficient, and objectivity was confirmed through the statistical significance of the correlation coefficient, as shown in Table (2).

The researchers also ensured avoidance of measurement errors resulting from repeated administration of the same test to the same sample. Therefore, the scores recorded by one of the evaluators for the construction and standardization sample (186 students) were adopted, given their objectivity. These scores were then analyzed to determine the difficulty and ease of the test by calculating Pearson skewness coefficients to verify normal distribution across the construction and standardization sample of (186) female students, as presented in Table (2).

Table 2. *Results of Face Validity, Difficulty and Ease, and Objectivity of the Test*

Physical–Motor Test (Shot Put)	Face Validity (Agreement of 15 Experts)	Acceptance	Objectivity Coefficient (Inter-Rater Validity)	Sig.	Acceptance	Difficulty and Ease (Normal Distribution)	Acceptance
Static Balance of Body Muscle Strength	100%	Accepted	0.986*	0.000	Accepted	0.167	Accepted

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

during the Preparatory Phase of the Shot Put	

☼ The correlation coefficient is statistically significant at Sig < 0.05, with degrees of freedom (n − 2) = 184 and a significance level of 0.05.
☼ Normal distribution is considered acceptable in SPSS when the skewness coefficient value falls within **±1**, indicating a normal (moderate) distribution.
The researchers verified the discriminative power of the test by relying on the scores obtained from administering the test to the construction and standardization sample of (186) female students, following these procedures:

- The test scores were arranged in descending order for the static balance of body muscle strength test during the preparatory phase of the shot put. A longer time indicated better performance and greater ability in this test.
- The method of two symmetrical extreme groups with equal numbers was adopted by multiplying the total number of students in the construction and standardization sample by (27%), yielding (50.22), which was rounded to (50). Accordingly, (50) students were assigned to each of the two extreme groups.
- Differences between the two extreme groups were statistically analyzed using the independent samples t-test, as shown in Table (3).

Table 3. *Results of the Discriminative Power of the Test*

Test and Unit of Measurement	Extreme Group	N	Mean	Standard Deviation	t-value	Sig.	Significance of Difference	Discrimination Acceptance
Static Balance of Body Muscle Strength during the Preparatory Phase of the Shot Put (s)	Upper	50	8.24	1.205	19.332	0.000	Significant	Accepted
	Lower	50	13.04	1.277				

Acceptance of discriminative power was confirmed by the presence of a statistically significant difference at Sig < 0.05, with a significance level of 0.05 and 98 degrees of freedom.
To verify the reliability of the test, the researchers adopted the test–retest method by administering the test to the construction and standardization sample of (186) female students during the period from Sunday (13/4/2025) to Monday (28/4/2025) as part of the previously described objectivity procedure. The test was then re-administered from Tuesday (6/5/2025) to Wednesday (12/5/2025). The data from both applications were statistically analyzed using the Guttman split-half coefficient (Guttman L.A.), which is considered one of the most appropriate correlation coefficients for estimating the expected reliability of future

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

administrations. The reliability coefficient reached (0.965*) at a significance level of (0.05) and 184 degrees of freedom.

Reliability is defined as "the consistency of a test in producing the same or very similar scores when it is repeatedly administered to the same examinees" (Al-Ameen, 2022, p. 89).

After completing the methodological steps and statistical analyses, the indicators of the dependability of the final version of the test (Appendix 1) for the shot put event among first-year female students at the two colleges under study can be summarized as follows:

- Low financial cost and no requirement for expensive equipment or tools that are difficult to transport to the shot put sector.
- Ease of score recording due to the clarity of instructions for both examiners and students.
- Absence of exaggerated movements, ensuring the physical and health safety of the students.
- Inclusion of elements of excitement and engagement during practical application, enhancing students' motivation and avoiding forced performance.
- Compliance with scientific foundations and coefficients required for physical and motor tests in Physical Education and Sport Sciences.
- Suitability to the educational environment of the shot put event, given that the test was constructed, applied, and standardized within the two colleges under study.

The researchers also standardized the results of this test by performing the relevant score transformations, which will be presented alongside the results. Furthermore, the data were analyzed using the Statistical Package for the Social Sciences (SPSS), Version 28, to compute the following statistical indicators:

- Percentages.
- Arithmetic mean.
- Standard deviation.
- Skewness coefficient (Pearson).
- Simple correlation coefficient (Pearson).
- Guttman split-half equation (Guttman L.A.).
- Independent samples t-test.
- Standard score (z-score).
- Modified standard score.

Results

Table 4. *Descriptive Statistical Parameters of the Preparatory Phase Test in the Shot Put Event*

Test Name	Number of Students	Unit of Measurement	Mean	Standard Deviation	Skewness

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Static Balance of Body Muscle Strength during the Preparatory Phase of the Shot Put	186	Seconds and fractions	10.50	2.035	0.167

A normal (moderate) distribution in **SPSS** is assumed when the skewness coefficient value falls within **±1**.

For the purpose of establishing test norms (physical–motor) for the preparatory phase of the shot put event, the raw scores of each tested student were arranged in ascending order. These raw scores were then converted into z-scores, which were subsequently transformed into modified standard scores using the equation (z-score × 10 + 50). This procedure was applied to obtain the modified standard scores used for criterion-referenced evaluation of the test.
To derive standardized norms for the preparatory phase physical–motor test in the shot put event, the scores were classified to extract normative levels by determining the frequency of students' scores within six categories bounded by ±3 on the normal number line. These categories represent both z-scores and modified standard (final) scores distributed across both sides of zero on the Gaussian (normal) curve, as shown in Table (5).

Table 5. *Derived Norms for the Preparatory Phase Test in the Shot Put Event*

Z-Score Category (Gaussian Curve)	Modified Standard Score Range	Normative Evaluation Level	Frequency	Percentage
−2 and below	29 and below	Very Poor	8	4.301%
−1.99 to −1.00	30 – 39	Poor	7	3.763%
−0.99 to 0.00	40 – 49	Acceptable	84	45.161%
0.01 to 1.00	50 – 59	Average	62	33.333%
1.01 to 2.00	60 – 69	Good	19	10.215%
2.01 and above	70 and above	Very Good	6	3.226%
Total			**186**	**100%**

Discussion

The results presented in Table (4) indicate that the scores of first-year female students from the two colleges under study, who constituted the main construction and standardization sample, were normally distributed in this test. The researchers attribute these findings to the soundness of the procedures followed in constructing the static balance test for body muscle strength during the preparatory phase of the shot put, as well as to the statistical treatments used to verify the acceptance of its foundations and coefficients, which met the scientific criteria adopted in Physical Education and Sport Sciences. In addition, the test was appropriate for the target sample, as evidenced by the indices of difficulty and ease, which were normally distributed.

Furthermore, the results of transforming raw scores into standard and modified standard scores showed that the z-scores were distributed around the mean (M = 0) with a

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

standard deviation (SD = ±1) on the normal number line. This confirms that the scores were distributed within the limits of the normal (Gaussian) curve, which allowed for proper standardization through the derivation of criterion-referenced normative evaluation levels for the female students who undertook the test. These findings also indicate that each student's performance can be evaluated by comparing her score with those of her peers.

A review of the derived norms shown in Table (5) demonstrates that the distribution of score categories across the six levels was consistent with a normal distribution. The researchers attribute this balanced distribution to the fact that the measurement was conducted during the second academic semester, after the students had received both theoretical and practical instruction in the shot put event.

Standardization is defined as the process of precisely determining the conditions of test administration so that a single method is used in application, scoring, and interpretation. This entails controlling all variables that may influence test results, thereby ensuring that differences among individuals can be attributed to their own characteristics rather than to external variables (Al-Obaidi, 2011, p. 251). In this regard, normative levels are of particular importance for classification and comparison among students' test results and may even extend to selection processes aimed at identifying talent (Hoshiyar, 2017, p. 26).

The researchers also attribute the validity of the standardization of the static balance test for body muscle strength during the preparatory phase of the shot put, across its six normative levels, to the careful attention paid to the precision of procedural steps in constructing the test. These steps considered the students' age, gender, and physical and health safety, and ensured that the test did not include complex, excessive, or irrelevant movements unrelated to the technical performance of the shot put. Emphasis was placed on the principle of specificity, such that the test incorporated a variety of static balance movements involving body muscle strength that characterize the preparatory phase of the shot put, thereby closely matching the technical performance requirements of the event.

Practical specificity and the appropriateness of test items are among the most important foundations upon which test developers rely when formulating test items. This specificity should be prioritized during test construction, as it plays a crucial role in determining the purpose for which the test is developed, and may even precede the importance of defining objectives (Shouq, 2019, p. 7).

Moreover, the researchers attribute the soundness of the standardization results to their reliance on qualitative analysis through consultation with experts to identify the most relevant physical and motor abilities required by the test, according to their relative importance. Measuring these abilities under actual shot put performance conditions enhances ecological validity and ensures specificity. Such an approach enables practical evaluation of students' performance, identification of deficiencies using quantitative indicators, and adjustment or modification of students' activities during lessons. It also allows students sufficient practice time to execute the preparatory phase of the event according to correct performance criteria. Muscle strength, in particular, is one of the most important physical abilities involved in producing movement to meet the demands of the preparatory phase, while balance contributes to stabilizing the body in preparation for executing movements across all phases of the event.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

It has been emphasized that the level of development of physical and motor abilities must correspond to the requirements of the motor skill in order to achieve proper performance (Al-Rabadi, 2020, p. 66). Accordingly, practice is considered the most important variable in the learning process of both complex and simple skills (Matnash, 2020, p. 25). The importance of developing muscular strength lies in the ability to exert force in different forms and magnitudes in harmony with movement execution. Strength development is also associated with rapid changes in the rhythm of neural signals, as muscular activity is characterized by a high degree of synchronization between the timing and magnitude of neural impulses (Mar'i, 2018, p. 166). Muscular balance between both sides of the body is regarded as the fundamental basis for good posture, as it helps correct body alignment from its current state toward the ideal posture (Al-Qatt, 2020, p. 28). Sports skills depend on muscular balance in all their components; even when dynamic balance is not clearly apparent, it nevertheless supports posture and prevents falling during skill execution. Therefore, coaches must train balance in its various forms before proceeding to skill development (Al-Yasin, 2019, p. 81).

Continuous and regular practice of skill-based exercises encourages students to explore technical information, thereby forming a knowledge base that enhances achievement. This process activates recall and retrieval mechanisms through sustained cognitive engagement, whereas discontinuity may gradually lead to forgetting (Dunn & Dunn, 2023, p. 4).

Conclusions and Recommendations

1.The static balance test for body muscle strength is valid for its intended purpose of measuring the ability of first-year female students in the College of Physical Education and Sport Sciences to maintain static balance and withstand specific muscle strength from a stationary position during the preparatory phase (initial position) of the shot put. The test meets the scientific foundations and coefficients required for accepted measurement and evaluation tools.
2.The ability to maintain static balance and withstand specific muscle strength from a stationary position during the preparatory phase of the shot put among first-year female students can be effectively evaluated using this test, which achieved six criterion-referenced normative levels.
3.It is essential to emphasize the utilization of constructing and standardizing specialized tests for physical and motor abilities related to the technical performance phases of the shot put, and to adopt such tests in evaluating female students in track and field courses within Colleges of Physical Education and Sport Sciences.
4.Greater attention should be devoted to training faculty members in Colleges of Physical Education and Sport Sciences through continuing education programs focused on the application of the test and the calculation of its scores.

Appendix (1): Physical–Motor Test for the Preparatory Phase of the Shot Put Event
Test Name: Static Balance of Body Muscle Strength during the Preparatory Phase of the Shot Put.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Test Objective: To measure the ability of the tested female student to maintain a static balance position and to withstand specific muscle strength from a stationary position during the preparatory phase (initial position) of the shot put.

Equipment and Tools: Electronic stopwatch, flat surface, shot put ball weighing (4) kg, whistle.

Procedures and Conditions:

The tested student stands in the preparatory position for the shot put, either barefoot or wearing appropriate athletic shoes. She raises the thigh of the left leg (or right leg, depending on preference) forward, while the other leg is positioned backward with a slight knee flexion so that the foot points backward. The upper arm is raised at an angle of (90)° relative to the body, with the forearm flexed toward it so that the hand holding the shot is fixed beside the shoulder. The trunk is slightly inclined backward. The tested student must maintain this position for as long as possible without changing her posture, as illustrated in Figure (1).

The tested student must be physically prepared and free from sports injuries.

The test is performed without the use of any assistive aids (e.g., leaning against a wall).

The attempt is performed on a flat, non-slippery surface.

The attempt is invalidated if the tested student loses balance or changes her movement position during measurement.

The tested student is given (3) attempts, with a rest period of two minutes between attempts, and the best attempt is recorded.

Scoring: The duration of static balance is timed from the moment the correct test position is fully stabilized until the moment balance is disturbed or movement occurs during a valid attempt among the three trials.

Unit of Measurement: Seconds and fractions of a second.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

The Effect of a Training Approach Using an Anti-Gravity Treadmill on Improving Strength and Balance in Athletes with Medial Ankle Ligament Tears

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DOI:

https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2360

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Article history: Received 18/September/2025; Accepted 27/October /2026; Available online 28/ October/2026

Abstract

This study examined the effect of a rehabilitation program using exercises and an anti-gravity treadmill on athletes with partial medial ankle ligament tears. Five athletes underwent eight weeks of training three sessions per week, including walking heel and forefoot exercises and treadmill use with and without anti-gravity support. Pre- and post-tests measured dorsiflexion plantar flexion inversion strength, balance, and single-leg walking. Results showed significant improvements in all measures: dorsiflexion (0.8 → 3.32), plantar flexion (0.9 → 2.7) inversion (0.36 → 3.06) balance (155.2 → 198.6) and single-leg walking (5.94 → 8.5) ($p < 0.05$). The program effectively enhanced ankle strength stability balance and functional performance. The anti-gravity treadmill enabled safe progressive training, supporting recovery while reducing joint stress. Combining strength, flexibility and balance exercises accelerated rehabilitation, improved motor performance minimized reinjury risk, and emphasized the value of ongoing functional assessment for safe return to sport.

Keywords : Ankle Injuries, Ligament Injuries, Rehabilitation, Exercise Therapy, Treadmills.

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Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

Medial ankle ligament tears are common injuries that occur when the medial ligament on the inner side of the ankle is ruptured due to abnormal or sudden ankle movements. This injury affects the ligament's function, leading to impaired balance and stability, as well as swelling and pain in the affected area.

In particular, medial ankle ligament tears are frequent injuries resulting from sudden movements or ankle sprains that impact the medial ligaments. These injuries often occur in athletes or individuals engaging in high-intensity physical activities that place significant stress on the lower limbs. Sudden directional changes , rapid movements and high-impact actions as seen in football and basketball players, increase the likelihood of such injuries .

Currently , scientific and technological advancements in sports have contributed to higher levels of athletic performance in recent years. As a result , the differences in athletic achievement have become minimal. These factors also make sports injuries more prevalent due to the high physical demands placed on athletes during performance , particularly in sports such as football , basketball and track and field (Shlash, 2023) .

Sports injuries are a major cause of sidelining athletes and limiting their ability to participate in physical activities especially when injuries are recurrent in the same area or affect a vital part of the body . Medial ankle ligament tears are considered complex injuries that cause severe pain and require rest and rehabilitation . If not treated properly and promptly these injuries may take a long time to heal potentially worsening the condition and delaying the athlete's return to sport. Moreover , the ankle joint is one of the most important joints in the body as it supports the entire body and is essential for walking and daily activities. Therefore , various treatment approaches have been developed for this joint .

An injury is defined as the impact on a tissue or a group of tissues by an external , internal , or self-induced factor leading to impaired function of that tissue. Rehabilitation and exercise programs play a crucial and fundamental role in daily life . Injuries can also be described as the disruption or impairment of the integrity of body tissues due to external factors whether mechanical, physical or chemical. Such factors are usually sudden and severe causing anatomical changes such as restricted joint or muscle movement as well as physiological alterations in the functions of the affected area including tears , bleeding , skin discoloration and other effects (Qasim, 2015).

When any part of the body is injured, it may result in the inability to move that part or to perform activities correctly for a period of time, which can reduce the functional capacity of the injured area. Therefore, the most appropriate method to restore function is through rehabilitative exercises, following consultation with a specialized physician and obtaining X-ray imaging. Pain management and appropriate pharmacological treatment should be applied when exercises cannot

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

be performed due to discomfort. Consequently, targeted rehabilitation exercises, including the use of an anti-gravity treadmill, are essential for effectively restoring the injured area.

Through the researcher's review of previous studies and research in the field of ankle sprain rehabilitation as well as the expertise of specialized supervisors and through the researcher's constant presence on the field during most tournaments held in Iraq as a referee in the federation certain observations were made regarding injuries reported by athletes during competition periods and preparation phases. After conducting further investigation and research in the sports field and with the active involvement of the supervisors in monitoring injured athletes both on the field and in other sports the researcher's visits to physical therapy and sports rehabilitation centers in Baghdad revealed that many athletes were suffering from partial medial ankle ligament tears . These athletes required proper injury rehabilitation and treatment to prevent further aggravation and to enable a safe return to competition . Some athletes experienced recurrent injuries increasing the risk of permanent absence from the field or the need for surgical intervention .

Consequently , the researcher in collaboration with the supervisors , decided to employ exercise programs in conjunction with an anti-gravity treadmill for the rehabilitation of medial ankle ligament injuries. The primary goal is to prevent the progression of the injury to a severe condition that could only be treated surgically. Exercises will be applied both with and without the device, following a group-based system at the rehabilitation center located in Baghdad (Al-Bashir Center) .

Research Questions

1. Do the exercises used have an effect on the rehabilitation of medial ankle ligament tears?
2. Does the device (anti-gravity treadmill) have an effect on the rehabilitation of medial ankle ligament tears?
3. Can medial ankle ligament tears be fully treated and rehabilitated to restore normal function?

Research Objectives

1. To design rehabilitation exercises for medial ankle ligament tears.
2. To develop rehabilitation exercises in conjunction with an anti-gravity treadmill for medial ankle ligament tears.
3. To determine the effect of exercises and the anti-gravity treadmill on medial ankle ligament tear rehabilitation.

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

H1: There are statistically significant differences between the pre-test and post-test results of the study group of athletes with medial ankle ligament tears.

Recently, there has been an increase in medial ankle ligament injuries, making it a phenomenon with significant medical and technical implications. To improve medical examination, diagnosis, treatment, and rehabilitation methods for ankle injuries, the importance of the current study lies in determining how athletes with medial ankle ligament tears can return to their normal condition. This is achieved according to established scientific principles and using appropriate tests at each stage of rehabilitation. The study focuses on exercises aimed at rehabilitating the injured area, combined with the use of an anti-gravity treadmill through specialized exercises that target the ankle injury and facilitate the athlete's return to the field as quickly as possible.

The study focuses on a number of athletes with moderate medial ankle ligament tears participating in various sports. The research was conducted over the period from April 1, 2025, to September 1, 2025. The spatial scope of the study includes Al-Bashir Rehabilitation Center in Al-Mansour, Karkh, Baghdad; Power House Hall in Al-Doura – Hay Al-Seha, Baghdad; and Al-Qala'a Gym in Al-Ghazaliya, Baghdad.

Methodology

The research methodology is considered the scientific path that the researcher follows to solve the research problem, as the nature of the problem dictates a specific approach to reach the truth (Hussein, 2022). Therefore, the researcher employed the experimental method, specifically the single experimental group design with pre-test and post-test, due to its suitability for the nature of the problem. The experimental method is among the most effective approaches for achieving practical objectives in a precise scientific manner, in addition to its important role in providing solutions to various problems (Al-Kubaisi, 2004).

Research Sample

The research sample consists of athletes suffering from medial ankle ligament tears in various sports (n=5), who were selected intentionally from Al-Bashir Sports Rehabilitation Center in Baghdad, after obtaining a medical diagnosis and confirming the injury through MRI or X-ray, as well as determining the appropriate pharmacological treatment period. The rehabilitation program was applied over a period of eight weeks at Al-Bashir Rehabilitation Center, which the athletes regularly attend for treatment. The injured right foot was chosen from the sample due to physiological differences between the affected feet, as well as the specific demands of the sport.

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Table 1. *Description of the Study Sample*

Player	Age (years)	Experience (years)	Height (cm)	Weight (kg)	Injury Date	Injury Severity	Sport/Event
1	26	7	175	71	10/3/2025	Moderate	Track & Field
2	23	5	188	90	15/3/2025	Moderate	Track & Field
3	23	2	184	86	13/3/2025	Moderate	Track & Field
4	22	3	180	65	17/3/2025	Moderate	Handball
5	24	4	178	70	19/3/2025	Moderate	Basketball

Table 2. *Statistical Description of Strength and Balance Tests for the Study Sample*

Test	Mean	S.D.	Skewness
Dorsiflexion Strength of the Foot	0.8	0.1	0.000
Plantar Flexion Strength of the Foot	0.9	0.18	0.382
Medial Flexion Strength of the Foot	0.36	0.11	0.405
Balance	155.2	15.75	0.608
Single-Leg Walking Test	5.94	0.48	0.770

Data Collection Tools

The data for this study were collected using a variety of sources and tools , including Arabic and foreign literature , personal interviews , measurements and tests online information networks , diagnoses by specialized physicians , observation and experimentation. The research team was assisted by supporting staff and information was gathered using forms completed by the study sample and data recording sheets. Additional tools included a measuring tape, elastic bands, a whistle, a stopwatch, fixation tape, foam cylinders, boxes of different heights (20 cm and 40 cm), and a Nikon D750 camera. The devices employed in the study included an Alter-G anti-gravity treadmill, a dynamometer for strength measurement , a goniometer for assessing range of motion, a medical scale for weight and height measurement , a laptop (Acer) for recording test and rehabilitation results and a balance disc , The anti-gravity treadmill is an advanced rehabilitation and training device that allows walking or running while reducing body weight impact on joints and muscles , minimizing pain and accelerating recovery. Using pressurized air in a sealed chamber , it partially lifts the body and supports weight from 20% to 100%, enabling natural movement without stress. The treadmill benefits include injury rehabilitation (e.g., partial medial ankle ligament tears) gradual return to walking , enhanced athletic performance , support for elderly and neurological patients and safe exercise for overweight individuals. Its applications span post-orthopedic surgery, gait improvement in neurological conditions, athletic recovery and reduced joint load during fitness training, making it a safe and effective tool for restoring mobility and performance .

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Procedures

The tests with the study sample were conducted on Monday , April 14, 2025 over the course of a single day following the sequential order of procedures outlined for the experiment.

1. Single-Leg Walking Test

The Single-Leg Walking Test was designed to measure walking performance on one leg against gravity . The test was conducted using an anti-gravity treadmill which allows the injured participant to walk while reducing pain and strain on the affected limb thus aiding the restoration of dorsiflexion and plantar flexion movements and strengthening the muscles around the ankle joint. The treadmill operates on a weight-reduction principle using pressurized air and the participant enters a closed air chamber around the lower body . Wearing special shorts with an attached loop the participant connects to the device's loop system and the therapist adjusts the session's time and speed. The performance time is recorded on the treadmill's display from start to finish, measured in minutes (Polyvios Kyritsis, 2016, p.123) .

2. Balance Test (Standing on the Injured Leg)

The Balance Test aimed to assess static balance by having the participant stand on the injured leg while lifting the healthy leg folding the arms across the chest , closing the eyes and maintaining stability for as long as possible. The test required that the healthy leg not touch the injured leg and that the eyes remain closed throughout the procedure. A stopwatch , whistle and recording form were used to measure and document the duration of balance recorded from the start to the end of the performance in seconds (Hughes, 2017, p.33) .

3. Muscle Strength Tests for the Ankle Joint

Muscle strength of the ankle joint was measured using a dynamometer designed for this purpose with the injured foot secured in the designated position using specialized straps. Three specific tests were conducted :

a. Dorsiflexion Strength Test: This test measured the maximum dorsiflexion strength of the injured foot . The participant performed maximal dorsiflexion from the initial position and the dynamometer recorded the force in kilograms which was then converted to Newtons by multiplying by 9.81 (Raouf, 2005, p.53).

b. Plantar Flexion Strength Test: This test assessed the maximal plantar flexion strength of the injured foot. Starting from the initial position the participant performed maximal plantar flexion and the recorded force in kilograms was converted to Newtons using the same conversion factor .

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

c. Medial (Inversion) Strength Test: This test evaluated the maximal inversion strength of the injured foot. The participant executed maximal inversion from the starting position with the force measured in kilograms and subsequently converted to Newtons by multiplying by 9.81.

The researcher conducted a pilot study on April 5, 2025 at Al-Bashir Rehabilitation Center with two athletes to test the equipment, procedures and timing of the tests. The assistant team was prepared and instructed on proper measurement techniques. The pilot aimed to identify challenges assess test suitability, verify equipment, organize procedures and define team roles ensuring smooth and reliable execution of the main experiment.

Rehabilitation exercises began on April 17, 2025 with three weekly sessions over eight weeks (24 units). Exercises included straight-line walking heel and forefoot walking on the treadmill and anti-gravity treadmill exercises. Preliminary tests determined rest periods, repetitions, session duration and exercise intensity based on each participant's initial pain in the injured medial ankle ligament.

The post-tests were conducted on Sunday, July 20, 2025 following the same procedures as the pre-tests. The researcher ensured that all variables recorded during the pre-test were carefully documented and applied during the post-test to maintain consistency and accuracy in the assessment .

Statical Analysis

Descriptive statistics were used to analyze all study variables for the single group of participants . Pre-test and post-test scores for each variable were summarized using the mean, standard deviation and skewness coefficient to assess the distribution and homogeneity of the data. Skewness values ensured the normality of the data allowing valid comparisons between pre-test and post-test results within the same group. All statistical analyses were performed using SPSS version 26 .

Results

Table 3. *Shows the results of the T-test for the pre-test and post-test measurements of the research sample*

Variables	Pre-Test Mean ± SD	Post-Test Mean ± SD	T-Test Value	P- Value
Dorsiflexion Strength	0.8 ± 0.1	3.32 ± 0.43	12.260	0.000
Plantar Flexion Strength	0.9 ± 0.18	2.7 ± 0.76	5.503	0.005
Inversion Strength	0.36 ± 0.11	3.06 ± 0.42	19.092	0.000
Balance	155.2 ± 15.75	198.6 ± 15.88	15.158	0.000
Single-Leg Walking Test	5.94 ± 0.48	8.5 ± 0.59	9.704	0.001

All results are under a significance level of 0.05 with degrees of freedom = 4

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Discussion

The results of the T-test for the pre-test and post-test measurements of the research sample in Table 3 revealed statistically significant differences in several assessments conducted on participants with medial ankle ligament (deltoid) tears. These differences indicate the positive effect of the rehabilitation exercises combined with the anti-gravity treadmill on muscle strength, balance and the ability to perform sports activities .

The results demonstrated a significant improvement in dorsiflexion strength increasing from 0.8 ± 0.1 in the pre-test to 3.36 ± 0.49 in the post-test with a T-test value of 12.260 and a significance level of 0.0000. This substantial improvement indicates a positive effect of the rehabilitation exercises on enhancing ankle muscle strength which is crucial for improving an individual's ability to withstand load and perform various sports activities.

Improving muscle strength around the ankle is not only essential for athletic performance but is also a key component of rehabilitation following injuries such as ligament tears or sprains which weaken the surrounding muscles , reduce ankle stability and increase the likelihood of recurrent injuries. Strengthening exercises help restore the muscular support needed to stabilize the ankle and reduce stress on the joint during movement. Exercises that target the anterior and posterior muscles of the lower leg, as well as the supporting muscles around the ankle play a central role in improving joint stability (Sohrabi et al., 2024).

Increased muscle strength enhances the ankle's capacity to tolerate mechanical forces during sports activities that involve sudden changes in direction or continuous loading such as jumping or running. Strengthening the muscles surrounding the ankle reduces joint stress and consequently lowers the risk of reinjury . The ability of these muscles to withstand load and adapt to various movement challenges determines the athlete's potential to return to the required level of sports performance (Prieske et al., 2016) .

Studies have shown that strength training contributes to preventing future injuries . Athletes who performed ankle-strengthening exercises demonstrated significant improvements in muscular stability and avoided subsequent injuries . Strengthening the muscles around the ankle enhances muscular balance and endurance reducing the likelihood of sprains and recurrent injuries (Baltich et al., 2014) .

In addition to preventive effects improved ankle muscle strength also enhances overall sports performance . Athletes focusing on ankle strength notice better performance in movements requiring increased power , such as sprinting , jumping and activities involving rapid directional changes . These improvements are not limited to professional athletes; they apply to anyone who regularly engages in sports as enhanced muscle strength contributes to higher performance levels and reduced muscular fatigue .

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The study results demonstrated a significant improvement in plantar flexion strength increasing from 0.9 ± 0.18 in the pre-test to 2.7 ± 0.76 in the post-test with a T-test value of 5.503 and a significance level of 0.0050 indicating statistically significant differences between the two measurements. This improvement reflects the positive effect of the rehabilitation exercises in strengthening the plantar flexor muscles which are responsible for the forward propulsion of the foot and are essential for both daily and sports-related movements.

Plantar flexor muscles are primary drivers of ankle movement during walking, running, jumping and landing generating the push-off force against the ground. When the medial ankle ligament or any of the internal support structures are injured , these muscles are often affected in terms of strength and neuromuscular response. Therefore , focusing on strengthening them is crucial for rehabilitation and achieving movement stability.

The noticeable improvement in this type of muscle strength indicates that the exercises used in the rehabilitation program were effective in restoring muscular balance around the ankle joint and enhancing endurance . These results are consistent with Fong et al. (2007) who reported that plantar flexor strengthening exercises improve overall ankle muscle strength and reduce balance loss during dynamic movements . Their study concluded that plantar flexor weakness is directly associated with increased risk of reinjury and impaired motor performance, making it a priority in post-ankle injury rehabilitation .

Additionally , Mattacola and Dwyer (2002) found that strengthening the plantar flexor muscles enhances overall ankle functional capacity and contributes to improved athletic performance in jumping, running and landing tasks, particularly following ankle ligament injuries. They recommended incorporating targeted resistance training for the plantar flexors into rehabilitation programs to reduce recovery time and improve motor efficiency.

Improved plantar flexion strength not only enhances motor performance but also contributes to better ankle stability by providing dynamic support during situations that require both balance and flexibility . Hall et al. (2018) confirmed that athletes who improved their plantar flexor strength exhibited greater ankle control during complex movements, such as longitudinal and lateral jumps thereby reducing the risk of sprains.

The study results demonstrated a significant improvement in ankle inversion (medial) strength, which increased from 0.36 ± 0.11 in the pre-test to 3.06 ± 0.42 in the post-test with a T-test value of 19.092 and a significance level of 0.0000. This improvement reflects the positive effect of the rehabilitation exercises in enhancing the strength of the muscles responsible for ankle inversion serving as an important indicator of restored functional capacity of the ankle and foot.

Inversion strength is closely associated with the muscles responsible for medial flexion such as the anterior foot muscles and surrounding ligaments. These muscles contribute to the dynamic stability of the ankle and foot enabling the individual to perform diverse movements such

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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as longitudinal and lateral jumps, which require rapid changes in direction. The ability of these muscles to execute such movements effectively and powerfully is critical in preventing injuries including sprains caused by inadequate response to sudden or complex mechanical stresses .

Ribeiro et al. (2009) reported that inversion strengthening exercises significantly improve ankle muscle strength and range of motion enhancing motor response during complex lateral movements. Their study applied regular strengthening exercises to a group of athletes demonstrating that improved inversion strength reduces the risk of sprains or tears particularly in athletes exposed to high dynamic loads .

Similarly, Aritonang and Wahyuni (2023) showed that inversion strength plays a key role in enhancing muscular stability around the ankle joint especially during activities requiring rapid directional changes such as sprinting or evasive maneuvers. Their findings indicated that resistance exercises targeting inversion muscles enhance the ability of the muscles to respond to sudden loads, thereby minimizing injury risk .

These findings align with Huang et al. (2022) who emphasized that the strength of ankle inversion muscles is essential for maintaining dynamic stability during complex movements. Athletes with weak inversion muscles demonstrate limited capacity to perform movements correctly while rehabilitation exercises aimed at strengthening these muscles help restore the ability to execute lateral movements quickly, ultimately improving overall athletic performance.

The balance test results showed a significant improvement increasing from 169.2 ± 7.12 in the pre-test to 198.6 ± 15.88 in the post-test with a T-test value of 15.158 and a significance level of 0.0000. This substantial improvement indicates that the rehabilitation exercises played a key role in enhancing overall balance reflecting better joint stability and the body's ability to maintain equilibrium during movement essential for restoring normal function after injuries. Balance exercises are a fundamental part of rehabilitation programs especially for injuries affecting joint stability such as ankle or knee injuries. Balance is not merely the ability to remain still but involves adapting to and responding to external forces during movement such as sudden changes in direction or loss of footing. By strengthening the muscles supporting the joint and improving neuromuscular responses balance exercises reduce the risk of future injuries and enhance safe and effective performance of sports movements. Improvement in balance among the participants indicates better body coordination in responding to forces during daily or athletic activities and reflects the restoration of muscular and ligamentous coordination around the injured joint. Recent studies highlight balance training as a crucial method for enhancing post-injury motor stability; for example Plummer et al. (2019) demonstrated that balance exercises improve functional capacity and muscular stability around injured joints which aligns with the significant improvements observed in the balance test in this study .

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The single-leg walking test results demonstrated a clear improvement in ankle functional capacity increasing from 5.94 ± 0.48 in the pre-test to 8.5 ± 0.59 in the post-test with a T-test value of 9.704 and a significance level of 0.0010. This marked improvement indicates a substantial enhancement in the ankle's ability to adapt to daily activities and perform movements requiring balance and stability such as walking and standing on one leg. The single-leg walking test is a crucial functional assessment used to evaluate motor stability and endurance after ankle injuries. It demands integrated neuromuscular control as the individual must maintain balance on one leg for a specified duration while stabilizing the ankle against dynamic challenges, such as movement or sudden directional changes . Improvement in this test reflects the ankle's restored capacity to perform daily motor activities normally indicating overall functional recovery (Trojian & McKeag, 2006). These findings are consistent with Ma et al. (2024) who reported that enhancing single-leg walking ability is a key indicator of functional ankle recovery post-injury. In their study athletes who underwent strengthening and flexibility rehabilitation exercises for the ankle showed significant improvement in single-leg walking performance, reflecting restored muscular stability and motor efficiency .

Conclusions

The study concluded that the rehabilitation program was highly effective in improving strength and stability. Exercises targeting muscular power and neuromuscular coordination, which contributed to better balance, functional performance and reduced risk of reinjury. The use of the anti-gravity treadmill facilitated safe , progressive training allowing participants to perform daily and athletic activities with improved control and confidence. Overall , the combination of strength, flexibility and balance exercises not only accelerated recovery but also supported injury prevention and optimized athletic performance highlighting the importance of continuous functional assessment through single-leg walking and balance tests to monitor progress and determine readiness for return to activity .

Recommendation

It is recommended to implement continuous rehabilitation programs focusing on muscle strengthening and balance exercises combined with regular functional assessments using single-leg walking and balance tests. Training should target endurance , rapid-response movements and dynamic stability, while education on injury prevention and use of advanced measurement tools can enhance outcomes . Future research should continue evaluating modern rehabilitation techniques to improve ankle function and performance .

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Volume 38 – Special Issue – 2026 Open Access
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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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The Effect of Guidance Program on the Improvement of Psychological Empowerment In Third Degree Basketball Referees

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DOI:
https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2271
https://creativecommons.org/licenses/by/4.0/
Article history: Received 25/March/2025; Accepted 8/April/2025; Available online 28/October/2026

Abstract

The study highlights the importance of developing the psychological aspect of basketball referees to help them manage stress during matches. It addresses the issue of weak psychological empowerment among third-degree referees which affects their performance The study aimed to examine the effect of a guidance program on enhancing psychological empowerment focusing on five aspects: active communication, decision-making, independence, self-efficacy and stress management. The experimental method was applied to 15 third-degree referees from the Iraqi Basketball League using interviews and a psychological empowerment scale for data collection The results showed significant improvements in psychological empowerment in favor of post-tests confirming the program's effectiveness. The guidance sessions enhanced theoretical aspects like decision-making and independence while improving referees' ability to handle match pressure. The study concluded that psychological empowerment enhances referees performance and recommended integrating psychological guidance programs into referee training for all age groups.

Keywords: Psychological empowerment, third degree referee, basketball, guidance program.

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

Basketball is one of the most popular and widespread sports globally with referees playing a crucial role in ensuring its success and fairness through fast and accurate decision-making under psychological pressure (FIBA, 2022; Feltz, 2011). Third-grade referees, in particular, face continuous challenges and pressures from players, coaches and audiences making the development of their psychological empowerment an urgent necessity to boost their self-confidence and enhance their ability to make decisive calls (Al-Zubaidi, 2019). Psychological empowerment encompasses vital aspects such as improving self-confidence, developing decision-making and communication skills and managing stress all of which contribute to stabilizing referees and enhancing their professional performance (Al-Moussawi, 2022). Studies confirm that targeted counseling and training programs directly contribute to improving mental skills and managing stressful situations thereby enhancing the efficiency of third-grade referees and elevating their performance levels in managing matches (Peterson, 2018).

Methodology and Tools

The researcher adopted the experimental approach as the most appropriate method to address the research problem utilizing a single-group experimental design with pre- and post-tests.

The research population encompassed all Premier League and category basketball referees, totaling (130) referees, distributed as follows: (13) international referees, (52) first-class referees, (12) second-class referees and (53) third-class referees.

The construction sample comprised (110) referees. After excluding (10) referees due to their inability to attend or complete the questionnaire the final number reached (100) referees accounting for (76.90%).

The main experimental sample was limited to (15) third-class referees in Baghdad Governorate purposively selected due to their presence at the federation headquarters while the exploratory experiment included (4) referees from Baghdad. The experiment was conducted at the Al-Shaab Closed Sports Hall, representing (3.07%).

The researcher constructed the psychological empowerment scale by following a series of steps, including defining the scale's core idea, objective and domains and establishing foundational standards such as face validity and construct validity which are verified through the statistical item analysis.

Pre-test

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The researcher conducted the pre-test on the members of the research sample on Friday, October 4, 2024 numbering (15) referees.

Application of the Counseling Program (Application of the Counseling Program)

The researcher proceeded to apply the pre-prepared program to the experimental group on Friday, October 11, 2024 at a rate of one session per week for a period of (12) weeks, with each session lasting (45) minutes. The final session was conducted on January 3, 2025. The counseling sessions were held in the Basketball Federation hall at the Al-Shaab International Stadium and the halls of the University of Baghdad College of Physical Education and Sports Sciences. The counseling units included psychological aspects and specialists in the field of sports psychology lectured during the sessions

Post-test

After completing the application of the counseling units to the members of the experimental group, the researcher conducted the post-test on Friday, January 3, 2025 measuring the level of psychological empowerment for the referees.

Statistical Analysis

The researcher used the SPSS statistical package, utilizing a set of statistics appropriate to the research requirements and methods for obtaining the required results as follows: percentage, arithmetic mean, standard deviation, standard error, median, hypothetical mean, simple correlation coefficient, independent samples t-test, one-sample t-test and paired (non-independent) samples t-test

Results

Table 1. *shows the arithmetic mean, standard deviation, median, skewness coefficient, calculated (T) value, and significance value for the pre-test of the psychological empowerment scale.*

Scale / Measure	Mean	Standard Deviation	Skewness	Median	T-Value	Significance
Psychological Empowerment Hypothetical Mean	108.4667 99	6.58859	-.373	107.0000	5.565	0.000

Table 2. *shows the arithmetic mean, standard deviation, median, skewness coefficient, calculated (T) value, and significance value for the post-test of the psychological empowerment scale.*

Scale / Measure	Mean	Standard Deviation	Skewness	Median	T-Value	Significance
Psychological	127.4000	3.54159	.175	126.0000	31.057	0.000

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Empowerment Hypothetical Mean	99

Discussion

The results of Table (1) indicate that the (T) value reached (5.565) with a significance level of (0.000) demonstrating a statistically significant difference in favor of the group which indicates that the referees were not in a state of complete psychological weakness but rather needed to develop their psychological capacities.

The study's findings showed that the investigated referees possess an acceptable level of psychological empowerment which the researcher attributes to the nature of their work environment that primarily focuses on improving their officiating performance without providing targeted programs to develop the psychological aspect in particular. Furthermore the lack of opportunities to interact with sports psychologists or participate in activities that enhance self-confidence and independence made it difficult to achieve high levels of psychological empowerment. This situation prompted the researcher to design a counseling program aimed at enhancing this empowerment through developing decision-making skills handling psychological stress and increasing self-efficacy.

Additionally , the program incorporated scale dimensions that include effective communication skills, decision-making, independence, self-efficacy and stress management which are considered essential dimensions for enhancing psychological empowerment among referees, as indicated by previous studies. According to Al-Moussawi's study (2019) effective communication skills are considered key factors positively influencing referees' performance, while Al-Tamimi's study (2021) confirmed that managing psychological stress has a major impact on performance stability in difficult situations, making the counseling program necessary to develop referees skills in those dimensions.

Upon analyzing the results of the tables a significant improvement is evident in the level of psychological empowerment among referees following the implementation of the counseling program. The results showed that the (T) value reached (10.204) with a significance level of (0.000), which is less than the significance level of (0.05) indicating that the differences between the pre- and post-tests were statistically significant in favor of the post-test.

This noticeable improvement in the level of psychological empowerment reflects a clear development in the referees' self-confidence. The researcher attributes

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

this to the psychological programming techniques utilized in the counseling program, such as self-enhancement and internal motivation techniques which helped referees boost their psychological capacities and improve their confidence in decision-making alongside training in reframing negative thoughts and fostering positive thinking. The researcher believes this improvement reflects the importance of referees adopting positive psychological mechanisms that helped them overcome negative thoughts and enhance self-confidence which also supports the findings of Bandura (1997) regarding the impact of enhancing self-efficacy in motivating individuals and achieving positive performance outcomes.

Overall the results demonstrate that the counseling program had a positive and effective impact on basketball referees across various psychological dimensions related to psychological empowerment which the researcher attributes to the program's techniques that included positive interaction among referees and continuous training on psychological empowerment skills. The researcher notes that this improvement in the degree of psychological empowerment reflects the importance of providing integrated counseling programs that enhance referees' ability to deal with psychological stress and improve their overall performance during matches as well as their ability to achieve a balance between personal emotions and professional tasks.

Finally the researcher believes that young referees with limited practical experience at the beginning of their officiating careers are the ones who benefit the most from this type of counseling program as it helped them develop psychological skills such as self-confidence and independence thereby enhancing their overall performance. Young referees represent the group that needs this type of psychological and professional support early in their careers as they face greater challenges in adapting to match demands and the pressures of players and coaches.

Conclusions

1. The counseling program has a significant impact on raising the level of psychological empowerment among third-grade referees.
2. The counseling program contributed to enhancing the level of effective communication for the referees.
3. The referees' ability to make decisions independently increased significantly.
4. The level of self-efficacy among the referees rose notably.
5. The program helped improve the management of psychological stress during matches.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Appendix 1. *Psychological Empowerment Scale (Final Version)*

No.	Statement	Never	Rarely	Sometimes	Often	Always
1	I avoid rushing into decisions and carefully consider potential consequences.					
2	I take responsibility for the outcomes of my decisions, whether positive or negative.					
3	I can adapt to sudden changes without negatively affecting my performance.					
4	I feel confident in my ability to deal with various refereeing/officiating challenges.					
5	I continuously strive to develop my refereeing skills to ensure optimal performance.					
6	I work to identify sources of stress and find effective solutions to manage them.					
7	I weigh different available options before making my final decision.					
8	I find it difficult to make quick and decisive decisions when the situation demands it. *(Reversed Item)*					
9	I lack flexibility when interacting with colleagues, which hinders smooth workflow. *(Reversed Item)*					
10	I execute my officiating decisions confidently, even under pressure from players or spectators.					
11	I believe in my ability to perform my duties efficiently and effectively during the match.					
12	I learn from past experiences to improve how I handle future pressures.					
13	I struggle to identify and capitalize on opportunities that enhance my refereeing competence. *(Reversed Item)*					
14	I can work as a head referee or assistant referee without					

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

	the need for constant guidance or supervision.
15	I use appropriate body language and tone of voice to reinforce my verbal messages.
16	I gather necessary information before making any important decision.
17	I regularly practice relaxation techniques to maintain my physical and mental health.
18	I handle complex officiating situations confidently without needing support or direction from colleagues.
19	I feel confident when making crucial officiating decisions during the match.
20	I demonstrate full capability in handling unexpected match situations independently without relying on others.
21	I make officiating decisions independently without needing validation from my colleagues.
22	I ask for additional clarification when needed to ensure complete understanding of situations.
23	I foster team spirit to ensure strong communication with my refereeing colleagues.
24	I can set my personal and professional goals as a referee and work toward achieving them without direction.
25	I leverage my previous experiences to enhance my performance and achieve positive outcomes.
26	I maintain my calm and focus even during high-pressure moments.
27	I consider myself capable of achieving the goals I set for myself.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

28	I demonstrate self-confidence when making decisions, even under extreme pressure.
29	I handle pressures and challenges independently without affecting the quality of my work.
30	I handle differences in opinion constructively to maintain effective communication with colleagues.
31	I believe in my ability to make decisions aligned with my refereeing and athletic principles.
32	I am willing to review or modify my decisions if new evidence requires it.
33	I show respect for my colleagues' opinions, even when I disagree with them.

(Appendix 2) Vocabulary and Content of the Implemented Counseling Program

Fourth Session: 45 minutes - 14/11/2024

Field / Component	Details
Session Title	Self-Efficacy
Related Needs	Understanding the concept of self-efficacy and its importance in achieving personal and professional goals.
General Objectives	• Defining self-efficacy. • Learning how to build and enhance self-efficacy. • Knowing the factors that affect self-efficacy.
Specific Objectives	• Enhancing participants' sense of self-efficacy. • Empowering participants with strategies for building self-efficacy. • Exploring how self-efficacy impacts performance across multiple fields.
Session Content	• Identifying the impact of self-efficacy on the individual and officiating teams. • Explaining how to build self-efficacy and presenting textual or video educational materials. • Stating the importance of self-efficacy in daily life and in the field of officiating. • Providing an opportunity for participants to share their experiences and discuss methods to enhance self-efficacy.
Formative Evaluation	Determining the extent of the supervisees' benefit from the session and opening the floor for discussion to express their viewpoints.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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Analytical Study of The Physical and Cognitive Skills of Tennis Referees From The Perspective of The Supervising Committee

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DOI:

https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2470

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Article history: Received 26/March/2026; Accepted 19/April/2026; Available online 28/ October/2026

Abstract

This study aimed to identify the effect of special exercises using weighted balls of varying masses and elastic resistance bands in futsal on perceptual abilities specifically the Nelson test of motor response (right and left) and perceptual motor coordination among players of the Baghdad Education (Al-Karkh II) team aged 15–16 years. The study was motivated by the observed weakness in perceptual abilities among players in the inter education directorates league. The researcher adopted an experimental approach using a pre-test/post-test design with two groups (experimental and control). The research population consisted of 60 players from six Baghdad Education Directorates while the study sample included 10 players representing 17% of the total population. The main experiment was conducted at the Al-Bayaa Youth Forum field to the Baghdad Provincial Council from 8/6/2025 to 3/8/2025 with three training units per week . The results indicated statistically significant differences between the pre- and post-tests in favor of the post-test demonstrating the effectiveness of using varied weighted balls and elastic resistance bands and their positive impact on developing perceptual abilities when incorporated into educational or training programs .

Keywords: skills, physical, cognitive, tennis referees, supervisory committee

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Introduction

Tennis is an individual sport that require a high level of accuracy in refereeing decisions due to the ball's high speed and constant changes in direction during play. The International Tennis Federation (ITF) noted that the nature of tennis matches requires referees to have a high level of observation, focus and the ability to make timely decisions (International Tennis Federation, 2022). Wissam Mohammed and Firas Mutashar (2020, p. 2) explained that some referees suffer from physical fitness issues and slow reaction times, which directly impacts their refereeing performance during matches. Sundus Musa Jawad (2020, p. 8) indicated that modern management in the field of refereeing contributes to understanding referees' feelings, needs and problems and addressing them fairly and objectively which helps enhance overall performance in sports competitions. Mohammed Nasr Al-Din Radwan (2016) emphasized that physical and cognitive skills are crucial factors that help referees choose the appropriate viewing angle and positioning, contributing to competitive fairness and reducing the likelihood of refereeing errors.

In this context Ali Kadhim Muslim (2024) indicated that developing the cognitive abilities of tennis referees contributes to raising the level of refereeing performance and decreasing role conflicts during match management through targeted training programs that focus on enhancing the cognitive aspects related to decision-making. Ahmed A. Mohamed (2025) also demonstrated that neuromuscular training contributes to improving the speed of motor response which is an important requirement associate to the referee's efficiency in following the fast-paced action on the tennis court. Hence the research problem arose from the observations of researcher Shahd Khalid, a second-grade national referee trained at the Iraqi Tennis Federation. She noted a disparity in the precision of refereeing decisions among referees which may be assigned to weak physical and cognitive fitness during match management. Regarding physical and cognitive skills: Physical and cognitive skills represent a set of abilities that integrate motor efficiency and the mental capacity to perceive surrounding situations quickly and accurately. These skills include speed of movement, balance, neuromuscular coordination and attention to various stimuli, which helps the individual to make an appropriate response at the right time (Schmidt, 2011, p. 118). Hence, the research problem arose. Research Problem: Despite the development of tennis, refereeing performance still suffers from inconsistencies in decision-making accuracy among referees, which can affect the fairness of competition. This is attributed to differences in their physical and cognitive skill levels which are essential for a referee to successfully follow the flow of play and make the right decision at the right time. Hence the research problem lies in the lack of clarity regarding the level of these skills among tennis referees in Iraq from the perspective of the supervising committee (Schmidt, 2011, p. 118).

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Method and tools

The research implemented the descriptive approach using the survey method as it is one of the most suitable methods for studying the physical and cognitive skills of referees and showing the nature of the relationship between them and the level of refereeing performance.

Research community: The research community included all tennis referees in Baghdad for the (2025–2026) season.

The research community was identified as (60) tennis referees in Iraq and the research sample was selected from within this same community using a simple random method. They were directly included in the study without creating a new community or changing it in order to ensure accurate representation and objective results.

The sample was distributed as follows

• A survey sample of (9) judges representing (15%)

• The application sample consisted of (51) judges after excluding the pilot sample from the original population.

It is important to observe that the evaluation of the scale items did not depend on the referees' own responses but rather on the assessments of the specialized refereeing committee. This ensured objectivity and accuracy in judging performance levels as the committee possesses the technical expertise and specialized knowledge to evaluate referees during matches. Therefore the data collected indicates the perspective of the supervising committee not the referees' self-assessment thus improving the reliability of the findings and reducing bias in responses. Research Instrument: In this research the researchers relied on a physical and cognitive skills scale enhanced by researcher Shahd Khaled (an analytical study of the physical and cognitive abilities of tennis referees from the perspective of the supervising committee). The scale consists of eight items designed to assess the referees' skill levels. A five-point Likert scale was used to answer the items: (1 = Very weak, 2 = Weak, 3 = Average, 4 = Good, 5 = Excellent). This scale was chosen for its suitability to the nature of the research as it directly measures the physical and cognitive aspects related to refereeing performance. Validity and Reliability: The researchers relied on the physical and cognitive skills scale developed by researcher Shahd Khaled. The instrument's validity was by presenting it to a group of fifteen experts specializing in refereeing and physical education to assess the confirmed suitability and clarity of the items. The instrument's reliability was verified using Cronbach's alpha coefficient which yielded a value of 0.87 indicating a high degree of

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

reliability. The scale has a good degree of reliability that can be depended upon in field application.

The pilot test

The scale was conducted to a pilot sample consisting of (9) judges in order to ensure the clarity of the items and the ease of answering them and no significant obstacles appeared which indicates the suitability of the tool for application.

Main experiment

The scale was applied to the main research sample of (51) judges and after collecting the forms the data were extracted and statistically processed using the Statistical Package (SPSS) to extract the results.

Table1. *Show the research population and its samples*

NO.	Expert	Population	Pilot sample	Study sample
1	Baghdad	25	9	16
2	Najaf	9	___	9
3	Karbala	10	___	10
4	Dohuk	8	___	8
5	sulaymaniyah	8	___	8
Total	5	60	9	51
percentage		%100	%15	%85

The accuracy of the instrument was confirmed by presenting it to a panel of fifteen experts specializing in arbitration and physical education. Their task was to evaluate the clarity of the statements and their suitability for measuring physical and cognitive skills. All their comments were incorporated, and the statements were modified accordingly. To ensure the instrument's reliability, Cronbach's alpha coefficient was used yielding a value of 0.87 indicating good reliability for the study. An expert opinion form was also used to determine the clarity and validity of the statements, further enhancing the scale's reliability. Subsequently the scale was broken down into its primary components, with each component representing a specific axis. Eight statements were formulated and presented to the experts to confirm their suitability for measuring the scale's intended purpose. All statements aligned with the experts' recommendations and demonstrated their validity for measurement, as the chi-square (χ^2) value was calculated for each statement. The instrument underwent a pilot phase during which

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

it was administered to nine judges to ensure the clarity and ease of answering the statements. No difficulties were observed in understanding or completing the form. After minor adjustments based on expert feedback the scale was adopted. The implementation phase involved administering the scale to the main sample of sixty judges. The completed forms were collected after verifying their accuracy and completeness. The data were then entered into SPSS version 24 for analysis and results extraction. The discriminatory power of the statements was analyzed using the two-groups approach. The sample scores were ranked in descending order from highest to lowest. The top 30% and bottom 30% of the forms were then selected to form two groups with maximum differentiation. The discrimination coefficient for each statement was calculated using the independent samples test with the significance level considered an indicator of the statements' discriminatory power. The statistical kit was also used to calculate the arithmetic means and standard deviations for each element of the scale to test the difference between the arithmetic mean and the hypothetical mean using the F-test, to calculate the simple correlation coefficient between physical and cognitive abilities and the level of referees' performance, in addition to using the F-test to assess the quality of the linear regression model.

Table2. *show the discriminatory power of the physical and cognitive skills scale*

Item no.	Upper group		Lower group		Calculated (t)	(sig.)value	result
	سَ	ع	سَ	ع			
1	4,17	0,585	2,13	0,653	16,062	0,001	significant
2	4,26	0,554	2,11	0,727	16,165	0,000	significant
3	3,91	0,992	2,23	0,695	9,545	0,000	significant
4	4,66	0,879	2,17	0,657	15,562	0,000	significant
5	4,08	0,674	2,44	0,474	13,666	0,000	significant
6	3,96	0,887	2,23	0,442	12,013	0,000	significant
7	3,88	0,682	2,31	0,444	13,305	0,000	significant
8	4,21	0,824	2,36	0,472	13,405	0,000	significant

*Significant at sig**0,05** ≥

Results

To achieve the aim of identifying the centering and mechanism of the ruling the arithmetic mean, standard deviation, hypothetical mean and skewness values were used for the variables as represent in Table (3).

Table 3. *Shows the Arithmetic Means, Standard Deviations and Skewness Coefficients of the Studied Variables*

Variables	Arithmetic means	Mean	Standard Deviation	Skewness Coefficients

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

physical and cognitive skills scale.	32,36	32	2,905	0,371

Table4. *Shows the Calculated t-values for the Significance of Differences Between the Arithmetic Means and the Hypothetical Means of the Studied Variables*

variables	mean	Standard deviation	Hypothetical mean	Calculated -t-value	Sig	significance
physical and cognitive skills scale.	32,36	2,905	24	22,293	0,000	**Significant**

Significant at sig0.05 ≥

Table5. *Shows the Pearson Correlation Coefficients and the Estimated Effect of Physical and Cognitive Skills on Tennis Referees*

Independent variable	Independent variable	Pearson correlation coefficient	Linear regression coefficient	Contribution percentage	standard error
physical and cognitive skills scale	Tennis referees	0,672	0.451	0,450	0,128

Table6. *Shows the Results of the F-test for Evaluating the Goodness of Fit of the Linear Regression Model for the Physical and Cognitive Skills Variable among Tennis*

Independent variable	Independent variable	constant	Sum of squares	Degrees of freedom	Mean square	Calculated -f-value	Sig	significance
physical and cognitive skills scale	Tennis referees	Regression	61,462	1	61,462	102,436	0.000	**Significant**
		Errors	34,806	58	0.600			

* Significant at sig **0.05** ≥

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Table 7. Shows the Estimates of the Constant and the Slope (Effect) of the Physical and Cognitive Skills Results among Tennis Referees

variable	variables	Beta (B)	Standard errors	Calculated -t-value	sig	significance
Tennis referees	Estimates of the Constant	0.572	0,013	8.959	0.000	Significant
Physical and Cognitive Skills	0.819	0.161	12.253	0.000	Significant	Physical and Cognitive Skills

Discussion

Table (3) shows that the arithmetic means, standard deviations and skewness coefficients for the physical and cognitive skills variable demonstrate a good degree of homogeneity among the sample members The arithmetic mean (32.36) is close to the median (32) indicating a balanced allocation of data and the lack of significant deviations in the responses of the sample members.

This reveals the fact that the referees possess similar levels of these skills indicating that these skills are crucial and indispensable neediest for the job. This findings can be explained in light of what Schmidt (2011) indicated namely that physical and cognitive skills are an integration of motor performance and mental processes officiating requires speed of movement synchronized with accurate perspective of the situation, and this can only be attained through a similar level of these skills among the referees This homogeneity also reflects the nature of the preparation and training that the referees undergo which aims to improve a minimum appropriate level of competence in them The results in Table (4) showed statistically important differences between the arithmetic mean and the hypothetical mean favoring the arithmetic mean. This indicates that the participants exhibited a higher-than-average level of physical and cognitive skills a positive indicator reflecting the referees' effectiveness in performing their tasks.

This result can be clarified by the nature of tennis matches, which requirements rapid decision-making do to the ball's high speed and constant alterations in direction. This requires that the referee possess high levels of focus, attention and quick response. This result is also connected to analytical skills allowing the referee to quickly analyze the refereeing situation and select the appropriate decision. The referee does not depend on solely on visual remark but also on interpreting the situation and understanding its dimensions. This aligns with Koontz & Weihrich (2010), who noted that analytical skills promote to making decisions draw

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

on logical and scientific principles. concerning the results in Table (5), they demonstrated a clear positive correlation between physical and cognitive skills and the performance level of tennis referees with a correlation coefficient of 0.672, reflecting the strong relationship between the two variables This demonstrates that a higher level of these skills among referees directly leads to develop officiating performance This relationship can be explained by the fact that a referee with good positioning and mechanics skills is better able to choose the suitable position on the court giving them a obvious view of the game and thus enabling them to make accurate decisions This is verified by the FIBA (2022) guidelines on the significance of proper positioning in enhancing decision accuracy This result is also linked to leadership skills, as the referee plays a leadership role during a game managing players and controlling the flow of play This needs self-confidence and the capacity to make crucial decisions. As noted by Mohammed Hassan Alawi (2002), leadership contributes to guiding behavior and achieving discipline within sports competitions. The results in Table 4 showed that the linear regression model was important indicating that physical and cognitive skills have a real impact on the level of referee performance This can be explained by the fact that these skills do not operate in isolation but rather are integrated with a range of other elements such as psychological and social aspects A referee needs to control their emotions and cope with psychological pressure during a match particularly in sensitive situations that require decisive decisions. Silva (1984) pointed out that psychological balance is a fundamental factor in successful athletic performance This result is also connected to emotional intelligence as a referee who possesses the ability to control their own emotions and understand the emotions of others is better equipped to handle stressful situations and make balanced decisions. Goleman (1995) indicated that emotional intelligence contributes to improved performance in situations that demand emotional control.

The contribution rate of 45% indicates that physical and cognitive skills are an important element in explaining the variation in referee performance levels but they are not the only factor. Other factors influence performance such as the legal domain, which included the referee's knowledge of the laws and regulations of the game enabling them to apply them correctly during a match (ITF, 2023). This finding can also be explained in light of the perspective of continuous improvement, as maintaining a high level of performance requires the referee to continue training and updating their skills to keep pace with the latest developments in the game, as noted by Hassan Ali.(2011) that continuous improvement contributes to improving professional efficiency and raising the level of performance. As for the results of Table (5)it demonstrate a direct and strong effect of physical and cognitive skills on the performance of referees as the value of the slope coefficient reached (0.819) which is a high value indicating that any improvement in these skills is reflected positively and

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

significantly on the level of performance This reflects that these skills are among the basic pillars on which the referee depends in managing the match as they help him to make the correct decision move around the field efficiently keep up with the speed of play as well as his ability to deal with the different situations that may occur during the match.

The researchers believe that these results confirm that physical and cognitive skills are not merely secondary requirements but rather show the true foundation for successful refereeing performance Those who possess these skills are better equipped to achieve fair refereeing, reduce errors and raise the overall quality of performance within the system.

Sports competitions. The researchers also explained that these skills demonstrate a practical application of general abilities as they appear clearly in actual performance situations within the match which justifies the use of the term (skills) in this research, as it reflects the practical aspect of refereeing performance more accurately.

Conclusions

1. There is a statistically importance effect of physical and cognitive abilities in improving the accuracy of refereeing performance among tennis umpires.
2. Most of the umpires in the sample possess a moderate to better level of physical and cognitive skills.
3. There is a positive relationship between possessing physical and cognitive skills and the development of umpires' performance.
4. Physical and cognitive skills contribute 45% to explaining the variance in the level of umpires' performance.
5. The results explain the importance of continuous training in enhancing these skills among umpires.

Appendix (2)

No.	Items	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	The referee possesses the physical fitness to maintain high concentration throughout the match					
2	. The referee moves quickly and efficiently to reach the correct position in a timely manner.					
3	The referee has good balance while moving which helps them make accurate decisions.					
4	The referee demonstrates physical endurance during long or demanding matches.					

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

5	The referee has adequate reaction time to handle unexpected situations during the match.
6	The referee possesses excellent visual perception enabling them to track the ball with high accuracy.
7	The referee can focus and pay attention to minute details despite having multiple tasks during the match.
8	The referee demonstrates high coordination between their visual and physical movements when making decisions.

Physical and cognitive skills scale

Appendix (2)

Name of experts to whom the items were presented for evaluation

1	Prof. Dr. Mohammed Fadel	College of Basic Education	University of Diyala, Administration and Organization
2	Prof. Dr. Suhair Mutab Munaf	College of Physical Education and Sports Sciences for woman	Sports Management
3	Prof. Dr. Warda Ali Abbas	College of Physical Education and Sports Sciences for woman	Measurement Tests / Tennis
4	Prof. Dr. Khalid Aswadد	College of Physical Education and Sports Sciences / University of Al-Muthanna	Sports Management
5	Prof. Dr. Othman Mohammed Shahadaة	College of Physical Education and Sports Sciences / University of Diyala	Sports Management
6	Prof. Dr. Alaa Abdul Wahab	College of Physical Education and Sports Sciences / University of Al-Qadisiyah	Sports Training / Racket Games
7	Prof. Dr. Ali Abdul Latif	College of Physical Education and Sports Sciences for woman	Sports Management
8	Prof. Dr. Salah Wahab	College of Physical Education and Sports Sciences for woman	Sports Management
9	Prof. Dr. Abeer Hatem	College of Physical Education and Sports Sciences for woman	Training Physiology / Racket Games
10	Dr. Basim Sami Suhaid	College of Physical Education and Sports Sciences for woman	Sports Management
11	Assistant Professor Dr. Nibal Karim Abdullah	College of Physical Education and Sports Sciences for woman	Sports Management

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Sports Management	College of Physical Education and Sports Sciences for woman	Assistant Professor Dr. Muhammad Qusay Muhammad	**12**
Motor Learning/Racket Games	College of Physical Education and Sports Sciences, University of Baghdad, Al-Jadriya	Assistant Professor Dr. Ali Makki	**13**
Psychology/Racket Games	College of Physical Education and Sports Sciences for woman	Dr. Nazik Subhi Matar	**14**
Motor Learning/Racket Games	College of Physical Education and Sports Sciences for woman	Dr. Muhammad Hassan Halil	**15**

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

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Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

The Effect Of Using Spirulina Supplementation On The Performance Of 400-Meter Runners Under 20 Years Old

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DOI:
https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2267
https://creativecommons.org/licenses/by/4.0/
Article history: Received 19/March/2025; Accepted 6/May/2025; Available online 28/ October/2026

Abstract

The idea of the present research lies in enhancing athletic performance through the application of auxiliary sciences that support the training process, such as nutrition science, by utilizing supplements that reduce muscular fatigue. The purpose of this research was to identify the effect of Spirulina supplementation on the performance of 400-meter runners under 20 years old. The research hypothesized that there would be no statistically significant differences between the pre-test and post-test results. The researchers adopted the experimental method using an experimental group and a control group design. The research sample was intentionally selected from elite 400-meter runners under 20 years of age, comprising ten athletes from various governorates of Iraq. The participants were randomly assigned using the odd-even method into two groups, with five runners in each group. The Statistical Package for the Social Sciences (SPSS) was used for data processing. According to the results, the researchers concluded that Spirulina supplementation contributed to the improvement of all biochemical variables investigated in the study, which was reflected in the enhancement of 400-meter running performance. The researchers recommend paying attention to the nutritional aspect of athletes alongside the training program, as it is no less important than training itself, given that physical exertion leads to numerous physiological and biochemical changes within the athlete's body.

Keywords: Spirulina supplement, performance, 400-meter runners, under 20 years old, biochemical changes.

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Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Introduction

The concept of this research is based on improving athletic performance in the 400-meter running event through the utilization of supportive sciences associated with the training process, particularly nutrition science, by administering Spirulina supplementation. Spirulina has been reported to reduce muscular fatigue resulting from elevated lactic acid concentrations and increased levels of free radicals. These free radicals negatively affect body systems and organs and cause substantial damage to cellular components, particularly deoxyribonucleic acid (DNA) located within the cell nucleus. DNA is responsible for the synthesis of all cellular components and determines both the nature and quantity of proteins. These vital biological processes are adversely affected by excessive free radical concentrations, which may lead to cellular damage and destruction (Abdel Fattah, 2003, p. 182).The purpose of the study was to identify the effect of Spirulina supplementation on the performance of 400-meter runners under 20 years of age. The research hypothesized that there would be no statistically significant differences between the results of the pre-tests and post-tests. Among the studies that addressed variables similar to those investigated in the current research was the study conducted by (Aziz, 2014), which aimed to determine blood lactate concentration levels following competitive effort at time intervals of 3, 5, 7, and 10 minutes and to compare these values during three different tests of the 400-meter race. The study concluded that the most appropriate time for recording the highest blood lactate concentration following exertion in the 400-meter event was five minutes. It also revealed variation in the timing of peak lactate accumulation during three months of specific preparation for the 400-meter event. Furthermore, the highest lactate concentration occurred at seven minutes, followed by ten minutes after exertion. The study by (Ta'ma, 2015) aimed to investigate oxidative stress responses, antioxidant responses, and selected biochemical indicators following a high-intensity training session in men's artistic gymnastics. The study concluded that oxidative stress occurred among gymnasts during high-intensity training sessions. No significant changes were observed in certain enzymatic antioxidants such as glutathione, nor in non-enzymatic antioxidants such as ceruloplasmin. Additionally, both enzymatic and non-enzymatic antioxidant systems returned to their normal state during the recovery period, indicating that twenty-four hours were sufficient for restoring the oxidant-antioxidant balance to normal levels (Yasser, 2018) investigated the effect of antioxidants on performance levels among weightlifters and concluded that antioxidant supplementation contributed to improved performance in both the snatch and clean-and-jerk lifts based on pre-test and post-test comparisons. (Ahmed, 2019) designed a training program incorporating circuit training and examined the values of CPK and LDH enzymes, as well as lactic acid accumulation in pre-tests and post-tests. The study concluded that the program was successful in terms of utilizing circuit training and training intensity. Furthermore, an eight-week training period was sufficient to produce an initial effect on CPK and LDH enzyme activity and lactic acid concentration. A main training session duration of 40–55 minutes positively affected the research variables, while exercise durations ranging from 20–60 seconds influenced CPK, LDH, and lactic acid levels (Jassim, 2019). investigated the effects of anaerobic exercises, curcumin, and ginseng extract on selected oxidative stress indicators and performance endurance among handball players. The study demonstrated that anaerobic training combined with ginseng supplementation produced superior effects in the first experimental group compared with the second and third groups, which performed anaerobic training and received curcumin supplementation. This superiority was observed in the

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

development of certain oxidative stress variables and performance endurance. Athletic performance is accompanied by numerous factors that may hinder achievement. One of the most significant factors is the elevated concentration of lactic acid within muscles, which causes muscular fatigue and subsequently increases the production of free radicals inside cells. Therefore, the scientifically controlled use of antioxidants under precise medical supervision can substantially reduce oxidative stress and lower free radical levels while enhancing total antioxidant capacity. This, in turn, contributes to improving the health, physiological status, and physical fitness of runners and assists in enhancing their performance levels.

Materials and Methods

The researchers adopted the experimental method to address the research problem using a design involving experimental and control groups, with both groups subjected to pre-tests and post-tests, as this design was deemed appropriate for the nature of the research problem. The research sample was intentionally selected from elite 400-meter runners under 20 years of age in the youth category. The sample consisted of 10 runners from different governorates of Iraq, selected based on the results achieved in the Iraqi Clubs and Institutions Athletics Championship held in Sulaymaniyah Governorate from March 7–9, 2024. The participants were randomly assigned using the odd-even method into two groups (experimental and control), with five runners in each group.

The following test was used:

400 Meter Running Performance Test (International Association of Athletics Federations (IAAF)).

Pre-Testing Procedures: The pre-tests for both the experimental and control groups were conducted on October 12, 2024, at 6:30 p.m. (post-exercise measurements) at the Ministry of Youth and Sports Specialized School Stadium. Before the implementation of the supplementation program, a specialist physician in sports nutrition was consulted to verify the safety of the product for athletes and to determine the appropriate dosage.

Spirulina Supplementation Program: A nutritional supplementation program using Spirulina was implemented for a period of two months, based on the manufacturer's instructions and the recommendations of specialists in nutrition and dietary supplementation.

The supplementation protocol was as follows: First month: 5 g of Spirulina administered two hours before each training session.

Second month: 10 g of Spirulina administered two hours before each training session.

The post-intervention biochemical assessments consisted of two measurements: one before exertion and another after exertion. Coordination was made with the coaches to standardize the training programs for all participants in terms of intensity, volume, and recovery periods in an attempt to control training-related variables among all athletes.

Post-Testing Procedures: Upon completion of the main experimental phase involving Spirulina supplementation, post-tests were conducted on December 12, 2024, at 6:30 p.m. (post-exercise measurements) under the same conditions used during the pre-tests.

Statistical Analysis: The Statistical Package for the Social Sciences (SPSS) was used to process and analyze the collected data

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Results

Table 1. *Means, Standard Deviations, Mean Differences, Standard Deviations of Differences, Calculated t-values, Significance Levels, and Statistical Significance for the Control Group in the Pre- and Post-Tests (Post-Exercise Measurements)*

s	variable	Unit	Pre-Tests		Post- Tests		Mean Differences	Standard Deviations of Differences	Calculated t-values	Significance Level	Significance
			Mean	Standard Deviations	Mean	Standard Deviations					
1	400-m Running Performance	sec	54.714	1.007	54.676	1.003	0.038	0.024	3.413	0.027	Significant

(Degree of Freedom = 4; Significance Level = 0.05)

Table 2. *Means, Standard Deviations, Mean Differences, Standard Deviations of Differences, Calculated t-values, Significance Levels, and Statistical Significance for the Experimental Group in the Pre- and Post-Tests (Post-Exercise Measurements)*

s	variable	Unit	Pre-Tests		Post- Tests		Mean Differences	Standard Deviations of Differences	Calculated t-values	Significance Level	Significance
			Mean	Standard Deviations	Mean	Standard Deviations					
1	400-m Running Performance	sec	54.744	0.983	52.876	0.965	1.868	0.147	28.342	0.000	Significant

(Degree of Freedom = 4; Significance Level = 0.05)

Table 3. *Differences Between the Control and Experimental Groups in the Post-Test (Post Exercise Measurements)*

s	variable	Unit	Control Group		Experimental Group		Calculated t-values	Significance Level	Significance
			Mean	Standard Deviations	Mean	Standard Deviations			
1	400-m Running Performance	sec	54.676	1.003	52.876	0.965	2.890	0.020	Significant

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

(Degree of Freedom = 8; Significance Level = 0.05)

Discussion

Table (1) shows that the mean performance time for the 400-meter run in the control group during the pre-test (post-exercise measurement) was (54.714) seconds, whereas in the post-test (post-exercise measurement) it became (54.676) seconds. This indicates the presence of significant differences between the pre-test and post-test in favor of the post-test. The researcher attributes this improvement in performance to the training program followed by the athletes.

Table (2) shows that the mean performance time for the 400-meter run in the experimental group during the pre-test (post-exercise measurement) was (54.744) seconds, whereas in the post-test (post-exercise measurement) it became (52.876) seconds. The figures clearly demonstrate a substantial improvement in 400-meter running performance. The researcher attributes this development to the regulated training program undertaken by the athletes, in addition to the Spirulina supplement, which contributed noticeably to performance enhancement. Spirulina supplementation increased the total antioxidant capacity in the runners' blood, which is considered a positive indicator reflecting improved efficiency and reserves of total antioxidant capacity among the runners. This increase was reflected in the free radical index, as total antioxidant capacity plays a direct role in reducing and combating free radicals, thereby preventing cellular damage within the athletes' bodies. From the researcher's perspective, improvement in athletic performance is associated with the integrity of functional systems and body cells, which are positively influenced by supplementation with antioxidant-containing products. Through reviewing numerous scientific sources, it became evident that short-distance runners of the Iraqi national team, being among the country's elite athletes, undergo high-load training programs that require intensive physical effort. Consequently, oxidative stress develops and free radical levels increase due to the high training intensities. This finding is consistent with the results of (Ta'ma, 2015), which indicated that oxidative stress occurs during high-intensity training sessions that constitute a fundamental component of athletic achievement. However, elevated free radical levels can lead to cellular damage, especially when athletes suffer from insufficient antioxidant reserves, negatively affecting recovery and physical performance. Under such circumstances, athletic development becomes slower or does not reach the expected level despite exposure to high training loads. Therefore, attention should be directed toward athletes' health status and ensuring that their nutritional intake contains adequate levels of antioxidants to compensate for deficiencies that may occur during training periods. Increasing antioxidant reserves is considered an essential component of nutritional and recovery strategies aimed at improving performance and minimizing the negative effects of oxidative stress. (Al-Kaabi, 2007, p. 172) stated that antioxidant deficiency within the body leads to multiple disturbances in vital functions and internal balance, thereby weakening athletic performance and negatively affecting achievement. This process is considered one of the principal causes of cellular damage, including damage to the cell membrane, which compromises its ability to regulate the movement of substances into and out of the cell and consequently impairs its normal functions. Damage to DNA within the cell nucleus directly affects all vital cellular processes. Furthermore, mitochondria, which are responsible for energy production, may also be damaged, resulting in cell death and directly

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

influencing athletic performance. Free radicals may spread to neighboring cells, causing a chain reaction of cellular damage. As a result, athletes, particularly runners, lose part of their internal energy reserves due to mitochondrial damage. Even if this loss is slight, it can adversely affect muscular strength and reduce the athlete's ability to sustain training for longer periods and achieve higher performance levels. The optimal approach for reducing muscular damage and limiting the harmful effects of free radicals is to enhance antioxidant defenses within cells. Antioxidants serve as an essential line of defense that protects body cells from the damaging effects of free radicals, thereby helping maintain athletic performance and improve achievement levels. Consequently, the researcher supplied the runners with Spirulina supplementation, which is rich in antioxidants. Scientific evidence indicates that Spirulina contains high concentrations of antioxidants and is characterized by a composition rich in biologically active compounds such as phycocyanin, chlorophyll, vitamins, and minerals. These compounds play a major role in combating free radicals and reducing oxidative stress at the cellular level. Such properties contribute to protecting cells from damage caused by intensive physical activity and improving post-exercise recovery, which in turn enhances overall athletic performance. Research also suggests that Spirulina supplementation may improve the body's resistance to cellular damage and enhance the functioning of vital physiological systems, making it a supportive option for improving athletic performance and reducing the adverse effects of oxidative stress. Some studies have reported that Spirulina supplementation contributes to improvements in muscular strength and endurance, making it beneficial for enhancing energy production and athletic performance (Joe Leech, 2024). Another study demonstrated that Spirulina supplementation improved oxygen uptake during exercise (Gurney & Spendiff, 2020). Recent studies indicate that muscular damage and the generation of free radicals constitute major factors negatively affecting athletes' performance, particularly among those participating in high-intensity activities such as sprint running. In this context, the use of antioxidant-containing nutritional supplements before training represents an effective strategy for reducing cellular damage within muscle tissue. These compounds help limit oxidative activity and enhance the body's natural antioxidant defenses. Antioxidant deficiency leads to oxidative stress because the cellular defense mechanisms, including antioxidant enzymes and nutrients, become insufficient to counteract oxidizing agents, resulting in substantial destruction of muscle cells and tissues. (Clarkson & Thompson, 2000) confirmed that the use of antioxidant substances is both safe and effective in improving athletic performance. Therefore, athletes exposed to strenuous physical activities should be encouraged to follow antioxidant-rich dietary regimens supplemented with appropriate nutritional products as part of preventive strategies aimed at reducing muscular damage and improving athletic achievement. The 400-meter sprint is considered one of the most demanding events in athletics because it requires substantial physical effort. During this event, athletes rely on the anaerobic energy system for approximately 80–85% of total energy production. Since performance duration exceeds 30 seconds, energy production depends primarily on the lactic acid system. Lactic acid accumulates within muscles due to insufficient oxygen availability during performance, leading to muscular fatigue and pain (Al-Shammaa, 2015, p. 77). The researcher attributes the improvement observed in the indicators—namely the increase in total antioxidant capacity reserves, the reduction in free radical levels, and the decrease in lactic acid concentration—to the enhancement of performance in the 400-meter run.

Table (3) shows that the mean 400-meter performance time in the control group during the post-test (post-exercise measurement) was (54.676) seconds, whereas the corresponding

Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

value in the experimental group was (52.876) seconds. This indicates the presence of statistically significant differences between the two groups in favor of the experimental group. The researcher attributes this improvement to the training program in addition to Spirulina supplementation, which enhanced antioxidant levels and effectively reduced free radicals, thereby preventing oxidative stress that adversely affects body systems and organs. Spirulina supplementation also contributed to reducing muscular fatigue resulting from elevated lactic acid concentrations in both blood and muscle cells.

Conclusions

Based on the obtained results, the researchers concluded that Spirulina supplementation contributed to the improvement of all biochemical variables investigated in the study, and this improvement was reflected in enhanced 400-meter running performance. Furthermore, the researchers recommend emphasizing the nutritional aspect of athletes' preparation alongside the training program. Nutritional preparation is no less important than training itself and should receive greater attention because physical exertion produces numerous physiological and biochemical changes within the athlete's body.

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Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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The percentage of contribution of the training process scale for coaches to the explosive power of the high smash skill for advanced volleyball players

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DOI:

https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2289

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Article history: Received 28/April/2025; Accepted 15/May/2025; Available online 28/ October /2026

Abstract

The purpose of this study was to explain the contribution of the training process level scale to the explosive power of the high spike skill in volleyball and to enhance and standardize a training process scale for volleyball coaches from the perspective of their players. The researcher used the illustrative survey method and correlational analysis as these were suitable for the research problem. The research population was described as the players of the Iraqi Elite Volleyball League in the 2024-2025 season, totaling (13) clubs (Peshmerga, Police, South Gas, Industry, Habbaniyah, Hit, Erbil, Nu'maniyah, Northern Refineries, Dagharah, Muqdadiyah, Nineveh, and Haditha), with a total of (158) players. The researcher picked the sample from the whole population, resulting in a total sample size of (145), representing (91.77%) of the original population. Thirteen players could not be reached or were therefore excluded. The sample was divided into (8) players for a pilot study, illustrating (Industry Club). (50) players were selected to develop and determine the scientific basis for a training process level scale. Subsequently, (62) players were chosen for the standardization sample, and (25) players were selected for the main experimental sample. The findings of the relationship and contribution percentage between the training process level scale and explosive skill power were presented and discussed. The researcher attained many conclusions: the scale demonstrates the level of the coach's training process and to develop performance accurate assessment of the training process demands continuous knowledge of the components of the training situation, identifying training needs, designing the training program, implementing the training and finally evaluating the training program. Explosive power plays a important role in the success of the volleyball spike skill.

Keywords: Percentage Contribution, Training Process Scale, Explosive Power, Volleyball

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

The training process is one of the major elements for the success of the team and its achievement of accomplishments at the local and international levels. Since the coach is its cornerstone he must have the successful features so that he can lead the team to attain its various skill-related, physical, tactical and psychological goals in addition to employing his abilities to reach certain developments that he sees the player needs in order to evaluate his performance. The training process needs many elements comprising material and moral ones. "The success of training relies on the availability of its basic pillars which are (the coach, the athlete and the training process). The leader of the training process is the coach who is responsible for planning and implementation and he must possess the qualifications that help him succeed in preparing the athlete in a comprehensive manner" (Al-Mayahi, 2022, p. 23).

The training process support from many aspects and perhaps the most important of these aspects are the achievements. However many aspects precede this to identify the level of the training process, which is the extent of progress in the functional and physiological aspects of the player and the development of his physical, technical and planning aspects. This relies on the extent of the advantages that the coach possesses in terms of years of experience, information and various training courses that involve all the training aspects mentioned above, in addition to his previous practice of the game or activity the extent of his progression in training and the extent of his implementation of modern methods and tools that would cause to his success at the training level and so on, from the advantages that should be available to the coach. As you know, they are numerous and varied. Moreover, the level of the training process is the main determinant of achieving athletic development, which reaches physical, motor, or technical development. Perhaps the most important characteristic of volleyball training is that there are several variables related to skills that depend on achieving a good skill level. Therefore, from this perspective, the researcher decided to show the level of training from axes that she believes affect the training process and the contribution of these elements to the explosive power of the spiking skill. Explosive power is a important physical capacity for volleyball players. Possessing this ability allows a player to jump, hit the ball, and execute skills effectively. However, a lack of explosive power (or weakness in this ability) will obstruct a player from mastering the spiking technique. Alawi (1994, p. 91) demonstrates that explosive power is one of the most important physical abilities, positively correlated with skill performance. It is the essential factor in developing performance. Hassan (1983, p. 280) defines it as the use of force in the shortest possible time to produce movement.

Material and Tools

The researcher used the descriptive approach with a examine method and correlational analysis as these were suitable for the research problem. The research population was defined as the players of the Iraqi Elite Volleyball League for the 2024-2025 season, totaling (13) clubs (Peshmerga, Police, South Gas, Industry, Habbaniyah, Hit, Erbil, Nu'maniyah, Northern Refineries, Dagharah, Muqdadiyah, Nineveh, Haditha), with a total of (158) players. The researcher identified the sample from all members of the population, resulting in a total sample

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

size of (145), representing (91.77%) of the original population. (13) players could not be reached or were therefore excluded. The sample was divided into (8) players for the pilot study, representing (Industry Club). Subsequently (50) players were sampled to establish and extract the scientific basis for measuring the level of the training process. After that, (62) players were selected for the standardization sample, and (25) were selected for the final sample. A player for the main experimental sample.

Table1. *It shows the details of the community and the sample distribution*

NO	Club name	Count	Sample	Pilot study sample	Construction sample	Sample of Technicians	Main study sample	Excluded players
1	South Gas	12	10	-	3	5	2	2
2	AI-Shorta	12	12	-	1	1	10	-
3	AI-Muqdadiya	12	12	-	6	6	-	
4	Peshmerga	12	11	-	5	6	-	1
5	North Refineries	12	11	-	1		10	1
6	AI-Habbaniya	12	9	-	5	4	-	3
7	AI-sinaa	12	8	8			-	4
8	Hit	13	11	-	6	5	-	2
9	Erbil	13	13	-	6	7	-	
10	AI-Daghara	12	12	-	4	8	-	
11	Haditha	12	12	-	5	4	3	
12	Nineveh	12	12	-	3	9	-	
13	AI-Numaniya	12	12	-	5	7	-	
Total		158	145	8	50	62	25	13
Percentage		%100	%91.77	%5.06	%31.64	%39.24	%15.82	%8.22

Field Research Procedures

Identifying the Areas of the Scale (Level of the Training Process for Coaches):

The researcher suggested and defined (6) areas and gave a theoretical definition for each area. The researcher was keen to guarantee that the areas gave meaning to the phenomenon studied or the construct that is to be measured from the questionnaire Appendix (1). It was presented to a number of experts and specialists in the field of training science, tests, measurement and volleyball numbering (13) experts as they were asked to give their opinions on the validity of the areas and their definitions and the possibility of adding or integrating any area that they see as appropriate and deleting or adjusting the areas that are not suitable. The researcher adopted the chi-square in identifying the research areas under a significance level of (0.05) as shown in Table (2) for the scale of the level of the training process.

Table2. *It shows the agreement of experts and specialists on the domains of the Training Process Level Scale for coaches*

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

No.	Proposed Domains	Agreed	Disagreed	K2 values	Significance Value	Significance
1	Sport Culture	13	0	13	0.000	Significant
2	Knowledge of the Psychological Aspect	13	0	13	0.000	Significant
3	Knowledge of Sport Training	13	0	13	0.000	Significant
4	Knowledge of Sport Teaching and Learning	11	2	6.231	0.013	Significant
5	Knowledge of Sport Analysis and Statistics	13	0	13	0.000	Significant
6	Knowledge of Sports Laws and Regulations	13	0	13	0.000	Significant

Preparing the Items for the (Training Process Level for Coaches) Scale

After defining the domains of the volleyball coach training process level scale the researcher formulated a questionnaire containing selected items for each domain. These items were allocated across the axes (domains), with each item representing the domain in which it was placed. The questionnaire was founded on the theoretical definition of the domain along with the identification of proposed answer alternatives. The scale which consisted of (61) items, is a fundamental step in scale design. The first domain is sports culture (11 items) the second is knowledge of the psychological aspect (10 items) the third is knowledge of sports training (11 items), the fourth is knowledge of sports teaching and learning (10 items), the fifth is knowledge of sports analysis and statistics (9 items), and the sixth is knowledge of sports laws and regulations (10 items). The researcher used a five-point multiple-choice (Likert) scale, utilizing a five-point scale (always, often, etc.). Sometimes, rarely, never) and arranged the scoring scale starting from (5) always, (4) often, (3) sometimes, (2) rarely, (1) never. Accordingly, the researcher regarded as the following aspects when formulating the scale:

- Each domain should have its own particular items
- The items in each domain should precisely reflect the theoretical definition of that domain
- .Each item should have only one explicit meaning
- The items should be obvious and easily understood
- Ambiguous or vague phrases should be avoided

Afterward, the scale's domains were defined and suitable definition was established for each. The item questionnaire (Appendix 1) was then presented to experts to identify the validity and suitability of the researcher's statements for the research topics and their applicability to the research subject matter.

Pilot Tests

The First Pilot Test of the Coaches' Training Process Level Scale

The transparency of instructions the respondents' understanding of phrases and vocabulary and their knowledge of how to answer the questionnaire are all achieved through scientific steps, one of the most important of which is the pilot test. The researcher administered her first pilot

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

test of the scale on a sample of (8) players from Al-Sina'a Club outside the primary research sample on (December 12, 2024). The researcher conducted this first pilot test to determine the following:

-Identifying the challenges the researcher faced when utilizing the scale to the sample and constructing it.

-Establishing the extent to which the players could understand the scale as well as the accuracy of its language and wording

Second Exploratory Experiment

The researcher administered her second exploratory experiment on the training process level scale and the skills tests under investigation using the same sample of players from the first exploratory experiment at Al-Sina'a Club on December 16, 2024. The researcher conducted this second exploratory experiment to ascertain the following: -

The difficulties the researcher encountered when administering the skills tests.

The appropriate time for conducting the tests.

The Main Experiment in Developing a Training Process Level Scale for Coaches

After completing all the initial steps in improving the training process level scale for coaches based on sound scientific principles the scale comprised (46) items, ready for application to the development sample. On Wednesday, December 18, 2024, a group of (50) volleyball players were administered. After verification and examination all forms were found to be valid. Therefore, the researcher compiled the results in formulation for statistical examination

Psychometric features of the training process level scale for trainers

The test was valid

Validity is one of the important scientific cornerstone in testing and measurement. It refers to "the validity or correctness of the test, i.e., whether it actually measures the purpose it is designed for without measuring another function alongside it" (Mustafa et al., 2006, p. 111).

First: Face validity

This type of validity aim to determine the extent to which the scale depicts the aspects to be measured. This type of validity was attained when the scale items were presented to experts and specialists in the field of training science, testing, measurement and volleyball to demonstrate their validity. In addition the researcher found the discriminatory capacity and internal consistency of the scale under study.

Second: Discriminatory Power

After compiling and processing the scale data the researcher organized the raw scores in ascending order from the lowest score to the highest score selecting (35%) of the highest scores and the same percentage of the lowest scores to id the capacity of the two scales to differentiate between the high-level and low-level groups (Al-Kubaisi, 2010, p. 276). Accordingly, the (T)

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

statistical test for unpaired equal samples was used. After statistically processing the data it was found that the scale has (power) of discrimination between the high and low groups as the significance values are less than the significance level of (0.05) at a degree of freedom n1+n2-2.(34) =

Third: Internal consistency of the training process level scale for trainers

The researcher extracted the internal consistency of the two scales using two methods.

➢ It seems that most of the items on the scale are significant except for items (18, 27, 29, 34, 38), which are not significant under the significance level of.(0.05)

➢ It appears that most of the items in the scale are significant, except for item (15), which is not significant under the significance level of.(0.05)

The relationship between a domain score and the total scale score: This includes finding a correlation between the score of each domain and the total scale score for all members of the sample. The aim of this procedure is to identify if a given domain represents the characteristic or phenomenon that the scale measures. Therefore the researcher also used Pearson's correlation coefficient between the total domain score and the total scale score to assess the scale's reliability.

Scale stability

The researcher used the split-half method as "the reliability of the test can be estimated if we know the reliability of its two halves" (Abdul Majeed, 1999, p. 99), and the Spearman-Brown coefficient because the number of items on the scale is even. The researcher also extracted Cronbach's alpha coefficient for the scale, as shown in Table (3). The researcher classified the items on the scale into two halves a first half and a second half and extracted the correlation coefficient between the sum of the scores of the two halves based on Pearson's method.

Table3. *It shows the reliability coefficients of the Training Process Scale for coaches*

Cronbachs Alpha	Split-half method		Scale	No.
	Reliability	Split – half reliability		
0.862	0.746	0.595	Training process level scale for trainees	1

Tests Used in the Research: The Spike Jump from Positions (2, 4) (Shaher, 2023, pp. 48-50)

Main Standardization Experiment

The researcher administered the scale to a standardization sample of (62) players from Sunday, January 12, 2025, to Thursday, January 16, 2025, concerning the level of the training process for coaches. The statements were then arranged non-sequentially to prevent limiting the respondent's focus to one area over another. The questionnaires were collected after a

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

specified period and then systematically rearranged based on each area in preparation for statistical analysis

Main Experiment

The researcher administered the Explosive Power Scale and Test to the main experimental sample of (25) players from Tuesday, January 28, 2025, to Saturday, February 1, 2025. The questionnaires and test scores were systematically collected in design for statistical analysis.

Standard Scores for the Training Process Level Scale for the Standardization Sample:

Standards are a set of scores derived using particular statistical methods from raw scores. They are used to compare the performance level of an individual with that of the group to which they belong. This is achieved by measuring the deviation of any score from the arithmetic mean of that group. An individual's score on a test (raw score) is meaningless in itself and cannot be contrasted with their score on other tests or scales or with another person's score on the same test or other tests, unless it is transformed into standardized scores. Standards are therefore important because they represent how others performed on the test thus providing a basis for comparison (Hasted & C, 1998; p. 73).

The researcher extracted the standardized scores for the scale by transforming the raw scores to standardized scores (Z-scores and modified T-scores), as shown in Table.(4)

Table 4. *It shows the standardized scores (z-scores and t-scores) of the Training Process Level Scale*

T-Score	Z- Score	Raw Score	T-Score	Z- Score	Raw Score
51.98	0.198	135	29.66	-2.03448	107
52.78	0.27773	136	31.25	-1.87502	109
53.57	0.35746	137	35.24	-1.47636	114
54.37	0.43719	138	36.03	-1.39663	115
55.17	0.51692	139	37.63	-1.23716	117
55.97	0.59666	140	38.43	-1.15743	118
56.76	0.67639	141	41.61	-0.83851	122
58.36	0.83585	143	42.41	-0.75878	123
59.95	0.99531	145	43.21	-0.67905	124
60.75	1.07504	146	44.01	-0.59931	125
62.35	1.23451	148	44.8	-0.51958	126
64.74	1.4737	151	46.4	-0.36012	128
67.93	1.79263	155	47.2	-0.28039	129
69.52	1.95209	157	47.99	-0.20066	130
70.32	2.03182	158	48.79	-0.12093	131
73.51	2.35075	162	49.59	-0.04119	132
			50.39	0.03854	133

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Presentation and Discussion of the Standard Levels for the Training Process Level :Scale for the Standardization Sample

After identifying that the sample is normally distributed using the skewness coefficient and after obtaining its standard scores the researcher used the Gaussian curve. This is an objective method for estimating scores and is one of the predominant distributions in physical education because many of the qualities measured in this field are normally distributed (Marqas, 2001, p. 94). The Gaussian curve consists of (6) standard levels because the standard scores expand to (6) deviations: three to the right of the arithmetic mean and three to the left of the arithmetic mean. This corresponds to six standard scores each associated to one standard level. The standard levels are determined using the normal distribution curve through the following steps:

✓Finding the arithmetic mean and standard deviation of the raw scores.

✓We plot the mean of the raw scores against the mean of the standardized g-score (0) or the adjusted t-score.(50)

✓We insert the mean of the raw scores to their standard deviation and to three deviations to the right of the curve.

✓We deduct the standard deviation from the mean of the raw scores and to three deviations to the left of the curve.

✓This gives us (7) standard levels, as shown in Table.(5)

Alternatively there can be (5) levels by integrating the two levels at the midpoint of the curve. This midpoint would then represent (68.27%) of the standard percentages under the .(5) curve, as shown in Table

Table 5. *It shows the standard levels and percentages used in the study*

Standard levels	Very good	Good	Average	Acceptable	Weak	Very weak
Standard percentage	%2,14	%13,59	%34,13	%34,13	%13,59	%2,14

Therefore, the researcher selected six levels. When the standardized scores were distributed across the adopted levels, the standard levels were obtained, as shown in Table (6).

Table 6. *It shows the levels and their assigned percentages in the normal distribution, as well as raw scores, standardized scores (z-scores and t-scores), number of cases, and percentages for the Training Process Level Scale*

Proportional percentage in the normal distribution	**Raw score**	**Standard score limits**	**Standard score limits**	**Sample size**	**Percentage**
very good %2,14	and above -158	-2.03	-70.32	2	%3.22

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

good %13,59	146 -157	1.07 -1.95	60.7 -69.52	6	%9.67
Average %34,13	133 -145	0.03 -0.99	50.39 -59.95	20	%32.25
%34,13 Acceptable	120 -132	0.99-- 0.041	40.0 -49.59	23	%37.09
weak %13,59	108 -119	1.87--1.15	31.25 -38.43	10	%16.12
very weak2.14	107	And below-2.03	And below 29.66-	1	%1.61

Table (6) shows that the percentages of standard levels demonstrated by the sample on the research scale when measured on the normal distribution curve were higher than the percentages specified in the normal distribution for some levels extracted by the researcher, and lower than their consistency percentages in the normal distribution.

The researcher detected that the sample results were confined to the following levels: (Very Good, Good, Average, Acceptable, Weak and Very Weak), as follows:

✓Very Good Level: The percentage of players was higher than their consistency percentages in the normal distribution.

Good Level: The percentage of players was lower than their conformity percentages in ✓ .the normal distribution of the research scale

Average Level: The percentage of players was lower than their corresponding percentages ✓ .in the normal distribution of the research scale

Acceptable Level: The percentage of players was higher than their corresponding ✓ .percentages in the normal distribution of the research scale

Weak Level: The percentage of players was lower than their corresponding percentages in ✓ .the normal distribution of the research scale

✓The level is very weak: The percentage of players was lower than the percentage anticipated in the normal distribution in the research scal

Discussion of the results of the standard levels of the training process level scale

The coaches' level was considered appropriate based on the sample's responses to the training process level scale. The researcher characteristics this to the fact that the training process level requires experience, continuous work, study and knowledge throughout the sports season. To guarantee an accurate assessment of the training process's effectiveness and to help players reach their highest levels of achievement, coaches must always possess in-depth theoretical knowledge of all the game's requirements. This aligns with what Mansour and Hashem (2007, p. 76) indicated: that raising the level of achievement and ensuring an accurate assessment of the training process's effectiveness requires continuous knowledge of the elements of the players' physical, technical, tactical, psychological and intellectual training state as well as their responsiveness and fulfillment of the basic duties of the preparation phases which aim to bring the individual to the highest levels of achievement in their specialized activity.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Presenting and discussing the relationship and contribution percentage between the training process level scale and explosive skill power.

To achieve the third aim of the study the researcher presented Pearson's simple correlation coefficient between (training process level and explosive skill power) to explain the relationship between the scale and explosive skill power. Furthermore the researcher used linear regression using the Enter method to measure the contribution percentage of each of these variables to the training process level.

Presenting and discussing the relationship and contribution percentage between the training process level and the spike jump test from positions**.(4 ,2)**

Table7. *Shows the Partial Correlation Coefficient and the Contribution Ratio of the Training Process Level to the Running Spike Jump Test from Positions (2-4)*

Variables	Mean	Standard deviation	Correlation coefficient	Contribution ration	Adjusted contribution ration	Calculated F value	Value T	Significance value
Scale	139.1600	8.12240	.5330	0.284	2.53	9.121	1.477	0.006
Spike jump test	7.8625	1.65596					3.020	

less than the significance level of (0.05). This verifies the existence of the relationship between them with a contribution percentage of (0.284). The researcher attributes this to the fact that the coach controls most of the variables influencing the training process by following the correct methods and techniques that influence the player's physical and motor abilities as well as technical skills including the smash. Like other skills the smash needed continuous attention and training based on prior data and information about the player, as well as the opponent, identifying the players' strengths and weaknesses, and working to improve the strengths and address the weaknesses. The training that players undergo, especially recently relies on the development of the game in terms of offensive skills. The coach always works to create new exercises depending on what he attends in courses and using software that delivers him with everything new. Physical exercises also play a role. Influence on the intelligence and cognitive achievement of coaches (Phillip & Jack, 2008, p. 111, p. 131) indicates that physical exercises have an effect on the intelligence and cognitive achievement of players and coaches, as physical exercises facilitate the necessary steps for selection, maintain and orientation towards the goal. Performing the smashing skill requires a high use of explosive power of the arms and legs to push off the ground and jump upwards, allowing the player to hit the ball. This is what Susan Jadou' confirmed: "The importance of the explosive power of the arms for the smashing skill comes from the fact that the technique of

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

the skill requires, directly the explosive power of the arm muscles to perform a strong and effective hit" (Jadou', 2001, p. 105).

Conclusions

✓A scale was improved to reveal the level of the coach's training process.

✓The level of the training process requires experience, continuous work and knowledge throughout the sports season.

✓To increase the level of achievement and accurately assess the training process, continuous knowledge of the components of the training situation is required.

✓The coach controls most of the variables that impact the training process by following the correct methods and techniques that influence the player in one way or another in terms of physical, technical, and motor skills as well as technical skills including the spiking skill.

✓Explosive power plays important role in the success of the spiking skill in volleyball.

(1) Appendix

The scale in its final form.

Sport culture :The first domain

No.	Items	always	often	sometimes	rarely	never
1	The coach contributes to the development of the player's cultural level.					
2	The coach encourages respect for the opponent, regardless of victory or defeat.					
3	The coach always urges continuous training and hard work instead of anger and fanaticism.					
4	The coach always fosters positive and interconnected relationships among the players					
5	He promotes himself through media outlets.					
6	I feel that the coach's confidence in the substitute player increases his determination.					
7	My coach has the ability to bear all the reasons for failure and defeat.					
8	My coach has the ability to manage the players' emotions, which has a positive impact.					

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

9	. My coach has interests in other areas that affect his coaching performance.					

The Second Domain: Knowledge of the Psychological Aspect

No	Items	always	often	sometimes	rarely	never
10	He possesses the ability to unlock the player's potential during the match.					
11	He has the ability to use strategies that help players overcome psychological pressure during training and matches.					
12	He possesses sufficient knowledge of sports psychology.					
13	He is able to provide continuous psychological support to players by offering feedback and constructive criticism.					
14	He uses various techniques and methods that contribute to strengthening the relationship between players, thus ensuring effective performance on the field.					
15	He has the ability to teach players how to recover from defeats, quickly overcome mistakes, and positively utilize past experiences.					
16	He possesses expertise in identifying players' psychological problems that affect performance and providing them with appropriate support					

The Third Domain: Knowledge of Sports Training

No	Items	always	often	sometimes	rarely	never
17	He uses a variety of compound exercises to improve his players' performance.					
18	He ensures a gradual progression in exercises, from easy to difficult and from simple to complex.					
19	He considers the individual differences between players during training and works to minimize these differences.					
20	He utilizes modern scientific techniques in the training process.					
21	He has the ability to develop playing strategies that suit his team and opponents.					
22	He is able to guide players on how to act appropriately in different situations.					
23	He monitors players' nutrition and ensures they get adequate rest to maintain a healthy lifestyle.					

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

24	He has the ability to prepare players physically before competitions.					
25	. He designs training programs aimed at improving performance efficiency in all its aspects.					

The Fourth Domain: Knowledge of Sports Teaching and Learning

No	Items	always	often	sometimes	rarely	never
26	He works on strategic planning and adds expertise and knowledge in sports information as a method for generating knowledge.					
27	He has the ability to search for up-to-date information from sources and the internet.					
28	He works to benefit from the experiences and expertise of those working in sports institutions and organizations.					
29	Reading and scientific discussions provide him with cognitive skills.					
30	He has the ability to acquire modern and advanced knowledge to update the training process.					
31	Periodic tests enable him to assess his knowledge in comparison with others.					

The Fifth Domain: Knowledge of Sports Analysis and Statistics

No	Items	always	often	sometimes	rarely	never
32	He works on collecting and analyzing data related to team and player performance to identify strengths and weaknesses.					
33	After each match he analyzes the team's data and performance to improve the team's level and reduce errors.					
34	He is able to analyze the tactical performance of his own team and the opposing team during the match.					
35	He uses past data and statistics to predict the team's future performance and results.					
36	He analyzes the players' performance levels periodically to adjust training programs.					

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

37	He performs sports analysis and statistical analysis of individual players' performance to provide accurate feedback that allows them to better understand their performance.					
38	Gathers data on competing teams and analyzes their performance for comparison and to develop tactical plans to exploit the weaknesses of the competition.					

The Sixth Domain: Knowledge of Sports Laws and Regulations

No	Items	always	often	sometimes	rarely	never
39	He is familiar with all the official rules of the game.					
40	He knows the rules and regulations concerning the use of equipment such as the ball, net, court dimensions, etc.					
41	He stays up-to-date with the latest updates to the rules of the game issued by the International Federation and local federations.					
42	He is familiar with the regulations concerning doping and ensures that team players adhere to testing procedures and avoid prohibited substances.					
43	He is knowledgeable about the procedures and conditions related to player contracts and transfers, and how to manage relationships with the club and team					
44	He is familiar with the disciplinary regulations governing player conduct during matches and training, and the penalties imposed on violators. 45. He is knowledgeable about the rights of players and his/her duties and responsibilities.					
45	. He is knowledgeable about the rights of players and his/her duties and responsibilities.					

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

46	. He/She continuously educates players and assistants about new rules, regulations, and updates, and ensures compliance.					

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

The Effect of Motor Control Exercises on Certain Physical Variables and The Accuracy of Forehand and Backhand Stroke Skills in Table Tennis Players Under 13 Years Old

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DOI:
https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2481
https://creativecommons.org/licenses/by/4.0/
Article history: Received 7/April/2026; Accepted 9/April/2026; Available online 28/October/2026

Abstract

Table tennis is an individual sport that demands precise timing rapid movement diversity and exceptional hand eye coordination. The Success in this discipline requires athletes to execute coordinated fast paced and directionally variable movements within confined court spaces while maintaining fluidity and focus. The particularly critical for fundamental skills such as the forehand and backhand strokes. The study aimed to evaluate the efficacy of specific motor control exercises on physical capabilities and the accuracy of forehand and backhand strokes among specialized school table tennis U13 years old. The researchers employed a controlled experimental design utilizing pre test and post test measures across experimental and control groups. The sample consisted of 14 players U13 . Following the development of a motor control training regimen baseline tests were administered. The intervention was applied over a two month period followed by post-intervention testing. Statistical analysis indicated that the motor control protocol significantly enhanced movement speed motor response time eye arm coordination and the accuracy of both forehand and backhand strokes. Consequently the study recommends incorporating motor control exercises into training programs to optimize motor speed response mechanisms coordination and stroke precision for juvenile table tennis players.

Keywords: table tennis, motor control training, physical capabilities, motor response speed, eye-hand coordination, skill accuracy, forehand and backhand strokes, under-13 players, specialized schools.

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Introduction

Modern table tennis is an individual sport consisting of fast-pacing motor responses, precise timing and high adaptability to sensorimotor perturbations within a limited space. The modern competition is fast-paced and multidirectional, where the player must assimilate visual information under time pressures (< a few hundred milliseconds), process tactical solutions and dynamically execute complex movement patterns in response (Chen & Wang, 2021; Müller & Abernethy, 2020). Forehand and backhand strokes constitute the foundation of offensive and defensive action in the game because the performance is predicated on effective coupling of neural pathways, musculo-skeletal coordination along with consistent motor accuracy yield under dynamic conditions.

Due to the under 13 years age group being at its peak for neural plasticity which is a critical period of motor and neurological maturation (Al-Fatlawi & Kareem, 2024; Zhang et al., 2022) athletes in this pathway are best determined for more complex motor patterns, creating stable neuromuscular connections. However examples of traditional training methods do continue to separate skill repetition from movement scenarios that can limit transfer to the field (Al-Obaidi & Al-Saadi, 2023; Hasan & Khalaf, 2022). Ambitious introductions of motor control principles in the educative processes involved in select training regimens with three frequently optimized (or compromised) movement capacities (shot precision as well as delay in and quality of adaptive response under competition conditions) exist at talent development academies based on field observations. (Abdul-gani et al., 2024).

To fill this educational and scientific void, the present study aimed to design and implement a unique motor control training intervention for young table tennis players (U13). The aims are (1) to create game specific age-appropriate alternative motor control exercises, (2) observe the effects on selectively chosen physical and physiological variables, (3) see improvements in training group forehand and backhand accuracy with a comparison to a control group following a traditional approach. We hypothesized that the group receiving the experimental motor control protocol would show significantly greater improvements in reaction time, limb speed, eye-hand coordination and skill accuracy outcomes compared to those in the control group. The study was performed in the National Center for Sports Talent Development of Table Tennis in Baghdad from November 2025 to January 2026. (Kadhim & Mahmood, 2023).

Table tennis as we know it today is a low-latency high-speed individual sport featuring rapid readiness motor responses and exact timing (but poor spatial awareness) as well after-the-fact sensorimotor adjustment to timed simulated trajectories. Contemporary competitions are often characterized by quick multi directional rallies able to assess how individuals process visual information and respond tactically or execute a motor action under tight fraction of second time pressure (Chen & Wang 2021; Müller & Abernethy 2020). The forehand and backhand strokes are a base for the performance of aggressive and defensive in the game

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

building on success through functional integration between neural pathways musculo-articular coordination and patterns of motor precision under constantly varying dynamic conditions (Wahed Issa et al., 2024; Kadhim& Mahood, 2023).

The youth age under 13years is a key time period for motor and neurological development and athletes competing in this period have been shown to acquire complex motor patterns and stable neuromuscular connections (Al-Fatlawi & Kareem, 2024; Zhang et al., 2022) since from this moment on neural plasticity reaches its maximal levels. But still, training workshops on using these skills in a separated context from the functional movement one (from where they originated) still remains a dominant practice and lead to restriction of transfer gain only on field performance (Al-Obaidi & Al-Saadi, 2023; Hasan & Khalaf, 2022). Methodological issues in acquirement of shot accuracy, slow adaptive responses and poor sensorimotor integration interacting during competition situations on the field are face due to limiting motor learning protocols to talent development academies. (Issa et al., 2024)

Method and Materials

The design selected for the study was a two-group (experimental and control) design with pre-test post-test, which is particularly appropriate to examine the effect of an independent variable (motor control exercises), on dependent variables while controlling other confounding variables (Campbell & Stanley, 1963). This design enabled a strong pre vs post intervention comparison to be conducted, thereby augmenting the internal validity of the conclusions.

Population And Sample

The study sample included 18 players of both genders; they were under 13 years old, and registered at the National Center for the Development of Sporting Talent in Table Tennis (Baghdad), all within the competitive season (2024–2025). A random sampling method was applied and 14 players (77.7% from the population) were selected and randomly divided into two equal groups, an experimental group (n=7) and a control group (n=7). To ensure pre-test homogeneity, a skewness analysis was conducted for the variables of weight, height, and age; the results showed that all values did not exceed (±1), indicating a normal distribution and high homogeneity among the sample members (Table 1). Players with recent musculoskeletal injuries or intermittent training experience were excluded to ensure homogeneity in training background.

Table 1. *Homogeneity of the Research Sample in Demographic and Basic Physical Variables*

Variable	Unit	Mean	Median	Standard Deviation	Skewness Coefficient
Body Mass	kg	46.82	46	3.571	0.688
Height	cm	154.33	154	6.804	0.145
Age	year	12.16	12	0.885	0.542

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Equipment and Tools Used

Physical Equipment and Tools

- Regulation table tennis paddles (10).
- Standard table tennis tables (4).
- Official balls approved by the International Table Tennis Federation (50).
- Kisia digital stopwatches (2).
- Digital heart rate monitor and pulse oximeter.
- Dell laptop and Sony video analysis monitor.
- Measuring tape, medical scale, and cones.
- Automatic ball-throwing machines with adjustable speed and timing.

Tests Used and Their Scientific Description

The tests were selected based on a review of the literature and were presented to a committee of experts (n = 15) in the fields of training assessment and table tennis those tests that achieved an agreement rate of large than 80% were adopted. The scientific basis of the tests was verified as follows:

First: Physical and Motor Tests

1. Motor Response Time Test (Nelson): Measures the ability to respond quickly to a visual stimulus. The subject stands in the center of a 20×2-meter area. The examiner gives a visual signal (moving their arm to the right or left), and the player sprints at maximum speed toward the opposite sideline and stops the clock. The fastest time from three attempts in each direction is recorded. The reliability coefficient is r = 0.825, and the objectivity coefficient is r = 0.914.
2. Hitting Arm Speed Test : Measures the speed and accuracy of the offensive response . The ball-serving machine is set to a speed of 6 m/s and serves 10 balls at one-second intervals. Performance is scored based on accuracy of landing on the opponent's table (2 points for a correct ball, 1 point for a mis-hit, 0 for a miss). The maximum score is 20 points. Reliability coefficient (r = 0.881).
3. Arm–Eye Coordination: A measure of sensorimotor integration through throwing and catching a tennis ball against a wall 5 meters away (right-to-right, left-to-left, opposite hand) Maximum score: 15. Correlation coefficient (r = 0.863).
4. Test of Agility: a test to measure the ability to change direction rapidly. Rectangular course (4×3×4.80 m); time expressed in seconds Reliability coefficient (r = 0.895).
5. Dynamic Flexibility Test (Lower & Lateral Touch) Allows to measure the range of motion of the spine and lower joints through flexion-extention-rotation movements of

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

the trunk, trying to touch specific markers using a special scale in less than 30 seconds. Correlation coefficient (r = 0.887).

Second: Skill Tests

1. Forehand Accuracy Test: The opponent's half of the table is divided into 5 zones using tape. The player hits 15 forehands on balls served at an average speed. Points are awarded based on landing accuracy (5 points for the center zone decreasing to 1 point for the outer zones) Correlation coefficient (r = 0.886).
2. Backhand accuracy test: The protocol is repeated with the backhand (10 attempts) Only successful attempts are counted Correlation coefficient (r = 0.891).
   Scientific foundations of the tests
   - Validity: Content validity was assessed by presenting the tests to subject matter experts tests that achieved an agreement rate of ≥80% were adopted.
   - Reliability: A test-retest method was applied after 3 days and Pearson's correlation coefficient was calculated, with values ranging from 0.825 to 0.895 all of which were statistically significant at the ≤0.05 level indicating high reliability.
   - Objectivity: The inter rater reliability coefficient was used during the re-application with values ranging from 0.906 to 0.946 reflecting the clarity of the instructions and the objectivity of the recording.

Pilot Study

Before the main study, a couple of pilot studies were conducted in which:

1. 10 & 13 November, 2025: Pilot of sample (n=4) to assess tests efficiency in relation to the equipment; support-team capability and determine time needed.
2. November 15th, 2025: to make evaluation difficulties with the exercises, how much and when they'll occur and wherein the education devices fit. The results of the current investigation required a slight adjustment, in that the rest periods between repetitions were modified to avoid the accumulation of lactic fatigue.

Main Study Procedures

- Baseline Tests: Performed on November 25, 2025 after the completion of a pretest standardized warm-up (10 minutes), and once environmental conditions and the experimental procedure were stable.
- Intervention: Trained for 3 times a week (24 total sessions between November 26, 2025 and January 26, 2026) on Friday Monday Wednesday. The core focus of the session was from 15 to 20 minutes post warm-up and consisted of motor control and flexibility exercises: cross-coordination exercises; cognitive: timing exercises

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

using visual cueing rapid reorientation cerebral cortex stimulation progressive kinetic chain movements. Control did the traditional training routine (general physical conditioning, skill repetition, aerobic fitness) but without systematic motor control elements.

- Post-tests: After the training, on January 27, 2026; same conditions as pre-test to ensure measurement. See Appendix (1)

Statistical Methods

The SPSS statistical package, version 27, was used, and the following tests were applied:

- Percentage, mean,standard deviation, median and skewness coefficient
- For reliability and validity Pearson's correlation coefficient
- t-test for the independent samples (for equivalence and comparison of pre- and post-tests).
- Paired samples t-test (within groups, pre- and post-test differences)
- Measure of the strength of association in terms of effect size (Cohen's d).

Results

Table 2. *Analysis of Pre-Test Equivalence Between the Two Groups*

Variable	Experimental Group (M ± SD)	Control Group (M ± SD)	Calculated t-value	Sig.	Significance
Motor Response Speed	4.12 ± 0.182	4.17 ± 0.265	0.381	0.212	Non-significant
Striking Arm Speed	15.92 ± 0.753	15.74 ± 0.911	0.373	0.245	Non-significant
Visual-Motor Coordination	6.38 ± 1.214	6.25 ± 1.087	0.195	0.368	Non-significant
Forehand Stroke Accuracy	45.82 ± 3.577	45.68 ± 4.375	0.060	0.295	Non-significant
Backhand Stroke Accuracy	5.11 ± 0.927	5.17 ± 0.811	0.119	0.277	Non-significant

Table 3. *Pre–Post Differences for the Experimental Group*

Variable	Pre-test (M ± SD)	Post-test (M ± SD)	Mean Difference	t-value	Sig.	Cohen's d
Motor Response Speed	4.12 ± 0.182	3.65 ± 0.086	0.47	8.545	0.000	3.12
Striking Arm Speed	15.92 ± 0.753	8.42 ± 0.914	7.50	10.121	0.000	8.91
Visual-Motor Coordination	6.38 ± 1.214	11.62 ± 0.843	5.24	9.065	0.000	5.02

Table 4. *Pre–Post Differences for the Control Group*

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

Variable	Pre-test (M ± SD)	Post-test (M ± SD)	Mean Difference	t-value	Sig.	Cohen's d
Motor Response Speed	4.17 ± 0.265	3.98 ± 0.052	0.19	3.166	0.005	0.92
Striking Arm Speed	15.74 ± 0.911	12.26 ± 1.747	3.48	5.989	0.002	2.15
Visual-Motor Coordination	6.25 ± 1.087	8.13 ± 1.153	1.88	5.053	0.002	1.68
Forehand Stroke Accuracy	45.68 ± 4.375	50.95 ± 3.417	5.27	4.870	0.003	1.42
Backhand Stroke Accuracy	5.17 ± 0.811	6.23 ± 0.581	1.06	3.408	0.005	1.49

Table 5. *Post-Test Comparison Between the Two Groups*

Variable	Experimental Group (M ± SD)	Control Group (M ± SD)	t-value	Sig.	Significance
Motor Response Speed	3.65 ± 0.086	3.98 ± 0.052	8.250	0.000	Significant
Striking Arm Speed	8.42 ± 0.914	12.26 ± 1.747	4.776	0.003	Significant
Visual-Motor Coordination	11.62 ± 0.843	8.13 ± 1.153	5.986	0.001	Significant
Forehand Stroke Accuracy	61.39 ± 2.571	50.95 ± 3.417	5.982	0.001	Significant
Backhand Stroke Accuracy	7.85 ± 0.624	6.23 ± 0.581	4.668	0.003	Significant

Discussion

Results of the tests its can observe that the control group demonstrated statistically significant improvement throughout all variables, which is a reasonable expectation due to the multiplying effects of repeated training, direct supervision and natural physiological adaptation spanning at least two months. This correlates with the principle of skill repetition, which sets up fundamental motor patterns devoid of complexity at a neural level to produce refined coordination and sensorimotor processing speed. Some of the latest findings suggest that there is no optimal transfer from traditional training in high-speed sports as it underlines quantity over motor quality (Al-Obaidi & Al-Saadi, 2023; Hasan & Khalaf, 2022).

Jumps in the Experimental Group: The Mechanisms Neuro-Motor Control

The experimental group performed much better; in fact, the difference is statistically significant and substantial, an indication of the systematic nature of the intervention. This is due to a neurological and biomechanical pathway involving multiple mechanisms:

1. Motor cortical reorganization Guided ,active motor control engage in areas of the primary motor cortex and cerebellum, which induce new neural pathways to be formed, facilitate speed of signal transmission between the central nervous system and target musculature (Al-Fatlawi & kareem,2024).
2. Enhanced sensorimotor feedback: That is high-precision timing and fast reorientation exercises help improve the ability of visual perception and motor response, reduce reaction time, and accurately correct the movement during performance (Chen & Wang, 2021).

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

3. Motor chain linkage optimization: The exercises focus on trunk, arms and hands, and feet synergy (Zhang et al., 2022), by developing through functional exchange of kinetic energy and reducing the loss of energy caused by dissociative movements between strokes.
4. Neuromuscular flexibility: Improved with assignment to progressive training for higher velocity and coordination of muscle action which is more efficient (Müller & Abernethy, 2020).

All these results support the last trends in sports training science emphasizing that a systematic introduction of motor control into youth training programs either shortens practice time demands or decreases motor variability, both of which increase athlete preparedness for fast-paced competitions (Al-Obaidi & Al-Saadi, 2023; Hassan & Khalaf, 2022).

Scientific Comparison and Training Applications

The comparison shows a rather tangible performance benefit for the experimental group, attesting to the pedagogical benefits of the protocol. In practical terms, one should incorporate motor control exercises in the first stages of the training session (Right after the warming up phase), where difficulty is still low and deterioration of learning acquisition functions due to fatigue or some other external causes are non-existent yet. Additionally, multidirectional visual and auditory stimuli should also be utilized to mimic what would happen in the actual game, therefore maximizing the positive transfer from training to performance. (Abdulameer & Ismail, 2024)

Limitations and Future Directions

Despite the robustness of the results, limitations of the study included a small sample size (n=14), a short intervention length (8 weeks) and that long-term effects on health behaviors after completion of the program were not measured. In addition, due to the lack of some three-dimensional biomechanical analysis, it is difficult to accurately interpret movements using field tests. Thus, future researches comparing motor control protocols (ecological, dynamic, cognitive) to identify the most suitable one for each age group and skill level suggested with advanced motion analysis improvement; larger sample studies and tracking of players performance by a competitive season long retention.

Conclusions

1. The targeted motor control program produced significant changes in specifically selected physical, physiological and skill-related variables in table tennis players aged under 13 years.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

2. Scores for motor reaction time, swing speed, eye-hand coordination and accuracy of forehand and backhand strokes in the experimental group were significantly higher and with large effect sizes compared to the control group.
3. Motor Control Training (MCT) is a fundamental methodological pillar of the preparation for young athletes since it promotes neuromuscular adaptation, increases the accuracy of sports skills and therefore increases their readiness to compete in high-velocity racket-based sports.

Recommendations

1. Regularly implement as part of training programs for developing table tennis players by dedicating 15–20 min of each training session to guided functional movement exercises.
2. Utilize movement protocols that are sequential and cognitively challenging to enhance neuromuscular response rate, reaction time, stroke refinement in critical periods of athletic maturation.
3. Coach others on how to use basic principles of neuromuscular control and perform exercises in such a way that they mimic the competitive environment, utilizing multidirectional and time-variable stimuli.
4. Longitudinal approaches to investigate transfer of motor intervention effects to real-life competition performance and potential prevention of musculoskeletal injuries in younger age-groups.

Appendix

Motor Control Exercises for Table Tennis Players

No.	Exercise	Objective	Performance Method	Equipment
1	Balance with Hitting	Improve balance and neuromuscular control	Stand on one foot while hitting the ball with the racket alternating feet every 10 hits	Racket, ball, table tennis table
2	Wall Ball Passing	Develop hand eye coordination	Hit the ball toward the wall and control its rebound	Racket , wall ball
3	Motor Timing Exercise	Improve timing and accuracy	Hit the ball after only one bounce	Racket, table tennis ball , table tennis table
4	Side Movement	Develop agility and motor control	Move right and left while hitting the ball	Racket, table tennis ball , table tennis table
5	Hitting Toward Targets	Increase motor accuracy	Direct strokes toward specific targets on the table	Racket , table tennis ball, cones
6	Grip Change	Improve neural control	Change the racket grip during slow rallies	Table tennis racket , table tennis ball
7	Toss and Hit	Develop motor coordination	Toss the ball with the free hand, then hit it	Table tennis racket , table tennis ball

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

8	Backhand Only	Develop backhand stroke control	Use only the backhand side during play	Table tennis racket , table tennis ball , table tennis table
9	Rotation Before Hitting	Link body movement with the stroke	Perform a half-turn rotation before hitting the ball	Table tennis racket , table tennis ball
10	Force Control	Improve force perception	Hit the ball using different force levels	Table tennis racket , table tennis ball
11	Forward and Backward Movement	Control longitudinal movement	Move forward and backward while hitting the ball	Table tennis racket , table tennis ball , table tennis table
12	Quick Response	Improve reaction speed	Respond to the coach's signals during play	Table tennis racket , table tennis ball
13	Movement Around the Table	Improve control during movement	Move around the table while continuously hitting the ball	Table tennis racket , table tennis ball
14	Ball Height Control	Improve trajectory accuracy	Perform strokes with different ball heights	Table tennis racket , table tennis ball
15	Timed Speed Exercise	Increase speed and coordination	Hit the greatest possible number of balls within a set time	Table tennis racket , table tennis ball , stopwatch
16	Irregular Rebound	Develop motor adaptation	Hit the ball after rebounding from an inclined surface	Table tennis racket , table tennis ball , inclined board
17	Sudden Direction Change	Improve neural control	Change the direction of the stroke suddenly	Table tennis racket , table tennis ball
18	Spin Control	Control ball spin	Perform strokes with topspin and backspin	Table tennis racket , table tennis ball
19	Non-Dominant Hand	Stimulate the nervous system	Hit the ball using the non dominant hand	Table tennis racket , table tennis ball
20	Combined Exercise	Achieve advanced motor coordination	Perform a light jump followed by a direct stroke	Table tennis racket , table tennis ball

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

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Volume 38 –Special Issue– 2026 Open Access

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

An Analytical Study Using the Player-Maker Device of Some Physical Variables of Midfielders and Attackers of Al-Karkh Football Club Under (19) Years Old

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DOI:
https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2283
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Article history: Received 21/April/2025; Accepted 5/May/2025; Available online 28/October/2026

Abstract

The research aims to identify the values of physical variables and their differences according to the Player-Maker device for the performance of midfielders and attackers in matches of the Iraqi Youth League Under (19) years old. The main experiment was conducted in the Iraqi League on a sample of Al-Karkh Sports Club youth players, including the midfield and attack positions. The researcher used a descriptive approach with a comparative approach. The statistical package (SPSS) was used to extract the results (Mean), (Std-Deviation), and (One-Way ANOVA). The researchers concluded that there were no significant differences in the playing levels of Al-Karkh Club in terms of the value of the physical variables studied. This indicates that playing levels and performance did not improve during matches against Al-Ittihad, Al-Kahraba, Al-Zawraa, Al-Talaba, and Amanat Baghdad clubs. The researchers recommend using the Player-Maker device in futsal to extract other physical variables, and to use the device in many other games, such as basketball, handball, and others, to extract many physical variables.

Keywords: Work rate, distance covered, back turns.

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

Football is a team sport characterized by high dynamism and a wide range of physical, technical and tactical demands with roles and responsibilities varying from one position to another, which requires players to develop specific abilities suited to their positions on the pitch. Midfielders and forwards are among the players most exposed to physical strain during a match given the nature of their roles which require constant movement, switching positions and participation in both attacking and defensive play (Bangsbo, Mohr, & Krustrup, 2006). Furthermore, the physical demands of football vary considerably between different positions. For example, midfielders are required to cover considerable distances during matches combining aerobic endurance with high-intensity efforts to transition between defense and attack (Bradley et al., 2013). In contrast, forwards rely heavily on explosive acceleration rapid changes of direction and short-distance sprints to outmaneuver defenders and capitalize on scoring opportunities (Buchheit et al., 2010). This requires advanced physical attributes such as speed, aerobic and anaerobic capacity balance coordination and agility alongside the technical skills that help them create and score goals. With the growing interest in the scientific analysis of sporting performance, there has been an increasing need for advanced tools and technologies that provide accurate quantitative data on players' physical and technical performance. Among these tools, the Player-Maker device has emerged as one of the most important modern technologies used to track and analyses players' performance. The device is characterized by its ability to record and analyse accurate and detailed data via sensors attached to sports shoes enabling the tracking of foot movements and the recording of the number of passes distances covered speeds accelerations and precise movement patterns during training or competitions. (Rein & Memmert, 2016).

The device also enables coaches and analysts to produce comprehensive reports on players performance helping them to improve training methods and identify each player's strengths and weaknesses. The analysis of physical variables takes on particular importance among young people, such as those under 19, as this age group marks a pivotal transitional phase between grassroots development and entry into the professional game. Understanding the physical capabilities of players at this stage helps coaches design appropriate training sessions that ensure optimal Improvement of physical performance and reduce the likelihood of injury resulting from unbalanced training loads (Dellal et al., 2010). Furthermore, analysing performance by position helps to tailor training to the specific requirements of each position which contributes to preparing players capable of meeting the demands of modern football characterised by speed and high pressure.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

It is against this backdrop that the importance of this study arises it aims to analyse certain physical variables among the midfielders and forwards of Al-Karkh Club's Under-19 team, using the 'Player-Maker' device by monitoring variables that are key indicators in performance assessment such as the number of accelerations and decelerations, distances covered in different areas of the pitch, and the frequency of high-intensity running. The findings of this study are expected to provide a realistic picture of these players' physical performance levels supply the coaching staff with accurate information to help improve training and match planning and support modern trends in the use of digital analysis in the preparation of sports teams.

Method and Tools

The researchers employed a descriptive approach using a comparative method, and the research sample was selected using a purposive sampling method, comprising 6 to 8 players representing the midfield and attack positions for Al-Karkh Sports Club for the 2024–2025 season, depending on the substitutions made in each match; these players constituted 100 per cent of the players in those positions.

The pilot studies

was conducted on Sunday, 1 December 2024, at 5.00 pm with the support team (*) on six players who were purposively selected from the research population.

The main experiment

was then conducted over five matches, running from Saturday 7 December 2024 to Friday 31 January 2025. The device (*) was attached to the players' feet and operated during the matches in order to analyse the players' performance and record physiological variables.

Statistical methods

The SPSS statistical package was used to calculate the mean standard deviation and to perform a one-way ANOVA.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Results

Table1. *shows the means, standard deviations and ANOVA results for the physical variables*

Descriptives					ANOVA				
variables	**Clubs**	**N**	**mean**	**SD**	**Between groups Within groups**	**SS**	**MS**	**F**	**Sig.**
Playing time (minutes)	Al-Zawraa	7	77.14	23.21					
Distance covered (km)	Al-Ittisalat	6	88.33	4.08	Between	2848.05	712.01		
	Amanat Baghdad	6	90.00	.000				2.199	.095
	Al-Kahrabaa	8	67.50	28.66	Within	9064.19	323.72		
	Al-Talaba	6	90.00	.000					
	Total	33	81.52	19.29	Total	11912.24			
	Al-Zawraa	7	6.90	2.47					
Work rate	Al-Ittisalat	6	7.77	1.44	Between	26.97	6.74		
	Amanat Baghdad	6	8.27	.709				1.827	.152
	Al-Kahrabaa	8	5.89	2.58	Within	103.32	3.69		
	Al-Talaba	6	6.18	1.22					
	Total	33	6.93	2.02	Total	130.29			
(m/min)	Al-Zawraa	7	92.01	7.32					
	Al-Ittisalat	6	91.35	4.78	Between	335.00	83.75		
	Amanat Baghdad	6	95.64	7.30				1.914	.136
	Al-Kahrabaa	8	87.54	7.74	Within	1225.03	43.75		
	Al-Talaba	6	86.72	4.56					
	Total	33	90.50	6.98	Total	1560.03			
Back turns (repetitions)	Al-Zawraa	7	53.00	17.45					
	Al-Ittisalat	6	56.67	14.50	Between	2316.47	579.12		
	Amanat Baghdad	6	49.50	15.11				2.269	.087
	Al-Kahrabaa	8	40.88	19.10	Within	7147.71	255.28		
	Al-Talaba	6	33.00	10.71					
	Total	33	46.45	17.20	Total	9464.18			

DF = 4 + 28 = 32… significant at (Sig) ≤ (0.05).

Table2. *shows the LSD (Least Significant Difference) values for the physical research variables*

Physical variables / First leg	**Clubs**		**Mean Differences**	**Sig.**	**Significance.**
Playing time (minutes)	Al-Ittisalat	Al-Kahrabaa	20.83*	.041	Al-Ittisalat
	Amanat Baghdad	Al-Kahrabaa	22.50*	.028	Amanat Baghdad
	Al-Kahrabaa	Al-Talaba	-22.50*	.028	Al-Talaba
Distance covered (km)	Amanat Baghdad	Al-Kahrabaa	2.38*	.030	Amanat Baghdad

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Work rate (m/minute)	Al-Kahrabaa	Al-Kahrabaa	8.10*	.031	Amanat Baghdad
		Al-Talaba	8.92*	.027	Amanat Baghdad
Turns	Al-Zawraa	Al-Talaba	20.00*	.032	Al-Zawraa
	Al-Ittisalat	Al-Talaba	23.67*	.016	Al-Ittisalat

Significant at (Sig. ≤ 0.05).

Discussion

Table (1) shows that there were no statistically significant differences (ANOVA); however, from our perspective given that this is an analytical study intended to benefit players and coaches we have included all statistics indicating statistically significant differences in certain variables in Table (2) (LSD). It is therefore evident that statistically significant differences for some of the physical research variables were observed in the matches against Al-Ittisalat, Al-Zawra'a, Al-Talaba and Al-Amana; these variables were playing time, distance covered, work rate and turns. The researcher attributes the cause of these differences to the coach's focus on these variables; furthermore numerous other factors, such as the venue of the match, the nature of the competition, the team's ranking, the standard of play, the match result and the style of play may influence individual and team performance (Eccles et al., 2009). With regard to playing time, the figures favoured the matches played against clubs (Telecom, Students and Baghdad Municipality) compared with the match played against Al-Kahraba Club. The researchers attribute this to the fact that in those three matches no players were substituted from the midfield or attack, thereby increasing the playing time for the players, with morale favouring them; whereas in the Al-Kahraba match, there were two substitutions in the attack and midfield. Official matches last for more than 90 minutes however, numerous interruptions—such as substitutions fouls injuries goals or the ball going out of play—can have a negative impact on playing time (Linke et al., 2018). A reduction in playing time will have a negative impact on the other variables As for the variable of distance covered the momentum favoured the match played against Amanat Baghdad Club compared with the match played against Al-Kahrbaa Club, Based on the field researchers' observation of the matches, this is attributed to the fact that in the match against Amanat Baghdad, Amanat Baghdad had more possession than Al-Karkh whereas in the match against Al-Kahrbaa, Al-Karkh had more possession than Al-Kahrbaa; teams run more when not in possession than when they are in possession. Furthermore effective playing time and the amount of ball possession influence players' running performance (Mernagh et al., 2021). Players need to improve their endurance depending on their playing position; furthermore, endurance performance is not the only

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

factor determining the distance covered by players, as there are many factors that can influence activity levels such as the coach's tactics (Amani, 2018). This variable is also influenced by several factors the most important of which are the players' level of fitness their different playing positions, the standard of the opposing team whether or not the team has possession of the ball, and the actual playing time. In a study that linked the increase in distance covered during the first 15 minutes of a match to the success of teams such as Liverpool in implementing the high-pressing strategy (Gegenpressing)

This increases the chances of regaining possession by 30 per cent, whilst defenders who increase their off-the-ball movement (particularly when positioning themselves) reduce the opponent's chances of penetrating the area by 25 per cent (Castellano et al., 2022). Furthermore, professional footballers cover between 10 and 13 km per match, with 20–30 per cent of this distance covered at speeds exceeding 19 km/h or 5.27 m/s (Lovell et al., 2013). As for the work rate variable the results favoured the match played against Amanat Baghdad compared with the matches against Al-Talaba and Al-Kahraba.

The researchers attribute this to the fact that the distance covered by the players in the Baghdad Municipality match was greater than in the other two matches which consequently led to an increase in work rate Players with a high work rate, such as midfielders and wingers demonstrate greater endurance for intermittent exertion, which improves the team's performance in pressing and regaining possession (Lovell et al., 2013). Teams that excel in terms of total distance covered and pressing have a higher probability of winning, particularly in competitive leagues such as the English Premier League (Carling et al., 2008). Furthermore, players with a high workload are better able to cope with sudden changes in match intensity, which reduces the risk of muscle injuries (Rahnama et al., 2003). Another study suggests that players with a high work rate motivate their teammates and boost team morale, particularly in difficult situations (Padrón-Cabo et al., 2018). As for the number of turns taken, morale was higher in the matches played against Al-Zawra'a and Al-Ittisalat compared with those played against Al-Talaba. The researchers attribute this to the fact that, in the match against Al-Talaba, Al-Karkh had more possession than in the match against (Al-Zawra'a and Al-Ittisalat), and that the team losing possession runs more and therefore requires a greater number of turns in response to the opposing team Furthermore, the team that loses possession always needs to drop back and retreat in order to defend. Rapid changes in speed and direction in response to a stimulus are key aspects of the game; this is also known as agility. The researcher believes that coaches should focus on incorporating exercises that help develop reactive agility given its high effectiveness in various game situations and its status as a requirement of modern

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

training. Speed combined with changes of direction places a significant mechanical load on the lower limbs which may lead to an increased risk of injury if poorly managed over time it is therefore crucial to plan carefully and monitor the load associated with the ability to change direction at high speed (Sheppard & Young, 2006). Players must adapt physically, physiologically and psychologically to the various factors associated with a match which may lead to changes and variations in technical and tactical actions and patterns whilst playing matches (Vilar et al., 2012).

Conclusions

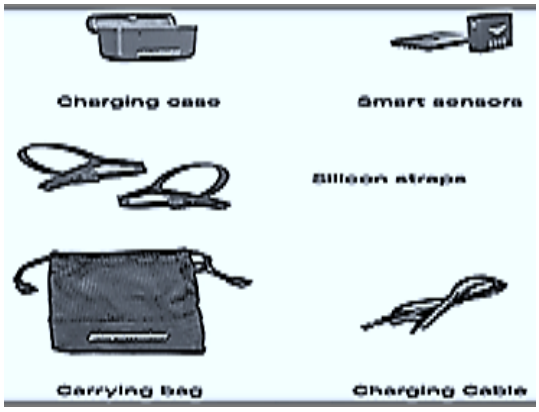
The researchers concluded that there were no significant differences in Al-Karkh Club's performance levels in terms of the physical variables studied; this implies that there was no increase in performance levels or improvement in performance during matches, As for the statistically significant differences in the physical variables that were added (playing time distance covered, work rate, turns) between matches, these differences were linked to factors such as substitution strategies and ball possession. When the number of substitutions was low (as in the matches against Al-Ittihad, Al-Talaba and Al-Amana), Actual playing time increased, which boosted the players' performance, whilst these indicators fell in the match against Al-Kahraba due to frequent substitutions. Furthermore, loss of possession (as in the Baghdad Municipality match) led to an increase in running and turns due to the pressure to regain the ball, whilst physical activity decreased when in possession (as in the Electricity match). The high work rate (as in the Baghdad Municipality match) was linked to players enduring intermittent exertion, which supports pressing and ball recovery Rear turns meanwhile increased when possession was lost (as in the Al-Zawra'a and Al-Ittisalat matches) due to the need to drop back defensively which highlights the importance of training reactive agility alongside managing training load to prevent injuries. Finally the study confirmed that physical performance is influenced by external factors such as the opposing team's ranking and style of play which requires players to adapt both physically and psychologically. It is therefore recommended that training programmes focus on interval endurance and agility monitor training load, and analyse data in line with the opponent's strategies to enhance performance.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Appendix (1) A device shows the 'Player-maker' device and its components





Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

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Journal of Physical Education

Volume 38 – Special Issue – 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

The Role of Insulin-Like Growth Factor 1 And Irisin in Muscle Dystrophy: Effect of Age and Comparison Among Patients

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DOI:

https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2401

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Article history: Received 24/December/2025; Accepted 12/January/2026; Available online 28/ October/2026

Abstract

Background: Muscle dystrophy and sarcopenia involve progressive muscle wasting and functional decline. Insulin-like growth factor 1 (IGF-1) and irisin are key myokines regulating muscle growth and metabolism. Changes in their levels may reflect disease and aging effects. To evaluate the role of IGF-1 and irisin in muscle dystrophy. **Methods:** A case–control study was conducted in Baghdad hospitals (Dec 2024–Feb 2025) involving 55 patients with muscle dystrophy and 35 healthy controls. Serum IGF-1 and irisin were quantified utilizing ELISA, and data were analyzed with SPSS v26 ($p \leq 0.05$). **Results**: Patients had significantly lower IGF-1 (75.18 ± 3.16 vs. 112.14 ± 8.75 ng/ml, $p = 0.0001$) and irisin (5.19 ± 0.22 vs. 9.92 ± 0.78 ng/ml, $p = 0.0001$) levels. Irisin declined with age, especially >70 years ($p = 0.0481$). No correlation was found between IGF-1 and irisin. **Conclusion**: This study suggests a potential role of IGF-1 and irisin in muscle dystrophy progression

Keywords: Muscle dystrophy, IGF-1, ELISA, irisin.

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Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

Sarcopenia, or age-related muscle loss, affects 5-10% of older adults. It first shows clinical signs in the sixth or seventh decade of life, but the underlying deterioration begins decades earlier (Gustafsson & Ulfhake, 2024). Compared to younger adults, older people display significant changes in muscle morphology. While these morphological changes are accompanied by functional loss, the decrease in lower-body strength with age is more noticeable than in the upper body (Sarto *et al.*, 2023). Irisin is one of these myokines involved in the paracrine and/or endocrine regulation of various tissues and organs, including the liver, fat, and brain, as well as the autocrine HCs of metabolism within the muscle (Iglesias, 2025). Irisin can enhance resistance to oxidative stress-induced muscle atrophy, endurance, and muscular strength, which is attributed to irisin's effects on the biogenesis of mitochondria, autophagy, and dynamics in skeletal muscles of the skeleton. Its multifunctional properties also include promoting the metabolism of bones, where it stimulates osteoblast differentiation and proliferation, potentially contributing to a treatment for osteoporosis and other musculoskeletal conditions (Zhao, Wu, Zhu, Liu, & Xu, 2024). The liver and skeletal muscle produce IGF1, which has endocrine and paracrine effects on muscle fibers. It appears that this growth factor is crucial for activating a specific signaling pathway in muscle fibers, resulting in muscle protein synthesis (MPS). This signaling cascade is initiated by the local production and release of IGF1 during muscle contraction, which then binds to its receptor on the sarcolemma (Erskine & Degens, 2019). IGF-1 and irisin have been researched individually in connection to neuromuscular diseases, but joint research in relation to muscle dystrophy is minimal. The current literature provides inconsistent data regarding IGF-1 and irisin levels in relation to disease types and ages, and an interaction between them has yet to be determined. The relationship between serum levels of IGF-1 and irisin in relation to musculardystrophy patients and normal participants, alterations in irisin levels in different ages, and a connection between IGF-1 and irisin levels will also be considered in this study.

Materials and Methods

Subject

Peripheral blood samples were obtained from patients with muscle diseases at Al-Wasiti Hospital, Saad Al-Watary Hospital, and the City of Medicine in Baghdad. During the period from December 2024 until February 2025. The Iraqi Ministry of Health approved the protocol of work. A total of 90 blood samples were collected. 55 samples from patients diagnosed with muscle disease (aged 27-77 years), and 35 samples from healthy individuals (aged 20-73), serving as a control group, were included in this work. For all participants, body mass index (BMI) and skeletal muscle mass (SMM) were quantified utilizing an InBody device (InBody Co., Ltd/South Korea), and anthropometric indexes were recorded. The patients were diagnosed with muscle dystrophy by specialized neurologists. They were so diagnosed through clinical observation, case history, physical and neurological exams, as well as laboratory tests (where available). Only patients with confirmed dystrophy and stable health status at the time of sampling were selected.

Inclusion and exclusion criteria

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Inclusion criteria, included adults aged ≥18 years with confirmed muscle dystrophy but not treated in the previous months with agents impacting muscle metabolism or endocrine biomarkers, while exclusion criteria, included inflammatory diseases, cancers, serious conditions in the liver or kidneys, other diseases in the endocrine system than muscle dystrophy, recent major surgeries, or agents impacting IGF-1/irisin levels such as systemic corticosteroids or anabolic agents. Healthy subjects should not have had neuromuscular or metabolic diseases or chronic systemic conditions, with inclusion based on age if feasible to control for variables impacting the biomarkers in question.

Blood Collection and Preparation

3ml of peripheral venous blood were drawn from every contributor utilizing sterile disposable syringe utilizing a sterile disposable syringe. For 30 minutes at room temperature, the samples were permitted to clot. Then, at 3000 rpm for five minutes, they were put in a centrifuge in order to disperse the sera. The obtained serum was transferred into a clean Eppendorf tube and stored at a low temperature in a refrigerator until laboratory analysis

Immunological study

Based on Biotin double antibody sandwich technology (Shanghai YL Biont, China), serum levels of Irisn and IGF1 were quantified utilizing enzyme-linked immunosorbent assay (ELISA).

Statistical Analysis

The analyses of the results used the software "SPSS version 26." The data was checked for normality before carrying out any tests. The analysis for the two independent groups (muscle dystrophy patients vs. control participants) was conducted using independent samples t-tests for the mean serum IGF-1 and irisin. Post hoc tests: LS-D and Duncan's test were conducted to identify intergroup differences that followed overall group comparisons for various age groups. Chi-square test and Pearson correlation test were used for distribution and correlation analysis. All tests were made to correspond to variable types and the design of the study; test statistics, p-values, and significance were standardized. Significance was set to $p \leq 0.05$, and $p \leq 0.01$ was highly significant (SPSS, 2019).

Results

The results in Table 1 show that significant decline in serum IGF-1 levels in the patient group (75.18 ± 3.16 ng/ml) compared to the HCs group (112.14 ± 8.75 ng/ml) with p-value 0.0001), highlighting its potential role in illness-related muscle and bone alterations.

Table 1. *Comparison between the variation patients and control groups in IGF-1*

Group	Means ±SE of IGF-1 (ng\ml)
Patients	75.18 ±3.16
Control	112.14 ±8.75
T-test	15.927 **
P-value	0.0001

** (P≤0.01).

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The results in Table 2 demonstrate that significant decline in serum irisin levels in the patient group (5.19 ± 0.22 ng/ml) compared to the HCs group (9.92 ± 0.78 ng/ml) with p-value (0.0001), indicating a potential role of this myokine in illness-related muscle and metabolic alterations.

Table 2. *Comparison between the variation patients and control groups in Irisin*

Group	Means ±SE of Irisin (ng\ml)
Patients	5.19 ±0.22
HCs	9.92 ±0.78
T-test	1.357 **

** (P≤0.01).

The results in Table 3 indicate that the correlation between IGF-1 and irisin levels was weak and not statistically significant in both groups. In patients, the correlation coefficient was negative (r = -0.11, P = 0.397), while in the HCs group it was slightly positive (P = 0.499; r = 0.12), implying that the regulation of these biomarkers may occur independently in the studied population.

Table 3. *Estimate of the Correlation coefficient among varied parameters in patients and HCs groups*

Parameters		Patients		HCs	
		r.	P-value	r.	P-value
IGF1	Irisin	-0.11 NS	0.397	0.12 NS	0.499

* (P≤0.05), NS: Non-significant.

Discussion

The results of the current study were in line, indicating a reduced level of serum IGF-1 in patients in comparison to healthy individuals, thereby confirming the hypothesis that the pathophysiology in muscle dystrophy is a result of the deficiency of IGF-1. Being an anabolic factor, the reduced level of IGF-1 in the circulation may be due to an impairment in the signaling pathway in the target tissues. Differences in the level of regulation of IGF-1 in various diseases have been noted. Higher levels of IGF-1 were identified in patients suffering from autism spectrum disorder (Robinson-Agramonte *et al.*, 2022), whereas in older individuals, the prevalence of sarcopenia decreased with an increase in the levels of IGF-1 in men, but not in women, in the context of age-related sarcopenia (Jiang *et al.*, 2022). However, these results, together with the U-shaped relationship between IGF-1 concentration and mortality rates (Rahmani *et al.*, 2022), suggest that the role of IGF-1 is condition- and dose-dependent, contrary to the general idea that IGF-1 has either negative or positive roles. Exercise studies also prove the biological significance of IGF-1 modulation, in which resistance or endurance training, as well as exogenous administration of IGF-1, suppressed muscle atrophy through the activation of the IGF-1/PI3K/Akt pathway (de Alcantara Borba *et al.*, 2020; Feng *et al.*, 2022; Sakai *et al.*, 2021), which could be therapeutically useful in individuals with low levels of IGF-1. In addition, irisin expression was found to be lower in patients and correlated with muscle dysfunction, thus providing support for the hypothesis that

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

muscle dysfunction is a result of myokine irregularities. Lower irisin expression was also found to result in lower muscle strength and quality in Charcot-Marie-Tooth disease, and sarcopenia, malnutrition, and high rates of mortality in liver cirrhosis patients (Colaianni *et al.*, 2022). In contrast, higher irisin expression was found in certain disease conditions, likely owing to compensatory reactions, as in the case of Becker muscular dystrophy and metabolic liver disease (Baek *et al.*, 2022) and Sheptulina *et al.* (2024). The endocrine and nutritional regulation on irisin expression is also supported by a recent observation that vitamin D administration results in the stimulation of FNDC5 expression and subsequent irisin expression (Sanesi *et al.*, 2023). The finding of the age-related decline of irisin, especially in persons over the age of 70 years, supports the hypothesis that the dysregulation of myokines by the aging process itself is mediated by the reduced muscle mass and activity of the affected individuals. This finding fits the metabolic dysfunction of the elderly with sarcopenia and the findings of coordinated disruption of the IGF-1 and irisin signaling cascades in metabolic diseases (Merawati *et al.*, 2023). It must be highlighted that the lack of a significant relationship between IGF-1 and irisin in the present study contradicts the hypothesis that these biomarkers are interdependently controlled but rather supports the alternative hypothesis that these are controlled by two self-contained processes. This finding fits the findings in patients with acromegaly in which no direct relationship exists between irisin levels and the levels of the GH/IGF-1 axis despite the severe disturbance of the hormonal levels (Mizera *et al.*, 2021; Sendur *et al.*, 2022), suggesting that in the disrupted endocrine states of GH or IGF-1, the regulatory control of irisin levels differs from the findings in the elderly with sarcopenia.

Conclusions

Serum IGF-1 and irisin were found to be lower in patients with muscular dystrophy than in healthy controls, associating the two markers with muscular impairment in disease. Irisin was found to be reduced in older patients, indicating signs of aging. Lack of correlation between IGF-1 and irisin indicates that they are potentially regulated in an autonomous manner. In terms of applications, both IGF-1 and irisin can act as markers indicating muscle status and exercise or training response. Designed training, particularly resistance training and endurance training, can affect these markers and promote functional improvement in affected patients. Future studies should investigate post-exercise changes, nutrition, and training responses related to predictive properties regarding performance, strength, and functional status in muscle dystrophy patients.

Acknowledgments

In the work, thanks for anyone who help us, the manuscript was derived from a master thesis.

Journal of Physical Education
Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Volume 38 – Special Issue – 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729

https://jcope.uobaghdad.edu.iq

The Functional Competence of Physical Education Teachers and Instructors from The Perspective of Sports Activity Departments in Iraqi Education

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DOI:

https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2314

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Article history: Received 1/June/2025; Accepted 17/June/2025; Available online 28/October/2026

Abstract

The research objective to improve and apply a functional competency scale for physical education teachers from the concept of sports activity departments in Iraqi education directorates and to identify the functional competency of physical education teachers from the perspective of these departments. The researcher used the descriptive questionnaire method as it was acceptable for the nature of the issue The research population consisted of (319) directors of sports and scouting activity departments in Iraqi education directorates. There were also (3) individuals from the sports and scouting activity units in the districts and sub-districts of Iraqi education directorates The research sample consisted of (319) individuals representing (100%) of the research population. The researcher designed a questionnaire for the scale to determine the validity of the statements which included (25) statements. The researcher adopted the Liker method in constructing the scale questionnaire. Based on this, a five-point scale was used to express the degree of agreement with each statement: (Strongly Agree, Agree, Sometimes Disagree, Strongly Disagree). The researcher then conducted a pilot study with a acceptable timeframe before the final study application, using a sample of 25 individuals. Following this, the scale was administered to a construction sample of 150 individuals. To complete the steps of constructing this study's scale the researcher performed statistical analysis of the scale statements This statistical process ensured the availability of the scientific requirements for the scale namely validity and reliability Subsequently the researcher administered the functional competency scale, consisting of 25 statements to a control sample of 130 individuals. The results were then statistically analyzed and discussed.

Keywords: Functional competency, physical education teachers, sports activity, Ministry of Education

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Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Introduction

Educational administration has obtained considerable attention in recent decades in many countries around the world both developed and developing This attention is reflected in the reform and development initiatives undertaken in this discipline which aim to develop and modernize educational performance to enhance its influence on the educational process. The professional competence of physical education teachers is considered a fundamental factor contributing to the success of the educational process and the achievement of physical education goals It encompasses a set of skills and knowledge that teachers must possess to perform their teaching duties effectively in addition to the ability to motivate students and improve their physical and mental abilities. (Raheem & AlShafai, 2019, p. 3).

Physical education is an integral part of the school curriculum aiming to improve students' physical skills and promote values of cooperation, fair competition and sportsmanship Teacher competence plays a vital role in achieving these goals as a competent teacher possesses the capacity to effectively utilize mathematical knowledge and modern educational theories contributing to the delivery of lessons in an innovative and interactive manner for students.

It is crucial for a physical education teacher to possess a strong foundation in sports science and physical education, including anatomy sports psychology and athletic training. They should also be familiar with modern physical education perspective and the latest methods and techniques in sports education.

A competent teacher must be able to effectively apply athletic skills and possess a high capacity for guiding and teaching students the correct techniques for performing various physical exercises They must also be able to encourage students and develop their physical capacities through diverse activities.

Effective communication with students is important for improving educational performance Teachers must have excellent communication skills both verbal and nonverbal to show mathematical concepts in a clear and engaging manner. They must also be able to provide constructive feedback and positive guidance to students.

Effective teaching need a teacher's ability to plan and organize physical education lessons effectively ensuring they are appropriate to students' abilities and interests. Teachers must also be able to set specific learning objectives for each lesson and provide educational activities that contribute to achieving those objectives.

One of the necessary tasks that a physical education teacher must master is the continuous assessment of students, including evaluating their physical performance and the progress each student makes. The teacher must be able to provide constructive feedback that helps students develop their performance and enhance their athletic skills.

In a challenging educational environment a physical education teacher must have the capacity to handle diverse situations such as crisis management or dealing with students with behavioral or medical problems. The teacher should also be prepared to adapt their lessons and methods to the needs of the students and the specific circumstances of the learning environment.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

The teacher's professional competence is the fundamental of achieving educational goals in physical education. Through a competent teacher, students learn the sporting values that contribute to their personal development such as teamwork, discipline and mutual respect A good teacher also helps build students' health awareness by encouraging physical activity and guiding them on the importance of maintaining overall health.

Despite the crucial importance of professional competence many physical education teachers face significant issues in improving their skills. These obstacles include the absence of ongoing training work pressures, the unavailability of appropriate sports equipment in some schools and the difficulty of managing students with varying interests in sports.

The professional perspective of physical education teachers is a fundamental element in the success of the educational process in this field. By possessing the necessary knowledge and skills, and the ability to handle various challenges, teachers can contribute to developing a generation of students who are healthy, possess advanced physical skills and are capable of critical thinking and teamwork.

The main problem addressed in this research lies in analyzing these factors and their impact on improving student performance in physical education. Physical education is a fundamental element of the educational system, contributing effectively to the development of students' physical and mental health and fostering sporting values such as cooperation and fair competition. However the professional competence of physical education teachers in schools remains a key factor determining the success of the educational process in this area. A physical education teacher's performance depends on a range of factors that may interact and influence how they carry out their teaching duties and their ability to effectively transfer skills and knowledge to students.

The research objective to: build and apply a functional competency scale for physical education teachers from the perspective of sports activity departments in Iraqi education and to determine the functional competency of physical education teachers from the perspective of sports activity departments in Iraqi education.

Methodology and Tools

The researcher used the descriptive questionnaire method as it was best suited to the nature of the problem.

The research population consisted of (319) directors of sports and scouting activity departments in the Iraqi education directorates. There were also (3) individuals from the sports and scouting activity units in the districts and sub-districts of the Iraqi education directorates. The research sample consisted of (319) individuals representing (100%) of the research population. The sample was categorized into several sub-samples as demonstrate in Table (1).

Table1.*Shows the distribution of the research sample*

Distribution	Pilot study sample	Construction sample	Application sample	Excluded participants

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

NO.	319	25	150	130	14
Percentage	%100	%7.83	%47.02	%40.75	%4.38

The following devices tools and methods of collecting information were used: (paper forms, computer (laptop), electronic calculator, Arabic and foreign sources, field visits to collect information the information network (Internet), personal interviews).

To determine the scale items the researcher reviewed literature, scientific sources and references and previous studies. To attain the research objectives and to ascertain the validity of the items for the functional competence scale the researcher improved a questionnaire containing 25 items. The researcher used the Liker method in build the questionnaire and utilized a five-point scale to express the degree of agreement with each item: (strongly agree, agree, sometimes, disagree, strongly disagree). Subsequently the researcher carried out a pilot study on December 11, 2024, with a sample of 25 individuals. This pilot study objective to establish acceptable conditions for administering the main test to the pilot sample ensure the sample's understanding of the scale items and prevent any errors or difficulties during the main test. After that the scale was applied to the construction sample of (150) individuals for the period from (21/12/2024) to (2/2/2025). The purpose of conducting this experiment is to build a functional efficiency scale for physical education teachers and instructors from the point of view of the sports activity departments in the education of Iraq.

To accomplish the steps of building the scale for this study the researcher carried out the statistical analysis of the scale's statements Through the statistical process the availability of the scientific conditions for the scale namely validity and reliability is confirmed.

Scale validity: The researcher used construct validity to verify the scale This type of validity is verified by performing statistical analysis of the statements (Raheem & Shakir, 2023). The researcher verified this by extracting the following indicators:

Construct validity: This type of validity is achieved through statistical analysis of the statements. The researcher verified this by extracting the following indicators:

1. Discriminatory Power of Statements: To verify this the researcher adopted the two extreme groups method in calculating the discriminatory power of statements using the (T-Test) for independent samples. The aim of analyzing the statements is to keep the statements with high discrimination which are the good statements in the scale (Radhi & Wahab, 2024). Experts indicate that the percentage of (27%) from the lower group and (27%) from the upper group is the best percentage by which we obtain the highest discrimination coefficients. Therefore the (T-Test) was used to determine the significance of the differences in the arithmetic means between the lower and upper groups It was found that all statements were statistically crucial at the significance level of (0.05) as present in Table (2).

Table 2. *Show the discriminative power of the scale items between the upper and lower groups*

Items	Group	Mean	Standard deviation	Calculated t-value	Sig	Significance
1	upper	5.0000	.00000	22.807	0.000	Significant
	lower	1.9500	.84580		0.000	Significant
2	upper	5.0000	.00000	24.861	0.000	Significant

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

	lower	2.3000	.68687		0.000	Significant
3	upper	5.0000	.00000	29.465	0.000	Significant
	lower	1.8000	.68687		0.000	Significant
4	upper	5.0000	.00000	26.465	0.000	Significant
	Lower	2.1750	.67511		0.000	Significant
5	Upper	4.8750	.33493	25.157	0.000	Significant
	lower	2.0000	.64051		0.000	Significant
6	Upper	4.9500	.22072	24.107	0.000	Significant
	lower	2.2000	.68687		0.000	Significant
7	Upper	4.9750	.15811	20.810	0.000	Significant
	lower	2.5750	.71208		0.000	Significant
8	Upper	4.9750	.15811	19.054	0.000	Significant
	lower	2.5750	.78078		0.000	Significant
9	Upper	4.9750	.15811	22.194	0.000	Significant
	lower	2.2250	.76753		0.000	Significant
10	Upper	4.9750	.15811	28.795	0.000	Significant
	lower	2.1750	.59431		0.000	Significant
11	Upper	5.0000	.00000	30.875	0.000	Significant
	Lower	1.9750	.61966		0.000	Significant
12	Upper	5.0000	.00000	25.258	0.000	Significant
	lower	2.4500	.63851		0.000	Significant
13	Upper	5.0000	.00000	22.786	0.000	Significant
	lower	2.3500	.73554		0.000	Significant
14	Upper	5.0000	.00000	22.079	0.000	Significant
	lower	2.5000	.71611		0.000	Significant
15	Upper	4.8750	.33493	20.584	0.000	Significant
	lower	2.3500	.69982		0.000	Significant
16	Upper	5.0000	.00000	28.794	0.000	Significant
	lower	1.8750	.68641		0.000	Significant
17	Upper	5.0000	.00000	27.813	0.000	Significant
	lower	1.7750	.73336		0.000	Significant
18	Upper	4.8500	.36162	19.911	0.000	Significant
	Lower	2.2500	.74248		0.000	Significant
19	Upper	5.0000	.00000	28.968	0.000	Significant
	lower	2.1500	.62224		0.000	Significant
20	Upper	4.8750	.33493	20.005	0.000	Significant
	lower	2.2750	.75064		0.000	Significant
21	Upper	5.0000	.00000	28.819	0.000	Significant
	lower	2.4750	.55412		0.000	Significant
22	Upper	5.0000	.00000	20.206	0.000	Significant
	lower	2.6500	.73554		0.000	Significant
23	Upper	5.0000	.00000	24.873	0.000	Significant
	Lower	2.3750	.66747		0.000	Significant
24	Upper	5.0000	.00000	34.697	0.000	Significant
	lower	2.3500	.48305		0.000	Significant
25	Upper	5.0000	.00000	22.807	0.000	Significant
	lower	1.9500	.84580		0.000	Significant

Significant.(0.05) >

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Internal Consistency Coefficient: Internal consistency goals to verify the homogeneity and consistency of the items in the study of the phenomenon under investigation To verify the validity of the scale using the internal consistency coefficient the researcher determined the correlation between the score of each scale item and the total scale score using Pearson's simple correlation coefficient All items emerged consistent because they were below the significance level of (0.05) as shown in Table (3).

Table3. *shows the correlation coefficients between the scale items and the total scale score using the internal consistency method*

No	Simple correlation coefficient	Sig	Significance
.1	.947	.000	Significant
.2	.962	.000	Significant
.3	.958	.000	Significant
.4	.958	.000	Significant
.5	.964	.000	Significant
.6	.967	.000	Significant
.7	.966	.000	Significant
.8	.956	.000	Significant
.9	.948	.000	Significant
.10	.968	.000	Significant
.11	.963	.000	Significant
.12	.955	.000	Significant
.13	.940	.000	Significant
.14	.962	.000	Significant
.15	.954	.000	Significant
.16	.962	.000	Significant
.17	.958	.000	Significant
.18	.969	.000	Significant
.19	.968	.000	Significant
.20	.969	.000	Significant
.21	.939	.000	Significant
.22	.923	.000	Significant
.23	.962	.000	Significant
.24	.962	.000	Significant
.25	.958	.000	Significant

Significant < (0.05)

Scale Reliability: A good scale is one that is reliable. Therefore the researcher verified the scale's reliability using Cronbach's alpha coefficient with the Statistical Package for the Social Sciences (SPSS). Applying this coefficient to the sample of (130) teachers yielded a reliability coefficient of (0.837) which is regarded as a high reliability value at the (0.05) significance level.

Scale Application: Subsequently the researcher and the enhance team administered the scale to the research sample of (100) teachers from (February 18, 2025) to (March 12, 2025).

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Results

Table 4. *presents the statistical data for the research sample*

Scale	Mean	Standard deviation	Skewness coefficient
Functional coefficient	93.831	7.643	0.360

The functional competence scale including of (25) items was administered to a sample of (130) individuals To calculate the significance of the scale the hypothetical arithmetic mean was found using the following formula (Jawdah, 2008, p. 178):
Hypothetical Mean = (Sum of Alternatives ÷ Highest Score for Alternative) x Number of Scale Items Therefore the hypothetical mean of the entire scale = (1+2+3+4+5) ÷ 5) x 25 = 75

Table 5. *shows the arithmetic mean, hypothetical mean, standard deviation, calculated t-value, true significance and type of difference*

Variables	Mean	Standard deviation	Calculated t- value	Significance	Type of difference
Functional coefficient	93.831	7.643	34.374	0.000	Significant
Hypothetical mean				75	

Significant < (0.05)

Discussion

The results shown in the table above demonstrate that the arithmetic mean was (93.831) with a standard deviation of (7.643) and the hypothetical mean was (75). Since the arithmetic mean was higher than the hypothetical mean this means that the difference is statistically significant and favors the arithmetic mean of the sample. To determine the significance of the differences between the arithmetic and hypothetical means the researcher used a t-test. The results showed a statistically important difference between the two means amounting to (0.000) at a significance level of (0.05).

Studies demonstrate that teachers with high functional competence in the field of physical education have a greater ability to organize sports activities and guide students more effectively which contributes to developing student results in this field. (Mohammed, 2013, p. 17)

Based on the research results it appears that continuous training and professional development play a pivotal role in enhancing the functional competence of physical education teachers. Teachers who receive continuous training in new areas such as modern teaching methods and advanced sports technologies achieve better results in performing their job duties. The results revealed many challenges affecting the professional competence of physical education teachers such as the absence of sports equipment and facilities as well as weak support from educational administrations. The findings reveals that teachers' professional competence directly impacts students' achievement in sports activities. The more competent

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

the teacher the greater the students' ability to participate actively and achieve good results in sports. (Ali, 2015, p. 28) Based on the above the researcher infers that the professional competence of physical education teachers is a fundamental factor affecting the quality of sports education and success in school sports activities. According to the reviewed Arabic studies there is a strong correlation between teachers' professional development and improved educational and athletic performance. Furthermore the obstacles faced by teachers must be considered to provide a suitable learning environment that contributes to enhancing their professional competence.

Conclusions

1. It appears that teachers with strong practical skills who can simplify mathematical techniques for students demonstrate superior performance in motivating students and developing their physical abilities The capacity to design innovative and enjoyable athletic activities contributes to increased student engagement.
2. The significant of effective communication between the teacher and the students is highlighted as teachers who possess outstanding communication skills are able to motivate students more which helps to enhance student performance and increase interaction in sports classes.
3. Teachers who continuously assess students and provide constructive feedback see better student outcomes. Regular assessment helps monitor student progress and guides them toward continuous improvement.
4. Many schools face challenges related to a lack of sports facilities, such as necessary equipment and tools, which affects teachers' ability to deliver lessons effectively In addition, teachers struggle to access ongoing training opportunities to improve their skills.
5. The research findings showed that the secondary school administrations specializing in physical education possess effective leadership competencies that contribute to enhancing the school environment and organizing school activities in an outstanding manner.

Recommendations

1. Ongoing training programs should be organized for teachers in the fields of sports and physical education These programs should contained modern teaching methods and the latest trends in sports science as well as enhance their skills in engaging with students and developing their physical abilities.
2. Teachers should be encouraged to use diverse and effective communication methods with students such as providing immediate feedback and positive reinforcement Emphasis should be placed on building strong relationships with students to raise their participation in sports activities.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

3. Educational authorities and related bodies should provide and regularly update the necessary sports equipment to ensure a suitable learning environment for students. In addition sufficient space should be provided for physical activities.
4. It is crucial that physical education teaching plans include comprehensive assessment strategies that cover physical, intellectual and psychological aspects. Assessment should be continuous and innovative to ensure the improvement of students' physical and mental performance.
5. More chances should be provided for teachers to attend workshops and specialized conferences in the field of physical education in addition to supporting teachers to obtain additional qualifications in the educational field.
6. The physical education teaching environment should be comfortable and safe motivating students to engage in regular physical activity. This includes improving sports facilities and providing equipment and resources that enhance the learning experience.

Appendices

Appendix (1) Final Form of the Functional Competency Scale Questionnaire

Dear Esteemed Professor,

Greetings...

The researcher intends to conduct his research entitled (Functional Competency of Physical Education Teachers from the Perspective of Sports Activity Departments in Iraqi Education Directorates) as part of the requirements for publication in journals. Based on your experience please select the answer that shows your opinion on the statements presented to you. Please note that your answer will be handled with complete confidentiality and is for scientific research purposes only. Therefore there is no need to write your name. We also request that you do not leave any statement unanswered.

No	Items	Strongly agree	Agree	Sometimes	Disagree	Strongly disagree
1	Physical education teachers and instructors are keen to keep up with developments in their field of work and improve their performance.					
2	Physical education teachers are characterized by speed and accuracy in all the tasks and duties assigned to them inside and outside the school.					
3						

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

	Physical education teachers are keen to prepare and maintain all lesson equipment and playgrounds and present them in the best possible condition.
4	Physical education teachers are characterized by flexibility in dealing with students and teaching staff.
5	Physical education teachers and instructors are knowledgeable in their field of study, both practically and theoretically.
6	Physical education teachers and instructors have the ability to take responsibility at work and to be quick in making appropriate decisions.
7	Physical education teachers and instructors have the ability to act efficiently and calmly in difficult situations.
8	Physical education teachers are keen to encourage students to acquire positive reinforcement when participating in extracurricular and sports activities for the physical education lesson.
9	Physical education teachers have a continuous desire to improve their performance and benefit from the experiences of others.
10	Physical education teachers contribute by providing modern, innovative, harmonious and renewed ideas and solutions to solve the problems facing the school.
11	The teacher possesses in-depth knowledge of mathematical science concepts (such as anatomy, sports psychology and sports training).

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

12	The teacher is familiar with the latest trends and methods in the field of physical education.
13	The teacher continuously develops his mathematical knowledge through training or attending workshops.
14	The teacher is able to apply mathematical skills practically and effectively during lessons.
15	The teacher is able to explain and clarify mathematical techniques in simple and understandable ways for students.
16	The teacher has the ability to design and implement sports activities that motivate students and help them improve their physical performance.
17	The teacher possesses effective communication skills with students and can guide them in an encouraging way.
18	The teacher pays close attention to all students and promotes their participation in sports activities.
19	The teacher has the ability to solve problems and deal with difficult situations during lessons.
20	The teacher periodically assesses the students' performance level and guides them to improve their mathematical techniques.
21	The teacher provides constructive feedback that helps students improve their mathematical skills.
22	The teacher ensures that all students have sufficient opportunity for training and physical exercise.

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

23	The teacher faces challenges related to the lack of sports resources and equipment at the school.	
24	The teacher receives sufficient support from the educational administration to improve his professional skills.	
25	The teacher receives sufficient support from the educational administration to improve his professional skills.	

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Cross-Training Exercises and Their Effects on Strength-Endurance Performance and Selected Electromyographic (EMG) Indicators in Strongman Competitions among Iraqi National Team Elite Athletes

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DOI:
https://doi.org/10.37359/JOPE.V38(SpecialIssue)2026.2042
https://creativecommons.org/licenses/by/4.0/
Article history: Received 28/February/2024; Accepted 15/March/2024; Available online 28/October/2026

Abstract

The study aimed to design cross-training exercises to develop performance and selected special physical abilities of the muscles involved in Strongest Man competitions in the advanced weight category (100–105 kg). The researcher adopted the experimental method because it suited the research problem and objectives. The research population comprised 20 advanced athletes from the Iraqi national Strongest Man team selected intentionally. The research sample included 12 athletes whose body weights ranged between 100 and 105 kg representing 60% of the original population. The remaining 8 athletes were excluded because of their lack of homogeneity in body weight. The research procedures involved identifying the study variables through consultation with experts and specialists in sports training and exercise physiology, selecting appropriate tests, establishing their scientific foundations and conducting a pilot experiment. pre-tests were administered before implementing the proposed training program. The program lasted 8 weeks comprising 3 training sessions per week. Following completion of the intervention post-tests were conducted to evaluate changes in the selected variables. The results revealed that the cross-training exercises positively affected the development of physical abilities among the experimental group, including maximal strength, explosive power and muscular endurance as well as competition achievement. The exercises produced noticeable improvements in the electrical activity of the investigated muscles particularly peak electrical activity. These findings demonstrate the potential effectiveness of structured cross-training programs in enhancing physical performance and neuromuscular function among advanced Strongest Man athletes in the 100–105 kg weight category.

Keywords: Cross-training, physical abilities, electrical activity indicators.

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Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Introduction

Sports training aims to enhance the various foundations and factors that play an effective role in improving performance across different sports; one such foundation is physical preparation, which is the cornerstone for enhancing the various physical and physiological attributes of players, whether in team or individual sports.

The aim of the training process is to help athletes achieve a high level of performance suitable for entering the world of champions in their specialist sport and for achieving international success in the sporting arena. Among the training methods is the cross-training approach, which the researcher adopted in the methodological procedures for the training module.

Cross-training stimulates auxiliary muscles that are not typically targeted in the training programme for a specific sport, whilst also helping the nervous and muscular systems to improve their coordination, which in turn enhances the athlete's performance.

This approach has a distinct and clear impact on athletes' aerobic and anaerobic endurance through the alternation, combination and variety of exercises used within training sessions, Consequently, this training process is made more engaging; it transfers the effort exerted during exercises and distributes it across different types of muscles and tendons that may not normally be engaged, causing them to work in different ways depending on the type of exercise, whilst also allowing for rest periods between exercises, which serves to reduce the strain on the nervous and muscular systems, and also enhance physical fitness.

Hence the importance of this research lies in developing interval training exercises and determining their effect on strength endurance and certain

indicators of electrical activity in strongman athletes. In his capacity as a certified coach, the researcher observed a lack of available information, or information that was out of date, which ultimately serves to raise the standard of the sport; Therefore, the researcher decided to employ a training method known as cross-training and to investigate its impact on specific physical abilities, performance efficiency and certain indicators of electrical activity in the working muscles, This raises the question of whether cross-training can offer a new training approach that contributes to the development of strength endurance, as strength endurance is one of the qualities required for this discipline, thereby enhancing the ability to perform at a high level despite the difficulty involved, given that athletes handle heavy weights whilst competing in these events Another question is: to what extent might changes occur in the internal physiological environment of the research sample's participants—in terms of muscular aspects and associated functional indicators—as a result of the cross-training approach?

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Academic studies are considered a key factor in the development of this modern sport and in helping coaches and players achieve the highest results and accomplishments in domestic and national championships.

Research objectives:

1- To develop interval training exercises to improve strength endurance and certain indicators of electrical activity in strongman athletes

2-To investigate the effect of interval training exercises on strength endurance and certain indicators of electrical activity in strongman athletes

Research Hypotheses:

1.There are statistically significant differences between the pre-test and post-test scores for the control and experimental groups.

2. There are statistically significant differences between the values of the physical ability and achievement indices and the values of the electrical activity of the working muscles between the pre-test and post-test.

Method and Tools

The researcher used the experimental design with two equivalent groups the experimental and control groups as it was appropriate for the research problem The research sample was purposively selected from the 20 players of the Iraqi national strongman team in the advanced category The research sample was selected using a purposive method based on weight, comprising 12 players weighing between 100 and 105 kg, representing 60 per cent of the original population. Eight players were excluded due to inconsistencies in their weight and were divided into two equal groups, one of which was the experimental group to whom the exercises designed by the researcher were applied, whilst the control group followed the exercises previously adopted for their training. The research sample was standardised and the two groups were matched, as shown in Tables 1 and 2.

Table1. *shows the homogeneity of the research sample in terms of the variables (height, weight, training age, chronological age)*

NO	variables	Unit of measurement	mean	SD	Skewness
1	Height	cm	180.91	1.37	0.32
2	Weight	kg	102.58	1.31	0.36
3	Training experience	month	26.16	1.19	0.39
4	Age	year	3.83	0.24	0.81

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Table2. *shows the arithmetic means, standard deviations, and calculated and tabulated t-values for the two study groups (control and experimental) for the research variables*

variables	Unit	control group		experimental group		T	SIG
		mean	SD	mean	SD		
Posterior deltoid	Microvolt	583.16	1.47	581.66	1.63	1.67	0.12
Dorsal lumbar	Microvolt	505.83	1.16	505.16	0.75	1.17	0.26
Triceps	Microvolt	575.0	0.89	574.33	1.21	1.08	0.304
Attachment of the arms to the shoulder joint	Number	6.33	0.51	6.66	0.52	1.11	0.29

Not statistically significant at the 0.05 significance level with 10 df.

Field Research Procedures

Identification of indicators of electrical activity

The views of a number of experts and specialists in the field were sought, resulting in the selection of 12 muscle-related variables, which were presented in a questionnaire to a group of nine experts in physiology. The variables were selected through direct observation via a video presentation of the technical performance.

Based on the above, the researcher adopted the variables that achieved a percentage of 75 per cent or higher, in accordance with the views of (Benjamin, 1983; Hassanein, 2004), who emphasise that 'the researcher must obtain a percentage of agreement of 75 per cent or more to accept the phenomenon, as shown in the tables below (3) (4), the researcher is also entitled to select variables they deem appropriate provided that the percentage is not less than 25 per cent as a percentage of 25 per cent does not constitute a significant contribution to the overall variation of the measured phenomenon. (Jassim, 2014)

Table 3. *shows the relative importance of the muscles studied, according to the opinion of (9) experts*

NO	variables	Relative Importance	Accepted variables	Unacceptable variables
1	Ulnar wrist extensor	68.8		✓
2	Humeroulnar	73.3		✓
3	Posterior deltoid	95.5	✓	
4	Lumbar dorsal	86.6	✓	
5	Triceps brachii	91	✓	
7	Coracobrachialis	46.6		✓

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

8	Ulnar brachialis	44.4	✓
9	Brachialis	73.3	✓
10	Ulnar wrist extensor	49	✓
11	Ulnar wrist stabiliser	44	✓
12	Lateral vastus ulnaris	47	✓

Tests used

Electromyography (EMG)

Test name: Electromyography (EMG).
Purpose of the test: To measure the amplitude and peak of the waveform of the working muscles. Equipment and instruments used: An electromyography (EMG) device (Samsung) that receives and transmits signals via Bluetooth and is rechargeable, weighing 250 g; connecting cables between the electrodes and the device; four surface electrodes per muscle a remote signal receiver tuned to the transmitter's frequency, software for the device supported by the manufacturer medical cotton wool, Aspirto, a shaving stand, a Sony camera, and a Lenovo computer Procedure: Steps for operating the EMG device:Before starting the EMG programme, the area over the muscle must be shaved to remove hair, and then cleaned with an alcohol solution. It is important to emphasise here the importance of cleaning the area to remove the thin layer of dirt that affects the electrical signal. We place surface electrodes to record electrical activity; the electrode closest to the stimulated motor unit records a larger EMG signal, whilst a smaller signal is recorded when the stimulated motor unit is further away from the electrode. Surface electrodes are the most commonly used in the analysis of human movements; in addition to recording signals that pass beneath the surface of the electrode, they also record electrical signals. A surface electrode consists of a small metal disc with a diameter of 1 cm; it can be even smaller if small muscles are to be tested. The electrode is made of silver chloride and is highly sensitive to the electrical signals emitted by muscles close to the skin. These electrodes record the signal indicating the rate of electrical activity. As for the surface electrodes, which are attached to the upper and middle parts of the muscles after we have asked the laboratory to contract the muscle, their function is to detect the electrical current in the activated muscles and transmit it to a computer screen to display the strength and shape of the signal via a software programme, which analyses the stored data and provides useful reports on muscle activity. Two electrodes have been placed on each muscle.
Method of recording: The peak values and areas of the waveforms for certain active muscles that have been measured will be calculated using the analysis software linked to the computer-connected EMG device.
The results of this test will be recorded alongside the results of the muscle strength tests for the muscles involved in the activity; these muscles are the posterior deltoid, the triceps brachii and the lumbar back muscles.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Strength Endurance Test

Test name: Pull-ups (Hazaa, 1413 AH) Source
Purpose of the test: To measure the strength endurance of the arm muscles.
Equipment used: Pull-up bar
Description of the test: The test subject stands beneath the horizontal bar; upon the start signal, they begin to pull themselves up with their arms until their chin is above the bar, then lower themselves until their arms are fully extended as in the starting position, and repeat this movement as many times as possible without stopping.
Scoring: Each contraction is counted as valid and complete if the participant's chin reaches above the bar.

Results

Table4.*Shows the arithmetic means, standard deviations and calculated t-values for the pre- and post-test results of the research variables for the experimental group*

variables	Pre-tests		Post-tests		fm	ES	T	SIG
	mean	SD	mean	SD				
Posterior deltoid	581.66	1.63	653.6	2.73	72	1.12	63.97	0.000
Dorsal lumbar	505.16	0.75	544.3	1.96	39.16	0.94	41.41	0.000
Triceps	574.33	1.21	633.3	2.80	59	1.31	44.81	0.000
Attachment of the arms to the shoulder joint	6.66	0.51	10.83	0.75	4.16	0.40	10.38	0.000

significant at the 0.05 significance level with 5 df.

Table5.*Shows the arithmetic means, standard deviations and calculated t-values for the pre- and post-test results of the research variables for the control group*

variables	Pre-tests		Post-tests		fm	ES	T	SIG
	mean	SD	mean	SD				
Posterior deltoid	583.1	1.47	622.5	1.87	39.33	0.49	79.55	0.000
Dorsal lumbar	505.83	1.16	524.5	1.87	18.66	0.84	22.13	0.000
Triceps	575.0	0.89	603.1	1.94	28.16	0.74	37.60	0.000
Attachment of the arms to the shoulder joint	6.33	0.51	8.50	054	2.16	0.40	5.39	0.003

significant at the 0.05 significance level with 5 df.

Table6. *Shows the arithmetic means, standard deviations and calculated t-values for the results of the dimensional tests for the research variables in the control and experimental groups*

variables	Unit	control group		experimental group		T	SIG
		mean	SD	mean	SD		

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

Posterior deltoid	Microvolt	622.50	1.87	653.6	2.73	23.05	0.000
Dorsal lumbar	Microvolt	524.50	1.87	544.3	1.96	17.89	0.000
Triceps	Microvolt	603.16	1.4	633.3	2.80	21.65	0.000
Attachment of the arms to the shoulder joint	Number	8.50	0.54	10.83	0.75	6.13	0.000

Discussion

The results in Tables (4) and (5), relating to the pre- and post-tests for the experimental and control groups, showed statistically significant differences between the pre- and post-tests, with the post-tests yielding better results. The results showed improvement in both groups with the experimental group performing better in these tests the researcher attributes this to the cross-training exercises he designed and their clear impact on the sample.

The researcher sought to develop the variables under study through scientifically and carefully designed exercises, which were undoubtedly aimed at improving the players' performance in accordance with the scientific principles and foundations of proven training programmes, based on the coach's experience and logical analysis, which focused on the variables under study; What distinguishes the exercises used by the experimental group is their specialised nature, which is evident from the extent of the differences shown in Table 4-1. His aim is to optimise and develop the variables under study to the greatest possible extent, in order to achieve the maximum possible strength in the shortest possible time, The specific exercises used by the researcher were characterised by their effect on rapid muscle responses, achieved by exerting maximum force in the shortest possible time, which has a positive effect on the development of physical capabilities and electromyographic activity (EMG). These exercises had a positive impact on strength gains, which were evident from the electromyographic readings of the muscles involved, as confirmed by (Abda Al-Aziz Al-Nimr and Nariman Al-Khatib, 2017) Increasing the range of motion in the joints and the muscles acting upon them enables these muscles to generate greater force throughout the range of motion, as muscles that are stretched perform their function with high efficiency and generate a certain amount of force as a result of the storage of elastic energy in the muscle tissue during the stretching phase and its release during the subsequent shortening phase (Al-Khatib, 2017, p. 305) The researcher also attributes the changes in electrical activity to the moment when players exert maximum force to achieve a feat; this requires a very high degree of coordination between the various forces exerted across several areas of the body that are actively involved in the specific execution of the skill, in order to achieve

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

the correct dynamics of the movement, which enables the optimal economy of force and time required to maximise the force output. Scientific sources have also pointed out that "proper training results in an increase in an individual's capabilities due to the performance of physical exercises over several days, weeks and months, as the body's systems and muscles adapt to the optimal performance of those exercises; In other words, the effect of physical exercise, as noted by the researcher, stimulates muscle cells to adapt, making them more efficient in performing high-intensity work (Edington, pp. 8–10)."

This improvement was confirmed by measuring the electrical activity of the target muscles under study; the researcher attributes the increase in electrical activity observed in the post-test of the experimental group to the effect of the exercise programme he devised, as the training led to an increase in electrical activity, making it more regular and less random; this is because muscle signals are elevated when the muscles are subjected to sustained high exertion and a prolonged period of training in order to achieve the goal of reaching the stage of adaptation and muscle plasticity. Consequently, there is an increase in the peak index (i.e. the amplitude of the electrical activity of the working muscles), and (Komi, 1992) confirmed that" "Muscle adaptation requires more time, which may extend to several months depending on the type and volume of training. We therefore observe an improvement in muscle strength within a short period; this performance gain resulted from the coordination of the working muscles due to the neural adaptations that occurred initially through an increase in the number of nerve impulses" (Komi, 1992, p. 38)

Table 6 presents the results of the post-test analyses for the experimental and control groups regarding the research variables under study. It shows that there were statistically significant differences between the experimental and control groups, in favour of the experimental group for the variables under study The results of the electrical activity of the muscles under study revealed differences in favour of the post-tests, as the results presented in the aforementioned table This means that the exercises designed by the researcher led to neuromuscular adaptation as a result of strength training and neuromuscular stretching of the sensory receptors, The researcher also attributes this development—the increase in electrical activity in the working muscles—to the nature of the exercises included in the training units, which focused on engaging the required muscles in a specific and fluid manner whilst avoiding excessive movements This helped the players to focus on their motor performance resulting in highly fluid movement without any interruptions and with minimal exertion; when one muscle has completed its task, it returns to a state of relaxation (inactivity) and the next muscle begins its electrical

Journal of Physical Education
Volume 38 –Special Issue– 2026 Open Access
P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

activity, which in turn leads to efficiency in the muscular effort expended, resulting in fluidity and coordination in muscular function, “The more streamlined the path of the forces, the more streamlined the motion; this is what is referred to as ‘dynamic configuration’, meaning the path of the force over time for this motion” (Al-Madamga, M., 2017, p. 650) Another important point to note, which explains the development of the electrical activity indicators for both peak and average values, is that ‘using low intensity during training results in the recruitment of fewer motor units, most, if not all, of which are red; whilst the white fibres will not be activated; however, when using loads close to or at maximum intensity, the muscle groups will recruit both types of fibres.”Consequently, white muscle fibres have a greater opportunity to be activated, and thus the muscle’s explosive strength will develop more effectively owing to the characteristics of white muscle fibres in force production (Al-Dalawi, 2011, p. 265), Here, the researcher explains that the high-intensity, repetitive exercises used contributed significantly to the recruitment of both types of muscle fibres as a result of working at high intensity for short periods, in accordance with the circuit-based exercises (stretching and shortening) In other words, the principle of maximising muscle contraction in the shortest possible time, which led to an increase in muscle capacity and had a positive effect on indicators of electrical activity, as confirmed by Paxinos (2004) “The recruitment of motor units follows the size principle; that is, the size of the recruited motor unit increases as the level of tension increases. This leads us to conclude that, initially, smaller motor units are recruited, whilst larger ones are recruited later; this system enables movements to be performed in gradual stages.” ‘This is reflected in movements that require high force; when maximum contraction is required, all motor units work together at the highest level of excitation’ (Thrasivoulos Paxinos, 2004, p. 82) In addition to the adaptation resulting in a reduction in muscle contraction time and a high degree of coordination between the neuromuscular system during contractions, achieved through the improvement of neural responses brought about by exercise This has been confirmed by some scientists: during strength training, neurological changes occur that reduce the time required to recruit motor units and increase the tolerance of motor neurons to high nerve impulses (Komi, 1992, p. 102). The researcher therefore considers that the results observed in the electrical activity indices reflect the extent to which the nervous and muscular systems have developed and adapted in response to the exercises used This led to an increase in peak muscle strength and an improvement in the rate of force production, on the one hand through greater recruitment of motor units, and on the other hand through improved contraction time and muscle contraction speed; consequently, the muscles under investigation demonstrated their efficiency in force

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

production. Furthermore, the balance in the work between the agonist and antagonist muscles led to an increase in force production. Since the muscular force resulting from the net interaction between the antagonist and agonist muscles during the effort exerted by the player at the moment of push-off and strike must be of a high magnitude, as it represents the final outcome of the body's muscles acting on the joints involved in performance (Al-Kilani, 2000, p. 179). This was a distinguishing feature of the members of the experimental group, as neuromuscular facilitation exercises for the receptors had a significant effect on increasing muscular balance, as confirmed by (Abdulaziz Al-Nimr and Neriman Al-Khatib) As the inhibitory process that hinders maximum muscle activity can be eliminated, these exercises should be performed correctly and regularly to restore the natural length of shortened muscles and to achieve and maintain muscular balance, This improves the functional efficiency of the muscles, which manifests as enhanced physical and technical performance, thereby enabling the athlete to perform movements with a wide range of motion and with optimal production of strength and speed (Al-Khatib, 2017, p. 305), which represents the high degree of coordination and harmony between the agonist and antagonist muscle groups at work during the process of generating the energy required for muscle force production. As regards the results of the strength endurance test (grip strength), there are differences in favour of the distance tests, as the results presented in Table 6 show an improvement in the distance tests for the experimental group. The researcher attributes this improvement to the exercises used, which were selected and guided in a scientific manner and designed to simulate the player's performance Through the involvement of the major joints and muscles involved in performance, and the resulting physical benefits and increased strength as an inevitable consequence of regularly practising exercises designed to achieve the best possible results in order to reach the desired goal, as (Risan Kharib and Ali Turki) state that "muscle strength holds a special place within the training programmes for all sporting activities, as it is one of the key factors in performance; the majority of training theories emphasise the need for muscle strength to be developed through specific training, Through exercises that approximate the actual nature of the technical performance of the specialised event. (Turki, 2002, p. 35)

Conclusions

1- The study revealed functional measurements within the normal range and no critical functional measurements were recorded.

2-The exercises had a positive effect on the development of strength endurance.

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
https://jcope.uobaghdad.edu.iq

3-The exercises used had a noticeable effect on improving the electrical activity of the muscles under study in the 'peak' variable among members of the training group.

Appendices

Schedule of exercises for the training unit in the CrossFit hall

Objective: Endurance
Duration: 31 minutes

NO	exercises	Intensity of the exercise	Repetitions	time	Rest between repetitions	The rest between the sets	Total performance time
1	25 kg dumbbell bench press (facing each other)	%89	2	25 Second	100Second	60Second	335Second
2	100 kg front squat with barbell	%89	2	30 Second	120Second	60Second	390Second
3	20 kg dumbbell jump	%84	2	30 Second	120Second	60Second	390Second
4	Clean with blocks plus shoulder press	%89	2	30 Second	120Second	60Second	330Second
5	Lying abdominal crunches holding a 10 kg disc	%89	3	25 Second	100Second	60Second	335Second
6	Incline dumbbell flyes + pull-ups	%89	3	30 Second	120Second	60Second	390Second
7	Barbell pull-ups to the neck	%84	3	30 Second	120Second	60Second	390Second
8	5 kg dumbbell lateral raises, front	%89	3	30 Second	120Second	60Second	330Second

Journal of Physical Education

Volume 38 –Special Issue– 2026 Open Access

P-ISSN: 2073-6452 , E-ISSN: 2707-5729
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Volume 38 – Special Issue – 2026

Journal of Physical Education

A Specialized Peer-Reviewed Quarterly Scientific Journal

in Sports Sciences, Published by the

College of Physical Education and Sports Sciences

University of Baghdad



http://jcope.uobaghdad.edu.iq
DOI: https://doi.org/10.37359/JOPE.V38(Special Issue)2026

P-ISSN: 2073-6452
E-ISSN: 2707-5729