



نشریه ذهن، حرکت و رفتار

دوره ۴ شماره ۲

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زبان انتشار: فارسی (چکیده و منابع به انگلیسی و فارسی)

نوع انتشار: الکترونیکی

مدیر مسئول: دکتر مهتا اسکندر نژاد

سردبیر: دکتر محمد تقی اقدسی

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مدیر اجرایی: دکتر سعید شکری



نشریه ذهن، حرکت و رفتار در ارزیابی کمیسیون نشریات علمی وزارت علوم، تحقیقات و فناوری در سال ۱۴۰۳، موفق به کسب درجه علمی "ب" گردید .

مجله ذهن، حرکت و رفتار، دانشگاه تبریز یک نشریه با شیوه داورى دو سو ناشناس به صورت دو فصلنامه و به طور **دسترسی آزاد به تمام متن مقالات** است که در حوزه تربیت بدنی و علوم ورزشی (رفتار حرکتی و روانشناسی ورزشی) منتشر می شود. این نشریه به منظور فراهم نمودن محیط فکری و فضایی علمی برای پژوهشگران ایرانی با تمرکز بر مباحث تربیت بدنی پایه گذاری شده است. این نشریه در پاسخ به پیشرفت های صورت گرفته در این حوزه از علم انتشار یافته و هدف آن انتشار مقالات پژوهشی و مروری، با کیفیت بالاست که یافته های مرتبط با موضوعات مهم رفتار حرکتی و روانشناسی ورزشی را گزارش می دهند. مطالب ارائه شده به مجله باید تحقیقات اصیل و ناب باشد و قبلاً جایی منتشر نشده باشد و نباید برای چاپ در اختیار نشریات دیگر قرار گرفته باشد.

انجمن علمی حامی: انجمن علمی رفتار حرکتی و روان شناسی ورزشی ایران

گروه علمی (موضوعی): علوم انسانی

زیر گروه: تربیت بدنی

درجه علمی: علمی

نوع داورى: دوسو کور

متوسط زمان تا اولین اقدام: یک روز



متوسط زمان تا اولین ارسال برای داوری: ۴ روز

میانگین بازه زمانی فرایند داوری پذیرش مقالات: ۳ تا ۴ ماه، حداقل دو داور

نوع انتشار: الکترونیکی

نوع دسترسی: رایگان (تمام متن)

نشریه «ذهن، حرکت و رفتار» نشریه ای علمی با هدف انتشار مقاله‌های علمی- پژوهشی و مروری- تحلیلی با مصوبه کمیسیون سیاست گذاری، پایش و ارتقاء نشریات علمی دانشگاه تبریز به شماره ۱۰۰۱/د/۳۵ به تاریخ ۱۳۹۱/۱۱/۲۱ تاسیس گردیده است .

این نشریه به صورت دو زبانه می باشد که مقالات فارسی پذیرفته شده شامل یک چکیده بلند انگلیسی می باشد. همچنین نویسندگانی که علاقمند به چاپ مقاله کامل به صورت انگلیسی می باشند نیز می توانند مقالات خود را ارسال نمایند (زمانبندی بررسی و داوری مقالات انگلیسی در مدت زمان کمتری نسبت به مقالات فارسی صورت خواهد گرفت.



در ادامه چکیده فارسی، انگلیسی و چکیده مبسوط انگلیسی مقالات چاپ شده در [دوره ۴ شماره ۲](#) نشریه ذهن، حرکت و رفتار نمایش داده شده است. همچنین جهت دسترسی به متن کامل مقالات با کلیک روی کد Doi هر مقاله مستقیماً به متن کامل مقاله مورد نظر دسترسی پیدا خواهید کرد.



فهرست مقالات (دوره ۴ شماره ۲)

طراحی و اعتبارسنجی نرم افزار تصمیم گیری در فوتسال

محمد حسین درخشانی؛ مهدی شهبازی؛ محمد حسین ستارزاده

سهم تمرین مسدود و تصادفی در تداخل زمینه‌ای نظام‌دار فزاینده در یادگیری پرتاب دارت

منصوره بختیاری زاده؛ رسول عابدان زاده؛ اسماعیل صائمی

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الیاس زمانی؛ داریوش خواجه‌وی؛ علیرضا فارسی؛ الله عرب عامری

تأثیر خودگویی ارگانیک و راهبردی بر عملکرد شوت بسکتبال

حکیمه رسولی پیروزیان؛ امیر دانا

مطالعه رابطه بین اعتماد به نفس با انسجام گروهی در بین ورزشکاران تیم ملی کبدی ساحلی

محسن احمدی؛ هادی صبوری

تأثیر تداخل زمینه‌ای بر اکتساب و یادگیری سرویس والیبال، با اثر تعدیل‌کنندگی میزان هیجان‌خواهی فراگیران

ظهره ناصری؛ محمدتقی اقدسی؛ سیدحجت زمانی ثانی

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فرناز ترابی؛ زینب السادات حجازی دهاقانی؛ مهدیه زمان خانپور

مقایسه اثربخشی آموزش غیرخطی افتراقی و سنتی بر یادگیری و انگیزش استارت شناگران مبتدی

مهران فقیه سلیمانی؛ شهاب پروین پور؛ فرهاد قدیری؛ رسول یاعلی

رابطه ناهنجاری‌های کف پا با مهارت‌های حرکتی درشت در کودکان

زهره فتحی رضائی

ارائه مدل علی خودآگاهی در بیماران مبتلا به ام اس بر اساس تحول دیداری-فضایی؛ نقش واسطه‌ای تعادل ذهنی (کاربرد تحلیل

مسیر)

مهدی یوسف‌وند؛ مرضیه محمداصلائی؛ احمد حق؛ الهه آخشی؛ زهرا زیار

تأثیر ۸ ماه تمرین با مهارت حرکتی بنیادی در یک محیط شناختی حرکتی مبتنی بر رویکرد TARGET بر ترکیب بدن و عملکرد

حرکتی کودکان دارای وضعیت اقتصادی پایین

محمد حسین زمانی؛ کریم بهارلویی؛ ایوب هاشمی؛ حمید قبادی؛ منصور هیلاوی نیسی



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Design and Standardization of Decision-Making Software in Futsal

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Abstract

The present study aimed to design and standardization a software application for assessing decision-making speed and accuracy in futsal players. Given the lack of standardized tools with confirmed validity and reliability in this domain, the software was developed using JavaScript, HTML, and CSS programming languages and was deployed on a Windows platform. A set of 70 selected images from international futsal competitions, curated by experienced coaches and instructors, was loaded into the software as test stimuli. During the test, participants were required to make the most appropriate decision-pass, shoot, or dribble-in the shortest possible time and with high accuracy. To assess the concurrent validity of the software, its results were compared with those of an established football decision-making assessment tool. Reliability was evaluated through a test-retest procedure with a one-week interval, and Cronbach's alpha coefficient was calculated. The results indicated that the developed software demonstrated satisfactory validity for both decision-making speed ($r = 0/87$) and accuracy ($r = 0/78$). Additionally, the reliability values for speed ($r = 0/82$) and accuracy ($r = 0/73$) were deemed acceptable. Given its low cost, user-friendly interface, and independence from internet connectivity, the introduced software serves as a practical and flexible tool for researchers and coaches alike.

Keywords: Decision-Making, Speed and Accuracy, Cognitive Assessment, Futsal, Validity and Reliability.



Extended Abstract

Background and Purpose

Decision-making is a fundamental cognitive skill essential for high-level performance in dynamic team sports such as futsal. In these fast-paced and highly interactive environments, players must continuously interpret complex game situations and respond with precise, timely decisions under intense physical and psychological pressure. Effective decision-making directly influences the outcomes of both individual and team performance, often determining success or failure in critical moments of play. Despite its recognized importance, there remains a notable lack of standardized, domain-specific tools designed to accurately assess decision-making speed and accuracy within the context of futsal. Existing assessment methods-including video-based tasks, computer simulations, and virtual reality systems-although useful, are often limited by several practical constraints. These may include high financial costs, the need for specialized equipment or software, limited portability, and reliance on consistent internet connectivity, which can hinder their accessibility and application, particularly in resource-limited training environments. Given these challenges, there is a pressing need for the development of more accessible, reliable, and ecologically valid tools tailored specifically to the cognitive demands of futsal. The present study aims to fill this gap by designing and validating a practical software-based tool that allows for the assessment of cognitive decision-making in futsal players. This tool is intended to be cost-effective, easy to use, and adaptable across a variety of training settings, making it suitable for coaches, sport psychologists, and researchers alike. By offering a practical alternative to existing methods, this software has the potential to enhance talent identification, performance analysis, and cognitive training in the sport of futsal.

Materials and Methods

This applied developmental study involved the design and implementation of a Windows-based software application using JavaScript, HTML, and CSS. Seventy match-play images were selected from international futsal competitions by a panel of five expert coaches. These images were integrated into the software as decision-making stimuli. Participants were instructed to choose the optimal action-pass, shoot, or dribble-for each scenario, aiming for both accuracy and speed. The software consists of three main sections: a familiarization phase with 20 training images, an instructional module, and the main test session with 70 scenarios. Upon completion, the software automatically calculates key performance indicators such as response time, total test duration, and the number of correct decisions, which are then exported in Excel format for further analysis. Twenty university-level futsal players (mean age = 23 ± 5.5 years), all with prior playing experience, voluntarily participated in the study. To establish concurrent validity, participants completed both the newly developed futsal software and an established football decision-making test (Bohloul et al., 2024), using a counterbalanced design to control for order effects. Test-retest reliability was assessed by repeating the futsal test after one week under identical conditions.

Results

The concurrent validity analysis revealed strong correlations between the new futsal software and the existing football tool. Pearson correlation coefficients were $r = 0.87$ for decision-making speed and $r = 0.78$ for accuracy, both statistically significant at $p < 0.01$. These results support the tool's validity in



measuring core decision-making constructs. Regarding reliability, Cronbach's alpha values were 0/82 for speed and 0/73 for accuracy, indicating good internal consistency and test-retest reliability. These findings demonstrate that the software provides stable and replicable results over time.

Conclusion

This study presents the development and validation of an innovative, accessible tool specifically designed to assess decision-making performance in futsal athletes. By integrating high-resolution, context-rich images derived from real competitive scenarios, the software effectively simulates the cognitive demands of in-game decision-making. Its structured yet concise format reduces cognitive fatigue while maintaining the complexity necessary to reflect realistic playing situations. Unlike many traditional assessment methods that rely on expensive equipment, specialized software, or stable internet access, this tool operates offline and is both technically and financially accessible. Its intuitive interface and compatibility with various devices enhance its usability in a wide range of training and research settings.

The software's strong concurrent validity and solid test-retest reliability suggest that it can serve as a trustworthy and replicable instrument for evaluating key cognitive parameters-namely decision speed and accuracy-in futsal players. These qualities make it a valuable resource not only for coaches seeking to monitor and enhance athlete performance but also for researchers and sport psychologists interested in exploring the cognitive aspects of game intelligence. Additionally, the tool's modular design allows for easy adaptation to other team sports by simply replacing the image-based stimuli with sport-specific scenarios, making it potentially useful for disciplines such as basketball, handball, or rugby.

Looking ahead, future research should aim to evaluate the software's ecological validity across broader participant populations, including different age groups, competitive levels, and genders. Moreover, assessing its responsiveness under varied psychological states-such as time pressure, cognitive fatigue, or acute stress-could provide deeper insights into its applicability for real-world performance monitoring. Overall, this tool represents a promising advancement in bridging the gap between laboratory-based cognitive assessment and the fast-paced, high-stakes demands of competitive team sports.

Funding

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Authors' Contributions

All authors have participated in designing, implementing and writing all parts of the present study.

Conflicts of Interest

The authors declared no conflict of interest.

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طراحی و استانداردسازی نرم افزار ارزیابی تصمیم گیری در فوتسال

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چکیده

هدف پژوهش حاضر، طراحی و استانداردسازی نرم افزار ارزیابی سرعت و دقت تصمیم گیری در بازیکنان فوتسال بود. با توجه به خلأ ابزارهای استاندارد در این حوزه، نرم افزار مذکور با بهره گیری از زبان های برنامه نویسی JavaScript، HTML و CSS طراحی و بر روی بستر ویندوز اجرا شد. مجموعه ای شامل ۷۰ تصویر منتخب از رقابت های بین المللی فوتسال، به عنوان محرک های آزمونی توسط مربیان و مدرسان مجرب انتخاب و در نرم افزار بارگذاری شد. در این آزمون، شرکت کنندگان باید در کوتاه ترین زمان ممکن و با دقت بالا، مناسب ترین تصمیم را از میان گزینه های پاس، شوت یا دریبل اتخاذ کنند. برای بررسی روایی همزمان نرم افزار، نتایج حاصل با یک نرم افزار معتبر سنجش تصمیم گیری در فوتبال مقایسه شد. همچنین، پایایی ابزار با اجرای مجدد آزمون پس از یک هفته و محاسبه ضریب آلفای کرونباخ مورد ارزیابی قرار گرفت. نتایج نشان داد که نرم افزار طراحی شده از روایی مطلوبی در شاخص های سرعت ($r=0.87$) و دقت تصمیم گیری ($r=0.78$) برخوردار است. همچنین، مقادیر پایایی برای سرعت ($r=0.82$) و دقت ($r=0.73$) نیز در حد قابل قبول بودند. نرم افزار معرفی شده، با تکیه بر هزینه پایین، رابط کاربری ساده و عدم نیاز به اتصال اینترنت، ابزار کاربردی و منعطفی برای پژوهشگران و مربیان محسوب می شود.

کلید واژه ها: تصمیم گیری، سرعت و دقت، ارزیابی شناختی، فوتسال، روایی و پایایی.



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The Contributed Blocked and Random Practice in the Systematic Incremental Contextual Interference on Learning of Throwing Darts

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Abstract

The aim of this study was investigate of the contributed blocked and random practice in the systematic incremental contextual cnterference on learning to throw darts. For this purpose, 60 children aged 9-12 years were selected through convenience sampling. Then, the participants performed the dart throwing pre-test. After the pre-test, the participants were randomly divided into 6 groups: 100% blocked, 70% randomized-30% blocked, 50%-randomized 50% blocked, 30% randomized- 70% blocked, 100% randomized and 100% constant. Each group was given a test run in accordance with the guidelines. Acquisition step was performed in three sessions. Each participant made 60 attempts during each of the 6 blocks of 10 attempts. After the end of the acquisition phase, a post-test was performed and 24 hours later, retention and transfer test carried out. For data analysis used the one-way ANOVA, Mixed ANOVA and Bonferron's post hoc test. The results showed that there was no significant difference between the groups in the acquisition stag, but in the retention and transferr test the group of a Systematic Incremental 70% randomized-30% blocked of the other groups perform better. It was also found that the 100% randomized group had a better than 100% blocked and 100% constant. Therefore, sports instructors and educators can use more systematic Incremental exercises that are more contributing to a randomized exercise in learning motor skills such as throwing darts.

Keywords: Contextual interference, Blocked practice, Random practice, Systematic incremental, Throwing darts.



Extended Abstract

Background and Purpose

Helping children develop effective motor skills is a central goal in physical education and motor learning. One strategy that has received considerable attention is contextual interference—the idea that practicing different skills in a varied, unpredictable order can enhance long-term learning. This is often compared to blocked practice, where a single skill is repeated over and over. While blocked practice tends to yield better performance during initial learning, it doesn't always translate into strong long-term retention or adaptability. In contrast, random practice, though more challenging upfront, tends to support better memory and application of skills over time. But for children or beginners, full randomization can sometimes be too difficult early on. To bridge this gap, this study looked at whether a systematic, incremental approach—gradually mixing random and blocked practice—could offer the best of both worlds. Specifically, the study focused on dart throwing, a skill requiring precision and control, and explored how different combinations of random and blocked practice affected children's ability to learn, remember, and adapt their skills. The goal was to find out whether there's an ideal balance of practice variability that supports both short-term success and long-term growth.

Materials and Methods

Sixty children aged 9–12 took part in this study, all of whom had no prior experience with dart throwing and met basic health criteria. After completing a pre-test to establish their starting skill level, participants were randomly assigned to one of six groups, each following a different practice structure over three sessions: 100% Blocked, 70% Random / 30% Blocked, 50% Random / 50% Blocked, 30% Random / 70% Blocked, 100% Random, 100% Constant (same task every time). Each session included 60 dart throws, with target distance or angle changes depending on the group's assigned practice style. After the training period, participants completed a post-test, followed by retention and transfer tests the next day to evaluate how well they remembered the skill and how flexibly they could apply it in a new situation. Statistical tests were used to analyze performance changes over time and between groups.

Results

During the practice sessions, there were no significant performance differences between the groups, suggesting that practice structure didn't strongly affect immediate results. This aligns with other research showing that blocked practice helps short-term performance due to its simplicity. However, in the retention and transfer phases, clear differences emerged. The 70% Random / 30% Blocked group performed the best in both retention and transfer tests, demonstrating that a balanced mix of predictability and variability helped solidify the skill and apply it in new situations. The 100% Random group also did well, though slightly behind the 70/30 group. On the other hand, the Blocked and Constant groups—which lacked variety—showed the weakest long-term learning and adaptability. These findings support the idea that a moderate level of contextual interference, introduced in a gradual, structured way, can enhance both retention and transfer of motor skills, especially in children.



Conclusion

This study reinforces the importance of structured practice variability in motor learning. While completely random practice promotes long-term adaptability, it can be overwhelming for young learners. A more balanced, incremental approach—like the 70% Random / 30% Blocked model—offers a supportive learning pathway that fosters both initial competence and future flexibility. For educators, coaches, and therapists, these results suggest that gradually increasing task variability is an effective strategy, especially when teaching precision-based skills like dart throwing or other fine motor tasks. Tailoring practice to match a child's developmental level—then slowly introducing complexity—can lead to more meaningful, lasting improvements.

Finally, the study encourages future research to explore how this approach applies to other age groups, skills, and populations, including those with learning or motor challenges. Adding neurocognitive measures could also help explain how and why these practice effects occur, ultimately leading to smarter, more personalized training programs.

Keywords: Contextual interference, Blocked practice, Random practice, Systematic incremental, Throwing darts

Funding

This study received no funding from public, commercial, or nonprofit organizations.

Authors' Contributions

All authors have participated in designing, implementing and writing all parts of the present study.

Conflicts of Interest

The authors declared no conflict of interest.

Acknowledgement

We sincerely thank all the students who collaborated in this research.



سهم تمرین مسدود و تصادفی در تداخل زمینه‌ای نظام‌دار فزاینده در یادگیری پرتاب دارت

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چکیده

هدف از پژوهش حاضر تأثیر سهم تمرین مسدود و تصادفی در تداخل زمینه‌ای نظام‌دار فزاینده در یادگیری پرتاب دارت بود. برای این منظور تعداد ۶۰ نفر از کودکان ۹-۱۲ سال به صورت نمونه‌گیری در دسترس انتخاب شدند. سپس، از تمام شرکت‌کنندگان پیش‌آزمون پرتاب دارت گرفته شد. پس از انجام پیش‌آزمون، شرکت‌کنندگان به صورت تصادفی در ۶ گروه مسدود ۱۰۰ درصد، مسدود ۷۰ درصد-تصادفی ۳۰ درصد، مسدود ۵۰ درصد-تصادفی ۵۰ درصد، مسدود ۳۰ درصد-تصادفی ۷۰ درصد، تصادفی ۷۰ درصد، تصادفی ۱۰۰ درصد و ثابت ۱۰۰ درصد قرار گرفتند. هر گروه با توجه به دستورالعمل در نظر گرفته شده به اجرای آزمون پرداختند. مرحله اکتساب در سه جلسه انجام شد. شرکت‌کنندگان در هر جلسه ۶۰ کوشش (۶ بلوک ۱۰ کوششی) انجام داد. پس از پایان مرحله اکتساب، پس‌آزمون با انجام ۱۰ کوشش انجام شد و ۲۴ ساعت بعد از پس‌آزمون، آزمون یادداری و ۱۵ دقیقه بعد آزمون انتقال اجرا شد. از آزمون تحلیل واریانس یک‌راهه و تحلیل واریانس مرکب و نیز آزمون تعقیبی بونفرونی جهت تجزیه و تحلیل داده‌ها استفاده شد. نتایج نشان داد که در مرحله اکتساب بین گروه‌ها تفاوت معناداری وجود نداشت ولی در مرحله یادداری و انتقال گروه فزاینده نظام‌دار مسدود ۳۰ درصد-تصادفی ۷۰ درصد از بقیه گروه‌ها عملکرد بهتری داشت. همچنین مشخص شد که گروه تصادفی ۱۰۰ درصد نسبت به گروه مسدود ۱۰۰ درصد و ثابت ۱۰۰ درصد عملکرد بهتری داشت. بنابراین، مربیان ورزشی و معلمان تربیت بدنی می‌توانند از تمرینات فزاینده نظام‌دار که سهم تمرین تصادفی بیشتر باشد در یادگیری مهارت‌های حرکتی از قبیل پرتاب دارت استفاده کنند.

کلید واژه‌ها: تداخل زمینه‌ای، تمرین مسدود، تمرین تصادفی، فزاینده نظام‌دار، پرتاب دارت.



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The impact of spectator motivation on event attachment in sports with the mediating role of satisfaction.

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Abstract

The purpose of this study was to determine the impact of spectator motivation on attachment to a sports event, with the mediating role of satisfaction. This research is descriptive-correlational and was conducted as a field study. The statistical population consisted of all spectators of equestrian events in Gonbad Kavous, from which 233 individuals were selected as the sample using convenience sampling. After confirming face and content validity, data were collected using the Maxton Motivation Questionnaire ($\alpha = 0.93$; CR = 0.95), the Lee et al. Event Attachment Questionnaire ($\alpha = 0.92$; CR = 0.94), and the Trail and James Satisfaction Questionnaire ($\alpha = 0.88$; CR = 0.93). Data were analyzed using the Partial Least Squares method with SPSS and Smart PLS software. The results of data analysis revealed that spectator motivation has a significant positive impact on event attachment ($\beta = 0.43$; CR = 5.51) and satisfaction ($\beta = 0.86$; CR = 42.17), while satisfaction also positively and significantly influences event attachment ($\beta = 0.44$; CR = 5.47). Additionally, spectator motivation indirectly affects attachment to the equestrian event in Gonbad Kavus through satisfaction. Based on the findings, it is recommended that event organizers identify and enhance spectator motivation to increase satisfaction among spectators. This will lead to greater satisfaction with the event and stronger attachment to it among spectators.

Keywords: Event Engagement, Customer Satisfaction, Equestrian, Motivational Factors.



Extended Abstract

Background and Purpose

Nowadays, sporting events are not only regarded as athletic competitions but also play a significant role as social and cultural phenomena in attracting and engaging audiences. Spectators, as the beating heart of these events, participate with diverse motivations and expectations. The motivation of spectators, whether emotional, social, or professional, can directly or indirectly influence their attachment to sporting events. On the other hand, spectator satisfaction with the overall event experience, as a mediating factor, can deepen this relationship and foster a lasting connection between audiences and sporting events. This study aims to examine the impact of spectator motivation on attachment to sporting events, with the mediating role of satisfaction, seeking to provide an analytical framework for better understanding these interactions and enhancing the spectator experience in sports environments. Therefore, the purpose of the present research was to determine the effect of spectator motivation on attachment to sporting events, with the mediating role of satisfaction.

Materials and Methods

This study, based on its primary objective, is classified as applied research. In terms of design, it is a descriptive-correlational study, as it seeks to measure the relationships between variables within a specific model, conducted in a field setting. The statistical population of this research consisted of all spectators of the Gonbad Kavous equestrian event. From this population, 233 individuals were selected as the sample using convenience sampling. To collect data, after confirming face and content validity, the following questionnaires were used: the Maxston Motivation Questionnaire ($\alpha = 0.93$; CR = 0.95), the Event Attachment Questionnaire by Lee et al. ($\alpha = 0.92$; CR = 0.94), and the Trail and James Satisfaction Questionnaire ($\alpha = 0.88$; CR = 0.93). Data were analyzed using the Partial Least Squares (PLS) method with the help of SPSS and Smart PLS software. In the Structural Equation Modeling (SEM) approach using Partial Least Squares (PLS-SEM), the measurement model fit and structural model fit were assessed. To evaluate the measurement model fit, reliability and validity indices were used. For reliability assessment, factor loadings, Cronbach's alpha, and composite reliability were examined, while for validity, convergent validity and discriminant validity were assessed. To evaluate the structural model fit, the indices R^2 and Q^2 were used. All examined indices met acceptable thresholds and were confirmed.

Results

The results of data analysis revealed that spectator motivation has a positive and significant impact on event attachment (0.43) and satisfaction (0.86). Additionally, satisfaction positively and significantly influences event attachment (0.44). The T-statistic (significance coefficient) for all paths exceeded 1.96, indicating that all paths are significant at the 0.05 level. Furthermore, spectator motivation indirectly affects attachment to the Gonbad Kavous equestrian event through the mediating role of satisfaction. These findings highlight the importance of both direct and indirect pathways in understanding the relationship between spectator motivation, satisfaction, and event attachment.

Conclusion



The results of this study demonstrate that spectator motivation plays a significant role in shaping attachment to sporting events. With a direct impact coefficient of 0.43, spectator motivation significantly influences event attachment, underscoring the importance of fostering strong and diverse motivations to attract and retain audiences. Furthermore, spectator motivation has a substantial positive effect on satisfaction (0.86), indicating that stronger and more varied motivations lead to higher levels of spectator satisfaction with the event. Satisfaction, in turn, positively affects event attachment (0.44), highlighting its role as a key mediating factor that strengthens the connection between motivation and attachment. These findings suggest that enhancing spectator attachment to sporting events requires more than just focusing on motivation; it is equally crucial to prioritize the overall spectator experience and satisfaction. The case study of the Gonbad Kavous equestrian event illustrates that creating an engaging and responsive environment that meets the needs and expectations of spectators can significantly boost satisfaction and, ultimately, foster lasting attachment to the event. These insights are particularly valuable for event managers and organizers, as they emphasize the importance of developing targeted strategies to enhance both spectator motivation and satisfaction, thereby ensuring the long-term success of sporting events.

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Authors' Contributions

All authors have participated in designing, implementing and writing all parts of the present study.

Conflicts of Interest

The authors declared no conflict of interest.

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تأثیر انگیزش تماشاگران بر دلبستگی به رویداد ورزشی با نقش میانجی رضایت‌مندی

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چکیده

هدف این پژوهش تعیین تأثیر انگیزش تماشاگران بر دلبستگی به رویداد ورزشی با نقش میانجی رضایت‌مندی بود. این پژوهش از نوع توصیفی-همبستگی است که به شکل میدانی انجام شده است. جامعه آماری این پژوهش را کلیه تماشاگران سوارکاری گنبدکاووس تشکیل دادند. از بین آنها ۲۳۳ نفر به صورت نمونه‌گیری در دسترس به عنوان نمونه انتخاب شدند. برای گردآوری داده‌ها پس از تایید روایی صوری و محتوایی از پرسش‌نامه‌های انگیزش بن‌ماکستون ($\alpha=0/93$ ؛ $CR=0/95$)، دلبستگی به رویداد لی و همکاران ($\alpha=0/92$ ؛ $CR=0/94$)، و رضایت‌مندی تریل و جیمز ($\alpha=0/88$ ؛ $CR=0/93$) استفاده شد. داده‌ها به کمک روش حداقل مربعات جزئی و با استفاده از نرم‌افزارهای اسپاس و اسمارت پی‌ال‌اس تحلیل شد. نتایج حاصل از تحلیل داده‌ها نشان داد که انگیزش تماشاگران بر دلبستگی به رویداد ($\beta=0/43$ ؛ $CR=0/51$) و رضایت‌مندی ($\beta=0/86$ ؛ $CR=0/42$) و رضایت‌مندی بر دلبستگی به رویداد ($\beta=0/44$ ؛ $CR=0/47$) تأثیر مثبت و معنادار دارد. همچنین انگیزش تماشاگران به واسطه رضایت‌مندی بر دلبستگی به رویداد ورزشی سوارکاری گنبدکاووس تأثیر دارد. با توجه به یافته‌های پژوهش حاضر به مسئولان برگزاری رویدادهای ورزشی پیشنهاد می‌شود که با شناسایی و تقویت انگیزش تماشاگران، رضایت‌مندی را در بین تماشاگران افزایش دهند که این امر موجب رضایت‌مندی آنان از رویداد شده و دلبستگی به رویداد در بین تماشاگران بیشتر خواهد شد.

کلید واژه‌ها: دلبستگی به رویداد، رضایت مشتری، سوارکاری، عوامل انگیزشی.



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The Effect of Exercise Based on the Sports Education Model on Motor Development and Motor Creativity of Overweight Students

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Abstract

Obesity and overweight have physical (motor skills) and psychological (motor creativity) complications in children and adolescents. Therefore, the present study was conducted with the aim of investigating the effect of exercise-based training on motor development and motor creativity of overweight students. In this semi-experimental study, which was conducted with a pre-test-post-test design, 30 overweight students aged 13 to 14 in Bakherz were selected based on voluntary participation based on the inclusion criteria and randomly assigned to two groups: the exercise training model and the traditional education model. In the pre-test phase, participants were administered the Broninex-Ozeretsky motor proficiency test and motor creativity test. In the training phase, which lasted for 12 weeks, 2 sessions per week, and each session lasted 45 to 50 minutes in the school hall, the sports training groups (Monday and Wednesday from 10 to 11 am) and traditional training groups (Sunday and Tuesday from 10 to 11 am) engaged in the relevant exercises (futsal). 48 hours after the last session, the post-test phase was conducted in the same way as the pre-test. The data were analyzed using factorial analysis of variance (2 groups in 2 measurement stages). The results showed that the sports training model significantly improved the motor development and motor creativity of overweight students. However, other results showed that traditional training did not have a significant effect on the motor development and motor creativity of overweight students. Therefore, based on the results, the sports training model may be an effective educational method for teachers who teach motor skills and motor creativity to overweight students.

Keywords: Sports Training, Traditional Training, Motor Skills, Creativity, Overweight.



Extended Abstract

Background and Purpose Adolescent overweight and obesity represent a growing global public health crisis, with significant physical and psychological consequences. Overweight adolescents often exhibit lower levels of motor competence and motor creativity compared to their normal-weight peers. In Iran, studies have shown a rising trend in the prevalence of overweight and obesity among youth, alongside gaps in effective preventive interventions. Schools, as key environments for youth development, are expected to address students' diverse needs, yet traditional physical education models often fall short in engaging overweight students. The Sports Education Model (SEM), a student-centered and structured approach, has gained attention for its potential to enhance physical, cognitive, and social outcomes. This study aimed to investigate the effect of exercise based on the Sports Education Model on motor development and motor creativity in overweight students.

Materials and Methods This semi-experimental study employed a pre-test–post-test design with a control group. The statistical population included 13–14-year-old overweight boys in Bakharz, Iran, identified using CDC BMI growth charts. A total of 30 students were selected through voluntary participation and randomly assigned to two groups: SEM-based training and traditional training (15 students each). The intervention lasted 12 weeks, with two 45–50-minute futsal sessions per week conducted in the school gym. The SEM group trained on Mondays and Wednesdays, while the traditional group trained on Sundays and Tuesdays. Motor development was assessed using the Bruininks–Oseretsky Test of Motor Proficiency (BOTMP), and motor creativity was measured using the Bertsch test, which evaluates fluency, flexibility, and originality in movement. Data were analyzed using factorial ANOVA across two measurement stages.

Results The findings revealed that the SEM-based training significantly improved both motor development and motor creativity in overweight students. Participants in the SEM group showed notable gains in balance, coordination, agility, and creative movement dimensions, while the traditional training group exhibited no significant changes. These results highlight the effectiveness of SEM in promoting both physical and psychological growth among overweight adolescents.

Conclusion The Sports Education Model, with its emphasis on student autonomy, peer collaboration, and role diversity, offers a promising alternative to traditional physical education for overweight students. By fostering engagement, decision-making, and responsibility, SEM contributes to the development of motor skills and creative movement. It is recommended that physical education teachers and curriculum designers incorporate SEM principles to better support the holistic development of students with special physical needs.

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Authors' Contributions

All authors have participated in designing, implementing, and writing all parts of the present study.



Conflicts of Interest

The authors declared no conflict of interest.

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تأثیر تمرین مبتنی بر مدل آموزشی ورزشی بر رشد حرکتی و خلاقیت حرکتی دانش آموزان دارای اضافه وزن

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چکیده

چاقی و اضافه وزن دارای عوارض فیزیکی (مهارت‌های حرکتی) و روانشناختی (خلاقیت حرکتی) در کودکان و نوجوانان می‌باشد. بنابراین مطالعه حاضر با هدف تأثیر تمرین مبتنی بر مدل آموزش ورزشی بر رشد حرکتی و خلاقیت حرکتی دانش‌آموزان دارای اضافه وزن انجام گرفت. در این پژوهش نیمه تجربی که با طرح پیش‌آزمون-پس‌آزمون انجام گرفت، از بین دانش‌آموزان ۱۳ تا ۱۴ ساله دارای اضافه وزن شهر باخرز به صورت مشارکت داوطلبانه، ۳۰ دانش‌آموز براساس معیارهای ورود و انتخاب به صورت تصادفی در دو گروه مدل آموزش ورزشی و آموزش سنتی قرار گرفتند. در مرحله پیش‌آزمون از شرکت‌کنندگان آزمون تبهر حرکتی برونینکس اوزرتسکی و خلاقیت حرکتی گرفته شد. در مرحله تمرین که به مدت ۱۲ هفته و هر هفته ۲ جلسه و هر جلسه ۴۵ تا ۵۰ دقیقه در سالن مدرسه به طول انجامید گروه‌های آموزش ورزشی (روزهای دوشنبه و چهارشنبه ساعت ۱۰ تا ۱۱ صبح) و آموزش سنتی (روزهای یکشنبه و سه‌شنبه ساعت ۱۰ تا ۱۱ صبح) به تمرینات مربوطه (فوتسال) پرداختند. ۴۸ ساعت بعد از آخرین جلسه، مرحله پس‌آزمون همانند پیش‌آزمون اجرا شد. داده‌ها به روش تحلیل واریانس عاملی (۲ گروه در ۲ مرحله اندازه‌گیری) تحلیل شد. نتایج نشان داد که مدل آموزش ورزشی باعث بهبود معنی‌دار رشد حرکتی و خلاقیت حرکتی دانش‌آموزان دارای اضافه وزن گردید. اما دیگر نتایج نشان داد که آموزش سنتی بر رشد حرکتی و خلاقیت حرکتی دانش‌آموزان دارای اضافه وزن تأثیر معنی‌داری ندارد. بنابراین، براساس نتایج مدل آموزش ورزشی ممکن است یک روش آموزشی موثر برای معلمان باشد که مهارت‌های حرکتی و خلاقیت حرکتی را به دانش‌آموزان دارای اضافه وزن آموزش می‌دهند.

کلید واژه‌ها: آموزش ورزشی، آموزش سنتی، مهارت حرکتی، خلاقیت، اضافه وزن.



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The Effect of Organic and Strategic Self-Talk on Basketball Shooting Performance

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Abstract

Given the identification of different forms of self-talk and their study in the field of sports. The aim of the present study was to compare two methods of organic self-talk of a goal-directed type and strategic self-talk on athletes' basketball shooting performance. The present study was conducted in terms of experimental content and as a pre-test-post-test with a control group. For this purpose, 60 skilled basketball players were voluntarily selected and randomly divided into three groups of 20, including the Goal-Directed self-talk group, strategic self-talk, and control. In the pre-test phase, motor performance was measured using a three-minute basketball shooting task; then, in the post-test phase, the three-minute shooting test was held again in a competitive manner; but in this phase, the strategic self-talk group uses self-talk phrases that are determined in advance by the coach; the Goal-Directed self-talk group uses self-talk phrases purposefully, voluntarily, and arbitrarily, and the control group will not use any self-talk phrases. Performance is again measured based on the number of shots scored. The results of the analysis of covariance (ANCOVA) showed that both Goal-Directed and strategic self-talk led to improved motor performance in basketball shooting. Therefore, it seems that organic self-talk of a goal-directed type based on the challenges facing athletes can lead to improved performance.

Keywords: Organic Self-talk, Goal-Directed Self-talk, Strategic Self-Talk, Motor Performance.



Extended Abstract

Background and Purpose

Self-talk (ST) is a widely recognized cognitive strategy used by athletes to regulate thoughts, feelings, and ultimately, enhance performance. Research has differentiated between various types of self-talk, including strategic (e.g., "follow-through," "focus") and motivational (e.g., "you can do it"). However, a newer distinction has emerged between strategic self-talk (predetermined cue words focused on technique) and purposeful organic self-talk (spontaneously generated by the athlete but still goal-oriented). While strategic ST is well-studied, the efficacy of purposeful organic ST, particularly in precision tasks, is less understood.

The purpose of this study was to compare the effectiveness of purposeful organic self-talk and strategic self-talk on the performance of a basketball shooting task (specifically, the free throw) among female university students.

Materials and Methods

The study utilized a quasi-experimental design with a pre-test, intervention (practice) phase, and post-test. The participants were 45 female students (mean age 21.6) from Islamic Azad University, selected via convenience sampling and randomly assigned to one of three groups (n=15 each):

1. Purposeful Organic Self-Talk Group: Participants were trained to develop their own goal-oriented cue words.
2. Strategic Self-Talk Group: Participants were given standardized, pre-determined cue words (e.g., "focus," "relax," "shoot") focused on technique.
3. Control Group: Participants received no self-talk instructions.

All participants first completed a pre-test (10 free throws). The intervention phase consisted of 6 sessions (2 per week for 3 weeks), where participants practiced their assigned self-talk strategy while performing 30 free throws per session. A post-test (10 free throws) was administered in the final session. The dependent variable was shoot performance, scored based on a standard point system. Data were analyzed using ANCOVA (Analysis of Covariance) to compare post-test scores while controlling for pre-test differences.

Results

The descriptive findings showed that all three groups improved their performance from pre-test to post-test. However, the inferential analysis (ANCOVA) revealed a significant difference between the groups in the post-test scores, after controlling for the pre-test scores ($F(2, 41) = 19.33, p < 0.001$).

Post-hoc comparisons (LSD test) indicated that:

- The Strategic Self-Talk Group (mean = 7.33) performed significantly better than both the Purposeful Organic Self-Talk Group (mean = 5.20) and the Control Group (mean = 4.40).



- The Purposeful Organic Self-Talk Group also performed significantly better than the Control Group.

This demonstrates that while both forms of self-talk were effective, strategic self-talk led to the greatest performance enhancement.

Conclusion

The findings of this study support the effectiveness of self-talk as a cognitive intervention for improving motor skill performance. Both purposeful organic ST and strategic ST were shown to be more effective than no intervention (control).

However, the key conclusion is that strategic self-talk was significantly more effective than purposeful organic self-talk in enhancing basketball free throw performance. This suggests that for tasks requiring fine motor control and technical precision, standardized and technique-focused cue words (strategic ST) provide a more potent performance benefit than self-generated (organic) cues. These results have practical implications for coaches and sports psychologists in designing effective mental training programs for athletes.

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Authors' Contributions

All authors have participated in designing, implementing, and writing all parts of the present study.

Conflicts of Interest

The authors declared no conflict of interest.

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تأثیر خودگویی ارگانیک هدفمند و راهبردی بر عملکرد شوت بسکتبال

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چکیده

با توجه به مطرح شدن اشکال مختلف خودگویی و اهمیت مطالعه آنها در حوزه ورزش، هدف تحقیق حاضر مقایسه دو شیوه خودگویی ارگانیک از نوع هدفمند و راهبردی بر عملکرد پرتاب بسکتبال ورزشکاران بود. روش تحقیق حاضر بر حسب محتوا تجربی و به صورت پیش آزمون-پس آزمون با گروه کنترل انجام شد. بدین منظور، ۶۰ بازیکن بسکتبال ماهر به صورت داوطلبانه انتخاب شدند و به صورت تصادفی به سه گروه شامل گروه خودگویی هدفمند و خودگویی راهبردی و کنترل تقسیم شدند. در مرحله پیش آزمون، عملکرد حرکتی با استفاده از تکلیف شوت بسکتبال سه دقیقه‌ای اندازه گیری شد؛ سپس، در مرحله پس آزمون دوباره آزمون شوت سه دقیقه‌ای به صورت رقابتی برگزار شد؛ اما در این مرحله گروه خودگویی راهبردی از عبارت های خودگویی که از پیش توسط مربی تعیین می شود؛ استفاده می کند؛ گروه خودگویی هدفمند، ارادی و اختیاری از عبارت های خودگویی استفاده می کند و گروه کنترل از هیچ عبارت خودگویی استفاده نخواهد کرد. عملکرد بر اساس تعداد پرتاب های گل شده دوباره اندازه گیری می شود. نتایج تحلیل کواریانس (ANCOVA) که خودگویی هدفمند و راهبردی منجر به بهبود عملکرد حرکتی در شوت بسکتبال شدند. همچنین، خودگویی هدفمند نسبت به خودگویی راهبردی منجر به بهبود بیشتر عملکرد حرکتی ورزشکاران شد. بنابراین، به نظر می رسد که خودگویی ارگانیک از نوع هدفمند مبتنی بر چالش های پیش روی ورزشکاران می تواند منجر به بهبود عملکرد آنها شود.

کلید واژه ها: خودگویی ارگانیک، خودگویی هدفمند، خودگویی راهبردی، عملکرد حرکتی.



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Studying the relationship between self-confidence and group cohesion among athletes of the kabaddi beach team

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Abstract

The purpose of this study is to investigate the relationship between self-confidence and group cohesion among athletes of the national kabaddi team. This is a descriptive research that was conducted in the field. The statistical population is all the members of the beach kabaddi national team who were invited to the national team camp in 2015 and all these athletes were used as research samples. The research measurement tools of the group cohesion questionnaire and the group self-confidence questionnaire have a reliability and validity coefficient of .93 and .92, respectively. There is a positive and high correlation between self-confidence and group cohesion of athletes. The most important sub-index in group cohesion is the feeling of cohesion as an individual task, and it is the least important sub-indicator in individual social cohesion. The most important sub-index in self-confidence is the sub-index of alternative experiences, and the least important sub-index in self-confidence is ability demonstration. Self-confidence has a high impact on the group cohesion of the kabaddi athletes. Since a high level of group cohesion leads to the team's success and due to the high sub-index of alternative experiences, preparatory competitions are very important to increase self-confidence and as a result, achieve group cohesion.

Keywords: group cohesion, self-confidences, beach kabaddi.



Extend abstract:

Purpose: Many sports coaches, over the years of their work experience, have found out that athletes need mental preparation more than physical preparation in order to win championships. The purpose of this study is to investigate the relationship between self-confidence and group cohesion among athletes in the Kabaddi national team. Self-confidence is one of the most important indicators of self-perception in the field of sports psychology and is considered one of the basic psychological skills for every person. Sports self-confidence is among the individual factors that some researchers have introduced at the top of the pyramid of advanced sports performance. Another factor affecting the performance of athletes in group sports teams is social cohesion, which is affected by sports and physical activities. Social cohesion is one of the main components of providing social health, which is of fundamental importance in order to preserve and maintain society and its values. In fact, the meaning of cohesion is the evaluation of the quality of people's relationships in society and the social groups they belong to. The existence of collective spirit and group cohesion in this sport is one of the effective factors in winning. Of course, one of the problems of us Iranians is the lack of teamwork and the spirit of collectivism, while teamwork in group sports is one of the most important factors in the success of sports teams. Kabaddi is an outdoor game that is a combination of wrestling and rugby. In order to catch the attacker or escape from the opponent in this game, flexibility skills, agility, endurance, attention and courage are needed. Also, in this sport, you need high self-confidence, because in national and international competitions you will face powerful opponents team from other countries, if you do not have enough self-confidence, your team will not get results. The existence of collective spirit and group cohesion in this sport is one of the effective factors in winning. Of course, one of the problems of us Iranians is the lack of teamwork and the spirit of collectivism, while teamwork in group sports is one of the most important factors in the success of sports teams. Kabaddi is an outdoor game that is a combination of wrestling and rugby. In order to catch the attacker or escape from the opponent in this game, flexibility skills, agility, endurance, attention, and courage are needed. Also, in this sport, you need high self-confidence because in national and international competitions you will face powerful opponent teams from other countries. If you do not have enough self-confidence, your team will not get results.

Methodology: Methodology: This is a descriptive research that was conducted in the field. The population of this research was all the kabaddi sportsmen invited to the Iranian national team camp, which was 36 people and all of them were used in this research. The tools used to collect information to achieve the objectives of the research are as follows: 1- Demographic questionnaire 2- Social cohesion questionnaire was prepared to measure the level of group cohesion in sports teams in the form of 18 questions and group cohesion in two sub-branches. It measures task dimension and social



cohesion. 3- Sports self-confidence questionnaire. This questionnaire asks the athlete to think about things that give him high self-confidence or help him to be more confident about his abilities during sports activities, believe and think for your success.

Findings: Due to the small number of national team athletes, we used non-parametric tests to perform the analysis. Which included the Kruskal-Wallis multiple mean comparison test, the comparison test of the mean of a population with a fixed number (Wilcoxon test), and for the existence of a relationship and its extent, Spearman's non-parametric correlation coefficient was used. Finally, to evaluate the importance of the sub-indices in each questionnaire, using this test, prioritization was done based on the average ranks. The results of the correlation coefficient between self-confidence and social cohesion show that, firstly, this relationship was significant and high (0.81) and secondly, its direction is positive. The Kruskal-Wallis multiple mean comparison test was used, and Spearman's non-parametric correlation coefficient was used to examine the relationship between demographic variables with self-confidence and group cohesion. The results with an alpha error rate of 0.1 are the only variable of education level that has a significant impact on the level of self-confidence and social cohesion of athletes. According to the results of the table below, the lowest level of self-confidence is among athletes with a bachelor's degree and the highest level is among athletes with a diploma degree, and also the lowest level of social cohesion is among bachelors and the highest level of social cohesion is among masters. Meanwhile, according to the test, these differences are significant. Ranking between self-confidence and social cohesion sub-indices: By using Friedman's non-parametric test, the self-confidence sub-categories were prioritized. The sub-indices are prioritized in order of importance. Average sub-index of priority rank in the index Coherence of individual assignment 2/79 first Individual social cohesion 2/18 IV Coherence of group assignment 68/2 II Group social cohesion 2/36 III.

Discussion: According to the results of the research, there is a high and significant relationship between self-confidence and group cohesion, although no similar research was found by researchers in this field. Sports self-confidence is among the personal factors that have been introduced as the peak of the pyramid of advanced sports performance, and they consider it the most important factor influencing sports performance. In relation to the effect of education on self-confidence, a similar research has not been found, but in this research, players with a diploma degree have higher self-confidence than those with a bachelor's degree, which may be due to an increase in the level of experience due to having more time to participate in sports competitions and camps. Also, the highest level of social cohesion among people with a master's degree and the lowest level of social cohesion among people with a bachelor's degree, and this may be due to their mental preparation due to reading books related to sports psychology or increasing age to gain experience in more competitions and bigger sports fields. Some researchers have used sports self-confidence as a synonym for self-sufficiency and consider self-sufficiency as a special situation of self-confidence or belief in one's competence. Statistically, there was no difference between the sub-indices of social cohesion and they all have the same importance, but according to the ranking, individual task



cohesion is the most important and individual social cohesion ranks last. In team sports, players interact with each other and success is achieved when team members work together effectively and harmoniously.

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Authors' Contributions

All authors have participated in designing, implementing, and writing all parts of the present study.

Conflicts of Interest

The authors declared no conflict of interest.

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مطالعه رابطه بین اعتماد به نفس و انسجام گروهی در بین ورزشکاران تیم ملی کبدی ساحلی

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چکیده

هدف از این مطالعه بررسی رابطه بین اعتماد به نفس و انسجام گروهی در بین ورزشکاران تیم ملی کبدی می‌باشد. این تحقیق از نوع توصیفی است که به شکل میدانی انجام شده است. جامعه آماری کلیه اعضای تیم ملی کبدی ساحلی می‌باشد که در سال ۱۳۹۵ به اردوی تیم ملی دعوت شدند و تمام این ورزشکاران به عنوان نمونه تحقیق استفاده شدند. ابزار اندازه‌گیری تحقیق پرسش‌نامه انسجام گروهی و پرسش‌نامه اعتماد به نفس گروهی که به ترتیب دارای ضریب پایایی و اعتبار ۰/۹۳ و ۰/۹۲ هستند. بین اعتماد به نفس و انسجام گروهی ورزشکاران هم بستگی مثبت و بالایی وجود دارد، مهم‌ترین زیر شاخص در انسجام گروهی؛ احساس انسجام تکلیف فردی است و کم اهمیت‌ترین زیر شاخص در انسجام اجتماعی فردی است. مهم‌ترین زیر شاخص در اعتماد به نفس زیر شاخص تجارب جایگزین است و کم اهمیت‌ترین زیر شاخص در اعتماد به نفس نمایش توانایی است. اعتماد به نفس تأثیر بالایی بر روی انسجام گروهی ورزشکاران کبدی دارد و از آنجایی که سطح بالای انسجام گروهی موجب موفقیت تیم می‌گردد و با توجه به بالا بودن زیر شاخص تجارب جایگزین از این رو مسابقات تدارکاتی اهمیت زیادی برای بالا بردن اعتماد به نفس و در نتیجه انسجام گروهی دارد.

کلمات کلیدی: انسجام گروهی، اعتماد به نفس، کبدی ساحلی.



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The Effect of Contextual Interference on Acquisition and Learning of Volleyball Service, with the Moderating Effect of the Amount of Subjects Sensation Seeking

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Abstract

Based on the studies, there exists a significant relationship between learning and the arousal of individuals when performing motor tasks. Individuals inclined towards excitement tend to favor environments with heightened arousal for activity. In this particular study, the impact of contextual interference on learning two types of volleyball serves was explored, considering the potential moderating effect of students' sensation-seeking tendencies. A total of 48 sixth-grade students in the age group of 11 to 13, were categorized into high and low sensation-seeking groups based on the sensation-seeking scale. They were then randomly assigned to two training groups: one with blocked practice and the other with random practice. Both groups engaged in 60 attempts of simple and wave services across 9 one-hour training sessions. Data were collected using Zuckerman's sensation-seeking scale and AAHPERD's standard test. Statistically significant differences were noted in the acquisition, retention, and transfer of the simple volleyball serve between groups exhibiting high and low excitement levels in both blocked and random training conditions ($p=0/004$, $p=0/0001$, $p=0/001$). However, the findings related to the wave service were only significant concerning memory and transfer ($p=0/004$, $p=0/001$). Additionally, within both high and low sensation-seeking groups, significant differences were observed in the various stages of learning the simple and wave volleyball serves under both random and blocked practice conditions. Utilizing both blocked and random training methods proved effective for enhancing volleyball serve skills in groups exhibiting both high and low sensation-seeking tendencies. Consequently, both training methods can be recommended for teaching volleyball skills.

Keywords: Acquisition, Contextual Interference, Motor Learning, Sensation Seeking, Volleyball.



Extended Abstract

Background and Purpose

Motor skill learning, particularly in sports, is a complex process influenced by individual characteristics, task features, and instructional methods. One key instructional variable widely examined in research is contextual interference, which refers to the cognitive challenge created when multiple skills are practiced within varying rather than repetitive sequences. According to the contextual interference theory, although random practice may slow performance during the acquisition phase, it typically enhances retention and transfer of learned skills ([Lee et al., 1992](#); [Magill & Hall, 1990](#)). Alongside instructional variables, personality traits also play an important role in how learners respond to different training environments. One such trait is sensation seeking, which, based on Zuckerman's model, reflects an individual's tendency to seek novelty, stimulation, challenge, and variety. High sensation seekers often prefer variable and demanding practice conditions, whereas low sensation seekers favor structure, order, and predictability. Consequently, this personal characteristic may meaningfully interact with the type of practice and influence the learning of sport skills. Although extensive research has been conducted on contextual interference, few studies have explored its relationship with sensation seeking in adolescent motor-skill learning. Moreover, simple and float volleyball serves are fundamental skills that require precise coordination, accurate timing, and stable motor control. Understanding how contextual interference and sensation seeking shape the acquisition of these skills can help optimize instructional programs for physical education teachers and volleyball coaches. Therefore, the present study aimed to examine the effect of contextual interference on the acquisition, retention, and transfer of simple and float volleyball serves while considering sensation seeking as a moderating factor, with the goal of determining whether high sensation seekers benefit more from random practice and whether blocked practice is more suitable for low sensation seekers.

Materials and Methods

The present semi-experimental study employed a pretest–posttest design with retention and transfer phases. Participants were 48 female students aged 11 to 13, selected through purposive sampling. To determine sensation-seeking levels, the Zuckerman Sensation Seeking Scale was administered, and students were categorized into high and low sensation-seeking groups. Each category was then randomly assigned to one of two practice conditions -blocked or random- resulting in four groups: high sensation seeking with random practice, high sensation seeking with blocked practice, low sensation seeking with random practice, and low sensation seeking with blocked practice. The motor tasks consisted of the simple serve and the float serve in volleyball. Training lasted nine sessions, with each group practicing according to its assigned practice schedule. Blocked practice involved the repetitive execution of one skill before moving to the next, whereas random practice provided an unpredictable and interleaved sequence of skills. Performance was evaluated in four stages: a pretest to assess baseline and group homogeneity; an acquisition test at the end of training;



a retention test 48 hours after the final session; and a transfer test that introduced modified performance conditions to assess generalization. All assessments used the standardized Aahperd Volleyball Serving Test, and the data were analyzed using appropriate statistical procedures, including analysis of variance.

Results

The descriptive results showed that all four groups -high and low sensation seekers under blocked and random practice- performed similarly at pretest in both simple and float serves, indicating equivalent baseline skill levels. ANOVA results confirmed no significant pretest differences and no significant group differences in the acquisition of the float serve. However, significant differences emerged among groups in the acquisition of the simple serve, as well as in the retention and transfer phases for both skills. Bonferroni post hoc tests revealed that the high sensation-seeking random-practice group consistently outperformed the high sensation-seeking blocked group across all phases, with substantially higher mean scores. This pattern extended to retention and transfer, where the high-sensation-seeking random group also scored significantly higher than the low-sensation-seeking random and blocked groups, indicating a strong advantage of random practice for high sensation seekers in both skill types. For the simple serve retention phase, high-random outperformed high-blocked, low-blocked, and low-random groups, while high-blocked was significantly lower than low-random. In the float serve retention and transfer phases, high-random again showed significantly higher scores than low-blocked and, in some cases, low-random. Additionally, low-sensation seekers practicing randomly performed significantly better than those in blocked practice during transfer tests. Repeated-measures ANOVA further demonstrated significant differences across phases (pretest, acquisition, retention, transfer) and significant interactions between group and phase, skill and phase, and group and skill. Overall, the findings indicate that random practice leads to superior retention and transfer, particularly for individuals with high sensation seeking, while blocked practice is less effective across both skill types.

Conclusion

This study investigated the effects of contextual interference on the acquisition, retention, and transfer of simple and float volleyball serve skills, considering the moderating role of sensation seeking. The results indicated that both blocked and random practice methods led to significant improvements in participants with high and low sensation-seeking traits; however, the high-sensation-seeking group performed better under random practice conditions compared to the other groups. These findings align with Zuckerman's theory of sensation seeking, which posits that individuals with high sensation-seeking tendencies prefer diverse and complex experiences, respond more positively to unpredictable and varied practice, and exhibit higher motivation and attention during training. Previous research has also shown that random practice enhances retention and transfer by reducing dependency on immediate feedback and promoting greater cognitive processing ([Lage et al., 2015](#); [Lee et al., 1992](#)). Moreover, neurobiological mechanisms, such as increased activity of NMDA and AMPA receptors and enhanced noradrenergic and dopaminergic



system function in high-sensation seekers, may further explain their superior performance. The findings demonstrate that both practice methods improved skill performance over the training period, suggesting that blocked and random practice are both effective in volleyball skill acquisition. Despite limitations, including variations in participant motivation, psychological and physiological states, the results suggest that combining blocked and random practice can optimize training programs. The study recommends that similar research be conducted on other sports skills, in older age groups, and with expert athletes to more comprehensively examine the effects of contextual interference and sensation seeking.

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Authors' Contributions

All authors have participated in designing, implementing, and writing all parts of the present study.

Conflicts of Interest

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تأثیر تداخل زمینه‌ای بر اکتساب و یادگیری سرویس والیبال، با اثر تعدیل‌کنندگی میزان هیجان‌خواهی فراگیران

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چکیده

مطالعات ارتباط نزدیکی مابین یادگیری و انگیزش‌آموزی‌ها نشان می‌دهند؛ هیجان‌خواهان اغلب محیطی با انگیزش‌آموزی بالا، برای فعالیت برمی‌گزینند. لذا مطالعه حاضر، تأثیر تداخل زمینه‌ای بر اکتساب، یادداری و انتقال دو نوع سرویس والیبال، با اثر تعدیل‌کنندگی میزان هیجان‌خواهی را بررسی کرد. طرح تحقیق نیمه‌تجربی با پیش‌آزمون/پس‌آزمون ۴ گروهی است. نمونه مورد نظر 48 نفر به صورت داوطلبانه از بین دانش‌آموزان پایه ششم در رده سنی ۱۱ تا ۱۳ سال انتخاب شد. براساس مقیاس هیجان‌خواهی به دو گروه هیجان‌خواهی بالا و پایین تقسیم و بصورت تصادفی در ۲ گروه تمرینی مسدود و تصادفی جای گرفتند. هر چهارگروه طی ۹ جلسه یک ساعته مداخله تمرینی ۶۰ کوشش سرویس ساده و موجی انجام دادند. مقیاس هیجان‌خواهی زاکرمن و آزمون ایفرد برای سنجش میزان هیجان‌خواهی و امتیازدهی سرویس والیبال به‌کاررفت. تفاوت معنی‌داری در اکتساب، یادداری و انتقال سرویس ساده بین گروه‌های مختلف مشاهده گردید ($p=0/004$, $p=0/0001$), تفاوت در مورد سرویس موجی در زمینه یادداری و انتقال معنی‌دار بود ($p=0/004$, $p=0/001$). در هر دو گروه هیجان‌خواه بالا و پایین، تفاوت‌های قابل‌توجهی در مراحل مختلف یادگیری سرویس‌های والیبال ساده و موجی در هر دو شرایط تمرین تصادفی و مسدود مشاهده شد. نتیجه‌گیری: روش‌های تمرینی مسدود و تصادفی در هر دو گروه هیجان‌خواه بالا و پایین برای پیشرفت مهارت سرویس والیبال مؤثر است؛ در نتیجه می‌توان هر دو روش تمرینی را برای آموزش مهارت‌های والیبال توصیه کرد.

کلید واژه‌ها: اکتساب، تداخل زمینه‌ای، والیبال، هیجان‌خواهی، یادگیری حرکتی.



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The Effect of Exercise Programs on Physical Literacy and Body Composition of Overweight and Obese Elementary School Girls

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Abstract

This study aimed to investigate the effect of an exercise program on physical literacy and body composition in overweight and obese elementary school girls in Dehaghan. In this study, 30 girls aged 7 to 12 years with overweight and obesity were randomly assigned to control and experimental groups. The experimental group participated in an exercise program for eight weeks, with one 60-minute session per week. Before and after the intervention, participants completed a physical literacy questionnaire, and body composition indices, including height, weight, BMI, body fat percentage, and fat-free mass percentage, were measured. Data were analyzed using analysis of covariance and dependent t-test with a significance level of $P \leq 0.05$. The results showed that the exercise program significantly increased the students' physical literacy and improved body composition indices; specifically, weight, BMI, and body fat percentage decreased significantly, while fat-free mass percentage increased. These findings indicate that physical exercise can play an important role in enhancing physical literacy and improving the physical condition of overweight and obese girls. Increasing physical literacy can facilitate greater participation in physical activities and promote children's health.

Keywords: Body Composition, Obesity, Overweight, Physical Literacy, Sports Training.



Extended Abstract

Background and Purpose

Obesity has emerged as a critical public health challenge globally, with the World Health Organization reporting that over 1.3 billion adults are affected by overweight and obesity. In the Middle East, Bahrain has the highest prevalence, while Iran reports the lowest in the region. Among children and adolescents, the rise in obesity is particularly alarming, especially in developed and developing nations where sedentary lifestyles and poor dietary habits have become more common. Childhood obesity is associated with a range of adverse health outcomes, including hypertension, type 2 diabetes, cardiovascular diseases, certain cancers, and psychological disorders such as low self-esteem. These consequences not only threaten individual health but also negatively impact academic performance and social interactions. Physical literacy, defined as the motivation, confidence, knowledge, and understanding necessary to maintain physical activity throughout life, has been identified as a key factor in promoting active lifestyles and preventing obesity. Children with higher physical literacy are more likely to engage in regular physical activity, develop essential motor skills, and adopt healthy behaviors. However, research indicates that overweight and obese children often have lower levels of physical literacy compared to their normal-weight peers, which points to the importance of targeted interventions.

Materials and Methods

This study aimed to examine the impact of an educational exercise program on physical literacy and body composition in overweight and obese elementary school girls in Dehaghan. The goal was to determine whether structured physical activity could enhance physical literacy and improve health-related body composition indices in this vulnerable population. The research employed a semi-experimental, pretest-posttest design with a control group. Thirty girls aged 7 to 12 years, identified as overweight or obese based on BMI criteria, were recruited from public schools in Dehaghan using purposive sampling. Participants were randomly assigned to either the experimental group (n=15) or the control group (n=15). Inclusion criteria included general health, absence of chronic diseases (e.g., cardiovascular, respiratory, epilepsy, diabetes), and no recent use of supplements or medications. The intervention consisted of an eight-week exercise program, with one 60-minute session per week. The program was designed in accordance with the Ministry of Education's physical literacy curriculum and included various activities that targeted balance, endurance, strength, coordination, and basic motor skills. For younger students, exercises included static and dynamic balance, hopping, plank holds, and beanbag throws. Older students performed more advanced balance tasks, zigzag hopping, plank endurance, and combined aerobic and strength exercises. Physical literacy was assessed using the validated Canadian Assessment of Physical Literacy (CAPL-2), which evaluates daily behavior, motivation and confidence, knowledge and understanding, and physical competence. Body composition was measured using standard protocols for height, weight, BMI, body fat percentage, and fat-free mass percentage. Data analysis involved descriptive statistics, paired t-tests for within-group comparisons, and analysis of covariance (ANCOVA) for between-group comparisons, with significance set at $P \leq 0.05$.

Results



Descriptive statistics indicated comparable baseline characteristics between groups. Following the intervention, the experimental group demonstrated significant improvements in physical literacy scores compared to the control group ($\eta^2=0.784$, $F=10.618$, $P=0.000$). The increase in physical literacy was observed across all CAPL-2 domains, suggesting comprehensive benefits from the exercise program. Body composition indices also improved significantly in the experimental group. Weight, BMI, and body fat percentage decreased (weight: $\eta^2=0.527$, $F=30.121$, $P=0.000$; BMI: $\eta^2=0.431$, $F=20.449$, $P=0.000$), while fat-free mass percentage increased, indicating a shift toward healthier body composition. No significant changes were observed in the control group. These findings confirm that regular, structured physical activity can effectively enhance both physical literacy and body composition in overweight and obese elementary school girls. The observed improvements in physical literacy are particularly noteworthy, as they may foster greater long-term participation in physical activity and contribute to sustained health benefits.

Conclusion

The results align with previous research demonstrating the positive effects of physical activity on physical literacy and health outcomes in children. By targeting multiple domains—physical, psychological, social, and cognitive—the intervention addressed the complex, multilayered character of physical literacy. Improvements in motor skills, confidence, motivation, and knowledge likely contributed to the observed increases in physical literacy scores. The reduction in body weight, BMI, and body fat percentage further illustrates the potential for school-based exercise programs to combat childhood obesity. Importantly, the study highlights the value of integrating physical literacy into educational curricula, as it not only improves physical health but also supports psychological and social development. This study provides compelling evidence that educational exercise programs can significantly enhance physical literacy and improve body composition among overweight and obese elementary school girls. By fostering motivation, confidence, and competence in physical activity, such interventions may play a critical role in promoting lifelong health and well-being. Policymakers and educators are encouraged to prioritize physical literacy in school curricula to address the growing challenge of childhood obesity and support the holistic development of children.

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Authors' Contributions

All authors have participated in designing, implementing, and writing all parts of the present study.

Conflicts of Interest

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اثر برنامه‌های تمرینی آموزش و پرورش بر سواد بدنی و ترکیب بدنی دانش آموزان دختر مقطع ابتدایی دارای اضافه وزن و چاق

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چکیده

این پژوهش با هدف بررسی تأثیر برنامه تمرینی آموزش و پرورش بر سواد بدنی و ترکیب بدنی دانش آموزان دختر ابتدایی دارای اضافه وزن و چاقی در شهرستان دهقان انجام شد. در این مطالعه، ۳۰ دانش آموز دختر ۷ تا ۱۲ ساله که دارای اضافه وزن و چاقی بودند، به صورت تصادفی در دو گروه کنترل و آزمایش قرار گرفتند. گروه آزمایش به مدت هشت هفته، هر هفته یک جلسه ۶۰ دقیقه‌ای تمرین ورزشی انجام دادند. قبل و بعد از مداخله، پرسشنامه سواد بدنی تکمیل و شاخص‌های ترکیب بدنی شامل قد، وزن، BMI، درصد چربی و درصد بدون چربی اندازه‌گیری شد. داده‌ها با استفاده از آزمون کواریانس و تی همبسته با سطح معنی‌داری $P \leq 0.05$ تجزیه و تحلیل شدند. نتایج نشان داد که برنامه تمرینی آموزشی باعث افزایش قابل توجه سواد بدنی دانش آموزان و بهبود شاخص‌های ترکیب بدنی شد؛ به طوری که وزن، BMI و درصد چربی به طور قابل توجهی کاهش و درصد توده بدون چربی افزایش یافت. این یافته‌ها نشان می‌دهد که تمرینات بدنی می‌تواند نقش مهمی در ارتقای سواد بدنی و بهبود وضعیت جسمانی دانش آموزان دختر با اضافه وزن و چاقی ایفا کند. افزایش سواد بدنی می‌تواند زمینه‌ساز مشارکت بیشتر در فعالیت‌های بدنی و ارتقای سلامت کودکان باشد.

کلید واژه‌ها: اضافه وزن، ترکیب بدنی، چاقی، فعالیت بدنی، سواد بدنی.



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Comparing the Effectiveness of Non-linear Differential and Traditional Training on Learning and Motivation in Swimming Starts for Novice Swimmers

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Abstract

differential learning is a process in which skill acquisition occurs without repeating the same movement and involves corrections during practice. The present study aimed to compare the effects of differential and traditional instructional approaches on learning and motivation in the front crawl start among beginner swimmers. The statistical population consisted of male university students at Kharazmi University, among whom 30 individuals were randomly selected as samples. After completing the Teller Motivation Questionnaire (Teller et al., 2013) and analyzing performance videos of the start using Dartfish software during the pre-test phase, the participants were randomly divided into two groups: incremental (non-linear) and traditional instruction. The training program consisted of 8 sessions. After completing this period, post-tests and a retention test one week later were conducted, and the results recorded. Data analysis was performed using Repeated Measures Multivariate Analysis of Variance with the SPSS version 26 software. The results indicated significant differences between the two groups (differential and traditional) in the time taken to reach the 5-meter line ($p=0.001$), start distance ($p=0.001$), average start speed ($p=0.001$), and motivation ($p=0.001$) during the post-test and retention phases. Furthermore, the analysis of phases and groups revealed that participants in the differential training group performed significantly better in learning ($p = 0.001$) and motivation ($p = 0.001$) related to the start performance compared to the traditional group. Based on the findings, it can be concluded that the differential instructional approach is effective for learning the swimming start. This approach may facilitate exploration of adaptive solutions by creating variability and increasing motivation in learners, thereby improving learning outcomes. The results support the effectiveness of the differential instructional method. Therefore, it is recommended to use this approach in swimming training programs.

Keywords: Differential learning, Learning, Motivation, Start swimming.



Extended Abstract

Background and Purpose

The differential learning approach emphasizes the importance of variability in learning (Raposo et al., 2020). In differential learning, fluctuations or variations introduced during practice are viewed as constructive deviations. That is, in differential learning, an increase in fluctuations and the addition of randomly varying exercises initiate a self-organizational process in which the learner finds an individually optimal solution for movement (Schollhorn et al., 2006). By creating diversity in goal-directed movements, it can be hypothesized that a wider range of potential solutions are discovered and covered, provided that no movement is exactly replicated. However, the differential approach has not yet sufficiently addressed the psychological aspects, such as motivation, and its impact on the learner's activities, thus neglecting these important dimensions of the learning experience (Chow, 2013). Furthermore, studies show that the differential approach can increase the speed of acquisition and learning in some sports, such as ball sports; however, this effect remains ambiguous in other sports, especially swimming. Accordingly, the aim of the present study is to investigate the effect of the differential training approach, compared to the traditional approach, on the learning and motivation of novice swimmers.

Materials and Methods

This research was a quasi-experimental study with a practical (applied) purpose, conducted in a field setting. The research design used was a pretest-posttest-retention design. The study population consisted of students from Kharazmi University, aged 19 to 22 years. A purposive and convenient sampling method was used to select the sample. Thus, 30 participants were selected and, after performing a pretest, were randomly assigned to two groups: a differential training group and a traditional training group, each with 15 participants. The intervention program was conducted for 4 weeks, with two 40-minute sessions per week. The differential training group aimed to perform movements without repetition based on the main components of the task (Savelsbergh et al., 2010). The training in the traditional group followed the usual swimming exercises. After the last training session, a posttest and a retention test (conducted one week after the posttest) were performed and the results were recorded. In this study, the different phases of the swimming start were recorded using two cameras placed at two different angles relative to the participant (Mourão et al., 2015; Vantorre et al., 2014). Dartfish software was used for analyzing the videos. In addition, Pelletier et al (2013) Sport Motivation Scale was used to record the participants' motivation scores. For data analysis, repeated measures ANOVA and the Bonferroni post-hoc test were used to compare different stages and groups. The error rate for all variables was assessed with an alpha of 0.05 and a confidence level of 0.95. All statistical operations were analyzed using SPSS version 26 software.

Results

The results of the repeated measures ANOVA showed a significant difference between groups regarding the time to cover a 5-meter distance, dive distance, and motivation. To examine the differences in detail in the posttest and retention test, independent samples t-tests were used. The posttest results indicated that participants in the differential training group performed significantly better than the traditional training group in terms of time to cover a 5-meter distance ($t=12.18$,



$p=0.001$), dive distance ($t = 10.07$, $p=0.001$), and motivation ($F=17.10$, $p=0.001$). Similarly, in the retention test, participants in the differential training group showed better performance in terms of time to cover a 5-meter distance ($F = 6.77$, $p = 0.001$), dive distance ($F= 9.47$, $p = 0.001$), and motivation ($F = 26.11$, $p = 0.001$). Furthermore, the Bonferroni post-hoc test results indicated that participants in the differential training group performed significantly better in the posttest and retention test compared to the pretest. No significant difference was observed between the test phases for the traditional training group.

Conclusion

The aim of the present research was to compare the effectiveness of the differential and traditional training approach on the learning and motivation of the swimming start. The results showed that the effect of training based on the differential approach on learning the skill of swimming is significant. In this regard, the results of this section of the study can be considered aligned with the results of the study by Bozkurt and colleagues (Bozkurt, 2018) and Schollhorn et al (2012), who in their studies reported the usefulness of training based on a non-linear approach. As stated in the findings section, in examining the groups, the results indicated the superiority of the differential learning group compared to the traditional group in learning the swimming start. In the differential learning approach, fluctuations in the learner's subsystems are used during learning, because they have the ability to destabilize the entire system (Bozkurt, 2018). By strengthening these fluctuations, the system, in addition to facing potential limitations, faces possible performance solutions, and the emergence of these solutions can lead to the emergence of an efficient movement pattern. As stated in the findings section of the research, the effect of training in the differential method on the motivation of the participants was significant, such that the participants in the differential group performed better than the traditional group in the post-test and retention stages. These findings are consistent with the result of the research by Moy et al (2016) and inconsistent with the result of the research by Lee et al (2017). In differential training, considering that the coach did not provide feedback related to the technique, the practice was interactive, and learning was harmoniously and positively associated with activity and practice and increased the perception of dependency or belonging. In contrast, most of the coach and subject verbal interactions in the linear method were prescribed in a hierarchical manner, which strengthened the negative perception of competence and created a negative relationship. Differential training gives participants the feeling that training is being done personally for them. This type of exercise helps to flourish individual talents and abilities and allows them to learn in a supportive and dynamic environment. This significantly increases their motivation and confidence.

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Authors' Contributions

All authors have participated in designing, implementing and writing all parts of the present study.

Conflicts of Interest

The authors declared no conflict of interest.



فهن، حرکت و رفتار

BEHAVIOR
MOVEMENT
MIND



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مقایسه اثربخشی آموزش غیرخطی افتراقی و سستی بر یادگیری و انگیزش استارت شناگران مبتدی

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چکیده

یادگیری افتراقی فرآیندی است که در آن یادگیری مهارت، بدون نیاز به تکرار یکسان حرکت و اعمال اصلاحات حین تمرین صورت می‌گیرد. پژوهش حاضر با هدف مقایسه تأثیر رویکردهای آموزشی غیرخطی افتراقی و سستی بر یادگیری و انگیزش مهارت استارت شنا در شناگران مبتدی انجام شده است. جامعه آماری این پژوهش را دانشجویان پسر دانشگاه خوارزمی تشکیل دادند که از میان آن‌ها، ۳۰ نفر به عنوان نمونه انتخاب شدند و پس از تکمیل پرسشنامه انگیزش پلی تیر و همکاران (۲۰۱۳) و تحلیل فیلم عملکرد استارت شنا با استفاده از نرم‌افزار Dartfish در مرحله پیش‌آزمون، به صورت تصادفی به دو گروه آموزش افتراقی و سستی تقسیم شدند. برنامه تمرینی شامل ۸ جلسه بود. پس از اتمام این دوره، پس‌آزمون و یک هفته بعد، آزمون یادداری اجرا و نتایج ثبت گردید. برای تحلیل داده‌ها، از آزمون تحلیل واریانس مرکب با اندازه‌گیری مکرر با استفاده از نرم‌افزار SPSS نسخه ۲۶ استفاده شد. نتایج نشان داد که بین دو گروه آموزشی افتراقی و سستی در زمان طی شده تا خط ۵ متر ($P=0/001$)، مسافت استارت ($P=0/001$)، سرعت متوسط استارت شنا ($P=0/001$) و انگیزش ($P=0/001$) در مراحل پس‌آزمون و یادداری تفاوت معنادار وجود دارد. در بررسی مراحل و گروه‌ها نتایج نشان داد که شرکت‌کنندگان گروه آموزش افتراقی به‌طور معناداری در یادگیری ($P=0/001$) و انگیزش ($P=0/001$) استارت شنا عملکرد بهتری نسبت به گروه سستی داشتند. بر اساس نتایج به‌دست‌آمده می‌توان اظهار داشت که رویکرد آموزشی افتراقی برای یادگیری استارت شنا مفید است و می‌تواند با ایجاد نوسان و افزایش انگیزش در فرد موجب کشف راه‌حل‌های انطباقی شود و به بهبود یادگیری کمک کند. نتایج به‌دست‌آمده از رویکرد آموزشی افتراقی حمایت نمود بنابراین پیشنهاد می‌شود از این رویکرد در برنامه‌های آموزشی شنا استفاده شود.

کلیدواژه‌ها: یادگیری افتراقی، یادگیری، انگیزش، استارت شنا.



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The relationship of foot malformations by gross motor skills in children

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Abstract

Introduction: Changes in the physical and anatomical structure of the foot can affect motor abilities and may limit or alter the execution of motor skills. Therefore, this study aimed to investigate the ability to differentiate foot abnormalities through gross motor skills in children. This correlational research employed discriminant analysis within a relatively large population of boys and girls aged 7 to 12 years. A total of 456 participants were purposefully sampled from the children of employees at the Sangan Copper Company (from the cities of Tabriz, Ahar, and Varzeqan). The Bruninks-Oseretsky test (1978) was utilized to assess gross motor development, and the DSI foot scanning device was employed. For data analysis, discriminant analysis was conducted using SPSS software version 26 at a significance level of 0.05. The results indicated that among the factors of motor development, agility, with a significance level of 0.005, was able to accurately predict 40.6% of the characteristics of different foot types. Factors such as balance ($p=0.502$), bilateral coordination ($p=0.252$), and strength ($p=0.653$) were not significant. Specifically, agility correctly predicted 37.5% of flat feet, 54.5% of Pes Cavus, and 43.8% of standard foot types. It can be concluded that agility, as a composite ability encompassing speed, balance, and strength, is highly capable of distinguishing various foot structures. Under specific conditions, it may serve as a predictive factor for foot structure, especially in cases of Pes Cavus (hollow foot).

Keywords: Agility, Motor Development, Flat Foot, Pes Cavus, Foot Deformities.



Extended Abstract

Introduction

Motor development in children involves the acquisition of various movement patterns and skills, influenced by factors such as age, gender, socioeconomic status, and physical activity levels (Zarezadeh et al., 2011), (Gallahue et al., 2011). Fundamental motor skills, particularly gross motor skills executed by large muscle groups, form the foundation for more complex movements, daily activities, sports participation, and specialized skills (Gallahue et al., 2011); (Ozonoff et al., 2008). These skills enable children to engage in walking, running, jumping, climbing, and object manipulation (e.g., catching, throwing, kicking). While genetic and maturational factors drive typical development, environmental elements like education, practice opportunities, and encouragement also play crucial roles (Sugden, 2013).

Theoretical frameworks, such as Newell's model, emphasize constraints on motor development: individual (structural and functional), environmental, and task-related (Gallahue et al., 2011). Individual structural constraints, including biomechanical features of the body, can impact motor patterns. Foot abnormalities, such as flat feet (pes planus) or high-arched feet (pes cavus), may disrupt proprioceptive inputs, postural control, and balance; (Proske & Gandevia, 2012), (Khalaghi et al., 2022). Flat feet, prevalent in 20-30% of young children (Smith et al., 2020), and high-arched feet, reported in up to 90% of pediatric foot clinic referrals (Sidarta & Afyora, 2024), can alter center of pressure displacement, sensory feedback, and overall biomechanics (Hajirezayi et al., 2019); (Jankowicz-Szymanska et al., 2018); (Abdoli et al., 2011); (Wozniacka et al., 2013).

Literature reveals mixed findings on the impact of foot arch types on motor performance. Some studies indicate flat feet reduce agility and alter gait in children aged 7-10 (Sidarta & Afyora, 2024), while others suggest no detrimental effects on sports skills or even advantages in vertical jumping for flat-footed children aged 9-15 (Tudor et al., 2009). Conversely, high-arched feet are associated with poorer balance and functional performance due to reduced surface contact and altered pronation (Wozniacka et al., 2013); (Hajirezayi et al., 2019). Skeletal-muscular abnormalities in the lower limbs, influenced by environmental factors, poverty of movement, or muscle imbalances, can affect biomechanics of walking, running, and displacement (Wozniacka et al., 2013); (Wilczyński, 2020). Pathological gait in children may lead to severe conditions like arthritis or scoliosis, underscoring the need for early monitoring.

Despite these insights, research on the link between foot structure and gross motor skills in children remains limited and inconsistent. This gap is critical, as motor abilities underpin learning and participation in physical activities (Aghdasi et al., 2021), (Fathirezaie et al., 2021). The present study addresses whether gross motor skills (agility, balance, bilateral coordination, strength) can discriminate and predict foot arch types (flat, high, normal) using discriminant analysis, potentially clarifying predictive relationships in a large pediatric sample.

Methods

This correlational, field-based study with applied objectives involved 456 children (234 boys, 222 girls) aged 7-12 years, purposively sampled from the offspring of employees at Sungun Copper



Company in Tabriz, Ahar, and Varzeqan, Iran. Sample size was calculated using G*Power software (effect size = 0.01, power = 0.95, predictors = 4), yielding a minimum of 110 participants; however, 502 referrals resulted in 456 analyzable cases after exclusions. Participants were recruited via company announcements, with informed consent obtained from parents. Testing occurred individually in a motor development laboratory at the University of Tabriz between 9:00 AM and 12:00 PM.

Inclusion criteria excluded children with fractures, severe visual/hearing impairments, cognitive disorders, or BMI >30. Demographic data (height, weight, age, gender) were collected first. Gross motor skills were assessed using the Bruininks-Oseretsky Test of Motor Proficiency (BOTMP) (Bruininks & Bruininks, 2012), a norm-referenced tool for ages 4.5-14.5 years, comprising eight subtests (46 items) administered in 45-60 minutes. Focus was on four gross motor subtests: agility (running speed, jumping), balance (beam walking, stork stand), bilateral coordination (hand-foot tasks), and strength (push-ups, sit-ups). Reliability (test-retest: 0.78; validity: 0.84; overall: 90%) was established in prior standardizations.

Foot arch type was evaluated using the Foot Medicine Plus scanner (Danesh Salar Iranian Co.), measuring maximum pressure, center of pressure changes, arch type (normal, flat, high) and degree, pressure distribution, contact area, and Achilles tendon angles.

Data analysis used SPSS v23, including descriptive statistics (means, SD) and inferential statistics: one-way ANOVA for group differences and linear discriminant analysis (LDA) to predict foot type group membership from motor skills.

Results

Descriptive statistics (Table 1) revealed variations in gross motor scores across foot types: flat ($n=203$; agility: 8.68 ± 5.11 ; balance: 20.97 ± 5.29 ; coordination: 13.95 ± 4.29 ; strength: 19.99 ± 8.50), high-arched ($n=84$; agility: 7.73 ± 4.87 ; balance: 22.32 ± 4.36 ; coordination: 12.59 ± 4.57 ; strength: 18.55 ± 5.34), and normal ($n=169$; agility: 10.22 ± 5.49 ; balance: 21.23 ± 5.51 ; coordination: 14.17 ± 3.96 ; strength: 20.14 ± 6.29).

ANOVA (Table 2) showed significant differences only in agility (Wilks' Lambda=0.977, $F=5.322$, $p=0.005$), with no significance for balance ($p=0.502$), coordination ($p=0.252$), or strength ($p=0.653$). LDA indicated a significant model (Box's $M=59.08$, $F=1.86$, $p=0.003$; Wilks' Lambda=0.95, $\chi^2=22.72$, $df=10$, $p=0.012$). Canonical discriminant function coefficients (Table 3) highlighted agility (0.176) as the primary discriminator, with minor contributions from others. Classification accuracy (Table 4) was 40.6% overall: 37.5% for flat, 54.5% for high-arched, and 43.8% for normal feet.

Discussion

Findings demonstrate that agility uniquely discriminates foot arch types, aligning with studies showing flat feet reduce agility (Samakosh & Hadadnezhad, 2021); (Sidarta & Afyora, 2024). and high-arched feet impair lower-limb performance (asl et al., 2020). Normal arches facilitate better shock absorption and sensory input, enhancing motor efficiency (Kumala et al., 2019); (Cobb et al., 2014). High-arched feet's higher prediction accuracy (54.5%) may stem from biomechanical issues like short Achilles tendons (23-63% shorter); (Burns & Crosbie, 2005), limiting



dorsiflexion, causing instability, muscle imbalances (evertor weakness, inverter dominance), and poor shock absorption (Wozniacka et al., 2013); (Sinclair et al., 2017). This affects agility tasks requiring explosive jumps, directional changes, and weight-bearing.

Non-significance for balance, coordination, and strength contrasts some prior work (Khodaveisi et al., 2009); (Hajirezayi et al., 2019); (Abdoli et al., 2011), possibly due to measurement methods (e.g., beam walking vs. dynamic tests) or statistical approaches. Agility's composite nature (encompassing speed, balance, power) likely amplified its discriminatory power in LDA. Age effects may diminish foot structure's influence (Musavi et al., 2012), with environmental factors like activity levels or lifestyle overriding (Bukowska et al., 2021); (Iordan et al., 2021); (Anida Kapo, 2020).

Limitations include urban sample bias; future research should compare rural/urban, climatic, or altitude variations. Recommendations: Annual school-based foot scans and motor assessments for early intervention.

Conclusion

This study reveals a significant association between agility and foot arch height, but not other gross motor skills (strength, bilateral coordination, balance). No universal positive/negative relationship exists between motor abilities and foot indices, influenced by age, gender, tools, and statistics. Agility's embedded elements (speed, balance, power) are collectively impacted by foot structure, though individually insufficient for discrimination except agility. Further in-depth studies are warranted to refine these insights.

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Authors' Contributions

All authors have participated in designing, implementing and writing all parts of the present study.

Conflicts of Interest

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رابطه ناهنجاری‌های کف پا با مهارت‌های حرکتی درشت در کودکان

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چکیده

مقدمه: تغییر در ساختار فیزیکی و آناتومیکی پا می‌تواند توانایی‌های حرکتی را تحت تأثیر قرار داده و اجرای مهارت‌های حرکتی را محدود کرده یا تغییر دهد. بدین منظور پژوهش حاضر با هدف بررسی قابلیت تفکیک ناهنجاری‌های کف پا توسط مهارت‌های حرکتی درشت در کودکان انجام گرفت. روش: تحقیق حاضر از نوع همبستگی است که به روش تحلیل تشخیص در یک جامعه نسبتاً بزرگ از دختران و پسران ۷ تا ۱۲ سال انجام گرفت. بدین منظور ۴۵۶ نفر به روش نمونه‌گیری هدفمند از فرزندان کارکنان شرکت مس سونگون (از شهرهای تبریز، اهر و ورزقان) انجام شد. آزمون پرونینکس-اوزرتسکی (۱۹۷۸) برای بررسی رشد حرکتی و دستگاه اسکن کف پا مدل DSI مورد استفاده قرار گرفت. برای تجزیه و تحلیل داده‌ها از آزمون تحلیل تشخیص با نرم‌افزار اس.پی.اس.اس نسخه ۲۶ در سطح معناداری ۰/۰۵ استفاده شد. یافته‌ها: نتایج نشان داد که از بین عوامل رشد حرکتی، عامل چابکی با سطح معناداری ۰/۰۰۵ قادر بود ۴۰/۶ درصد از ویژگی‌های انواع کف پا را به درستی پیش‌بینی کند و عامل تعادل ($p=0/002$)، هماهنگی دو سویه ($p=0/002$) و قدرت ($p=0/003$) معنادار نبود. درواقع عامل چابکی ۳۷/۵ درصد از کف پای صاف، ۵۴/۵ درصد از کف پای گود و ۴۳/۸ درصد از کف پاهای استاندارد به درستی پیش‌بینی شد. بحث و نتیجه‌گیری: می‌توان نتیجه گرفت که توانایی حرکتی چابکی بعنوان یک توانایی ترکیبی از سرعت حرکت، تعادل و قدرت توانمندی بالایی در متمایز ساختن انواع ساختارهای کف پا دارد و در شرایط خاص می‌تواند بعنوان عامل پیش‌بینی کننده ساختار کف پا و به ویژه کف پای گود مورد استفاده قرار گیرد.

کلید واژه‌ها: چابکی، رشد حرکتی، کف پای صاف، کف پای گود، ناهنجاری‌های کف پا.



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Presenting a causal model of self-awareness Patients with multiple sclerosis based on visual-spatial transformation; Mediating role of Mental balance (application of path analysis)

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Abstract

The aim of the present study is to present a causal model of self-awareness based on visual-spatial transformation; The mediating role was mental balance. The design of the current research was practical in terms of purpose, and in terms of data collection, it included quantitative studies based on the correlation approach using path analysis. The statistical population included all patients suffering from multiple sclerosis in Borujerd city in 1402-1403, and 300 people were selected as a sample using the Krejsi-Morgan table using available sampling method. Visual-spatial transformation questionnaires, mental balance questionnaire and self-awareness questionnaire were used to collect data. The obtained data were analyzed using SPSS version 24 and AMOS software. The findings showed that the standard coefficients of the path of visual-spatial transformation to mental balance ($P < 0.001$, $\beta = 0.60$), the path of visual-spatial transformation to self-awareness ($P < 0.001$, $\beta = 0.67$) And the standard coefficient of the path of mental balance to self-awareness ($P < 0.001$, $\beta = 0.57$) is significant at the significance level of $P < 0.01$. Also, the findings showed that 34% of the variance of mental balance and 42% of the variance of self-awareness were explained by the current model. In addition, to investigate the significance of the mediating role of mental balance, the bootstrap maximization method was used in AMOS software, and the results showed that mental balance plays a role as a mediating variable in the relationship between visual-spatial transformation and self-awareness. Therefore, according to the obtained results, it is obvious that the increase in mental balance and consequently the increase in the level of visual-spatial transformation will improve the level of self-awareness in patients with multiple sclerosis, and it is suggested that the officials concerned with the role of mental balance as Mediator and promoter of visual-spatial transformation and self-awareness should be paid more attention.

Keywords: Self-awareness, Visual-spatial transformation, Mental balance.



Extended Abstract

Background and Purpose

MS is more common in young people between the ages of 20 and 45 (Tervonen et al., 2023). According to World Health Organization statistics, nearly three million people worldwide are affected by MS (Kang, 2022). According to statistics recorded in the Rare Diseases System of the Ministry of Health, 95,000 patients with MS have been identified and registered in Iran. Also, according to statistics from the Rare Diseases Association of the Ministry of Health, the average prevalence of MS in Iran is 111 patients per 100,000 population (Ghasemi et al., 2017). Researchers in the field of central nervous system damage have shown in their studies that one of the cognitive structures that undergoes many negative changes in patients with MS and has a direct impact on self-awareness is visual-spatial development (de Oliveira et al., 2016), such that affected individuals experience many problems in terms of visual-spatial perception and having an appropriate mental and physical balance (Naisby et al., 2023). Visual-spatial development helps to understand the spatial relationships between objects and how childhood experiences are stored and encoded to give meaning to sensory inputs (Nguyen et al., 2018). Unfortunately, visual-spatial development, which is one of the most important foundations of development and shapes mental representations of the outside world (Gilad et al., 2006), is severely impaired in patients with MS (Gontkovsky, 2023). Research has shown that patients with MS have difficulty with visual-spatial processing and understanding complex designs, and they easily get lost in details, to the point where their mental balance is even disrupted (Gomelsky et al., 2023). Therefore, since no study has been conducted so far that has examined the variables of self-awareness, visual-spatial development, and mental balance in the form of a conceptual-mathematical model, and considering the importance of addressing the psychological health of patients with MS, the aim of the present study is to present a causal model of self-awareness based on visual-spatial development with the mediating role of mental balance.

Materials and Methods

The present research design is applied in terms of purpose and is based on a correlational approach, which was pursued with a path analysis approach in accordance with its objectives. The statistical population included all women with MS in Boroujerd in 2024-2025, with a volume of 1561 people who were selected using the convenience sampling method. For studies based on model drawing, the minimum sample size for each parameter is 5, a ratio of 10 to 1 is more appropriate, and a ratio of 15 to 1 is considered desirable (Kline, 2011). Since there are 20 observed parameters in the present study, approximately a ratio of 15 to 1 was used and 300 people were selected using the convenience method. To be precise, 293 participants answered the questionnaires accurately and completely. 7 participants did not answer the questions completely, and these 7 participants were excluded from the analysis. Descriptive and inferential statistical methods were used to analyze the collected data. SPSS24 and AMOS24 software were used for quantitative statistical analysis.

Results

The results showed that visual-spatial development had an effect on self-control with an impact coefficient of 0.54; visual-spatial development had an effect on mental balance with an impact coefficient of 0.60; visual-spatial development had an effect on self-awareness with an impact



coefficient of 0.67. The results also showed that perceived physical fitness had an effect on self-control with an impact coefficient of 0.59; perceived physical fitness had an effect on mental balance with an impact coefficient of 0.46; perceived physical fitness had an effect on self-awareness with an impact coefficient of 0.55. In addition, the results showed that sports mindfulness had an effect on self-control with an impact coefficient of 0.50; sports mindfulness had an effect on mental balance with an impact coefficient of 0.59; sports mindfulness had an effect on self-awareness with an impact coefficient of 0.51 and a critical value of 64.7; Self-control had an effect on self-awareness with an impact coefficient of 0.47 and a value of 6.70, and mental balance had an effect on self-awareness with an impact coefficient of 0.57. The following section explains why and how exogenous variables were able to explain part of the variance of the endogenous variable. Also, the direct and indirect relationships resulting from the effect of predictor variables on the mediator and endogenous variables have been theoretically explained and interpreted. One explanation for this finding is that visuospatial development makes the individual feel empowered, which creates the basis for creating and increasing self-awareness. On the other hand, since mental balance also improves the level of visuospatial development and increases self-awareness in people with MS, we conclude that mental balance plays a mediating role between visuospatial development and self-awareness.

Conclusion

In the self-awareness theory, it is believed that people with MS should have a higher level of self-awareness about their disease so that they can better cope with it for control and follow up on treatment. On the other hand, people who have higher perceived physical fitness and better visuospatial development also have higher self-awareness because high perceived physical fitness and higher visuospatial development allow people to better control their emotions and have more optimal arousal levels. This finding can also be explained from another perspective, in that people with MS who have a higher level of mental balance certainly have better self-awareness about their disease, so it is clear that these people have better perceived physical fitness and visuospatial development. Another explanation that can be offered based on theoretical foundations is that in the theoretical foundations of visuospatial development and also the approach of perceived physical fitness, it is pointed out that people with visuospatial development always have high perceived mental and physical acceptance and readiness, as well as optimal control of their emotions. So it is quite natural that if people with MS have high perceived physical fitness and visual-spatial development, they can both control their emotions and accept their current conditions, as well as improve their self-control, which is the final result and consequence of increasing the level of self-awareness in patients with MS. So in general, and based on theoretical and empirical foundations, it can be said that the existence of common elements in the concepts of perceived physical fitness, visual-spatial development, and mental balance has caused them to have a mediating and positive role in the relationship between perceived physical fitness and visual-spatial development with self-awareness.

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Authors' Contributions

All authors have participated in designing, implementing and writing all parts of the present study.



Conflicts of Interest

The authors declared no conflict of interest.

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ارائه مدل علی خودآگاهی در بیماران مبتلا به ام‌اس بر اساس تحول دیداری فضایی؛ نقش واسطه‌ای تعادل ذهنی (کاربرد تحلیل مسیر)

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چکیده

هدف مطالعه حاضر ارائه مدل علی خودآگاهی بر اساس تحول دیداری فضایی با نقش واسطه‌ای تعادل ذهنی بود. طرح پژوهش حاضر کاربردی و به لحاظ جمع‌آوری داده‌ها کمی و مبتنی بر رویکرد همبستگی با استفاده از تحلیل مسیر بود. جامعه آماری شامل کلیه بیماران مبتلا به ام‌اس شهر بروجرد در سال ۱۴۰۳-۱۴۰۲ بودند که تعداد ۳۰۰ نفر به روش نمونه‌گیری در دسترس به عنوان نمونه انتخاب شدند. از پرسشنامه‌های تحول دیداری فضایی، تعادل ذهنی و پرسشنامه خودآگاهی برای گردآوری داده‌ها استفاده شد. داده‌های بدست آمده با استفاده از نرم‌افزارهای SPSS نسخه ۲۴ و AMOS تجزیه و تحلیل شدند. یافته‌ها نشان داد که ضرایب استاندارد مسیر تحول دیداری فضایی به تعادل ذهنی ($\beta=0/60, P<0/001$)، مسیر تحول دیداری فضایی به خودآگاهی ($\beta=0/67, P<0/001$) و ضریب استاندارد مسیر تعادل ذهنی به خودآگاهی ($\beta=0/57, P<0/001$) در سطح معنی‌داری $p<0/01$ معنی‌دار است. همچنین یافته‌ها نشان داد که ۳۴ درصد از واریانس تعادل ذهنی و ۴۲ درصد از واریانس خودآگاهی به‌وسیله مدل حاضر تبیین شد. علاوه بر این برای بررسی معنی‌داری نقش میانجی تعادل ذهنی از روش بیشینه‌نمایی بوت‌استرپ در نرم‌افزار AMOS استفاده شد. نتایج نشان داد که تعادل ذهنی در بین رابطه بین تحول دیداری فضایی و خودآگاهی به عنوان متغیر میانجی ایفای نقش می‌کند. بنابراین و با توجه به نتایج بدست آمده بدیهی است که افزایش تعادل ذهنی و به تبع آن افزایش سطح تحول دیداری فضایی باعث ارتقای میزان خودآگاهی در بیماران مبتلا به ام‌اس می‌شود که پیشنهاد می‌شود که مسئولین ذیربط به نقش تعادل ذهنی به عنوان میانجی و ارتقادهنده تحول دیداری فضایی و خودآگاهی توجه بیشتری داشته باشند.

کلیدواژه‌ها: خودآگاهی، تحول دیداری فضایی، تعادل ذهنی.



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The Effect of 8 Months Training With Fundamental Motor skills in a Cognitive-Motor Climate Based on The TARGET Approach on Body Composition and Motor Performance of Children With Low Economic Status

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Abstract

Teaching fundamental motor skills is an important principle in childhood. Unfortunately, overweight and obese children show significant delays in these skills. Research in the field of fundamental motor skills and body composition has been neglected. Therefore, the aim of the present study was to investigate the effect of an 8-month fundamental motor skill intervention based on a cognitive motor environment on the body composition and motor performance of children with low economic status. The population of this study was male children aged 6-8 years, from which 118 children were randomly selected and divided into two intervention and control groups. The instruments used in this study included Movement Assessment Battery of Children, standard weight balance scale for measuring weight, stadiometer for measuring height, and bioelectrical impedance body composition device for measuring fat mass (FM), fat-free mass (FFM), and body composition (BMI). Initially, motor performance, body composition measures, height, weight, and BMI were recorded as pre-test scores of the groups. The training period consisted of 8 months, two sessions per week, and 30 minutes of activity. After the 8-month training intervention, post-tests of motor performance, body composition, height, weight, and BMI were taken from the subjects. The statistical data showed an improvement in motor performance ($P=0.001$), a significant decrease in fat mass ($P=0.001$) and body composition ($P=0.001$), and a significant increase in lean mass ($P=0.001$) as a result of eight months of fundamental motor skills training. The findings of the present study showed that this intervention can improve motor performance and delay the increase in FM. Overall, it is suggested that this approach be used to prevent obesity and emphasize the importance of measuring body composition in children. Keywords: Fundamental motor skills, motivational-expertise climate, body composition, children with low economic status.

Keywords: Fundamental Motor Skills, Mastery-Motivational Climate, Body Composition, Children With Low Economic Status.



Extended Abstract

Background and Purpose

The prevalence of childhood obesity has increased dramatically since 1988 (Ogden et al., 2016) and continues to represent a public health crisis, with one in three children aged 2 to 5 years classified as obese (Skinner et al., 2018). The preschool years are a critical period for the development of obesity later in life, as children who are overweight or obese at age 5 are more likely to be obese by age 14 (Cunningham et al., 2014). Although obesity is a multifaceted disease, regular participation in physical activity is a key factor in weight management (Wiklund, 2016). Fundamental motor skills are the foundation for motor behavior in adulthood and influence an individual's proficiency in physical and motor activities (Goodway et al., 2019). However, the important point about fundamental motor skills maturation is that these skills are not simply a function of age and must be practiced (Goodway et al., 2019). Research has shown that children of low socioeconomic status often lag behind their middle-class peers in fundamental motor skills (Brown, 2010). Furthermore, fundamental motor skill competence is positively associated with cardiorespiratory fitness (Ross et al., 2016), which may be a more valid indicator of adolescent obesity than physical activity (Oliveira-Santos et al., 2020). Most obesity studies focus on body mass index rather than fat mass and lean mass in early childhood. Therefore, the aim of this study was to determine the effect of a 9-month fundamental motor skill intervention in a motivation-expertise-based environment on the body composition and motor performance of children of low socioeconomic status.

Materials and Methods

The present study was a semi-experimental research with a pre-test and post-test design with two experimental and control groups. The statistical population of this study included all male children aged 6-8 years in Jahrom city. 11 schools were selected from schools located in Jahrom city, with approximately 20 children in each class. Children from low-income families were selected from these schools. Written consent forms were completed by the parents of each child. Out of 136 eligible participants, 118 participants returned the parental consent form. Therefore, in accordance with the main criterion of low income, 118 children were selected and assigned as the research sample. The training method or training intervention method was that the classes engaged in motor activity for 30 minutes every day in a covered artificial grass playground with sufficient light and temperature. Then, the participating subjects in each class were randomly divided into two intervention groups ($n=59$) and control ($n=59$). The intervention group performed basic motor skills under conditions of expert motivational atmosphere, which this group occupied six classes. The control group also performed free games, which this group occupied five classes. The duration of the training interventions in both experimental and control conditions was 8 months. During 8 months, the subjects performed 64 training sessions (2 sessions per week, each session lasting 30 minutes). Before the start of the research intervention, motor performance, body composition measurements, height, weight, and BMI were recorded as pre-test scores of the groups. After the



completion of the 8-month training intervention, the post-test measurements of motor performance, body composition, height, weight, and BMI were taken from the subjects again. In order to examine the differences in the mean of the groups in the pre-test and post-test stages, the analysis of covariance test was used.

Results

The results of the independent t-test in examining the main variables of the study between the control and intervention groups in the pre-test stage indicated that there was no significant difference between the control and intervention groups ($P>0.05$). The results of the analysis of covariance test showed that in the intervention group, the average fat mass and body composition decreased by 1.18% and 1.84 kg from the pre-test to the post-test stage, and the lean body mass increased by 1.46%. In addition, the results indicated that fundamental motor skills training significantly reduced fat mass and body composition and significantly increased lean mass in children with low economic status ($P=0.001$). There was a significant difference between the two groups with an effect size of 0.53 in fat mass ($F=10.64$, $P=0.001$), an effect size of 0.65 in fat-free mass ($F=40.39$, $P=0.001$) and an effect size of 0.57 in body composition ($F=20.55$, $P=0.001$) of children with low economic status. Regarding the motor performance factor, in the intervention group, the average of manipulative skills, ball skills, and balance skills increased by 3.18, 3.49, and 4.25 units, respectively. There was a significant difference between the two groups with an effect size of 0.56 in manipulative skills ($F=25.67$, $P=0.001$), an effect size of 0.58 in ball skills ($F=29.88$, $P=0.001$), an effect size of 0.61 in balance skills ($F=39.53$, $P=0.001$), and an effect size of 0.76 in total motor performance ($F=45.51$, $P=0.001$) in children with low economic status. The results of the follow-up test indicated that after eight months of fundamental motor skills training; fat mass and body composition of the intervention group were significantly reduced ($P=0.001$) and motor performance and fat-free mass was significantly increased ($P=0.001$) compared to the control group.

Conclusion

The aim of the present study was to investigate the effect of an 8-month FMS intervention with a motivational-expertise climate approach on children's body composition. Studies have shown that efforts to improve FMS in young children may indirectly improve their body composition in later years (Barnett et al., 2008; Logan et al., 2015; Lubans et al., 2010). The results of the present study also highlight the importance of FMS interventions in relation to body composition, showing that the FMS intervention based on a motivational-expertise climate reduced the rate of FM gain over 8 months (1.60% for the control group compared to 28.10% for the intervention group); suggesting that a FMS intervention in a motivational-expertise climate may help reduce the rate of FM acquisition in children. The results also indicated an 88.9% increase in FFM as a result of the FMS intervention. Currently, according to the research literature, interventions aimed at increasing FMS typically involve small samples and are of short duration (Veldman et al., 2016). In general, FMS acquisition requires interaction with supportive social and physical environments, including space



and professional development. Although preschool teachers can be trained to implement FMS interventions, they are typically not trained in FMS practice and development and may benefit greatly from specialized training in this area (Pick & Valentini, 2022). Given that early childhood is considered the best time for FMS development (Goodway et al., 2019), training and resources should be prioritized so that children can receive quality instruction.

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Authors' Contributions

All authors have participated in designing, implementing and writing all parts of the present study.

Conflicts of Interest

The authors declared no conflict of interest.

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چکیده

آموزش مهارت های حرکتی بنیادی یک اصل مهم در دوره کودکی می باشد. متاسفانه کودکان دارای اضافه وزن و چاق تاخیرهای قابل ملاحظه ای در این مهارت ها نشان می دهند. تحقیقات در حوزه مهارت های حرکتی بنیادی و ترکیب بدن مورد غفلت واقع شده است. بنابراین هدف تحقیق حاضر بررسی تاثیر ۸ ماه مداخله مهارت حرکتی بنیادی مبتنی بر یک محیط شناختی حرکتی بر ترکیب بدنی و عملکرد حرکتی کودکان با وضعیت اقتصادی پایین می باشد. جامعه این تحقیق کودکان پسر ۸-۶ سال بودند که از بین آن ها ۱۱۸ کودک به صورت تصادفی انتخاب و به دو گروه مداخله و کنترل تقسیم بدنی شدند. ابزار مورد استفاده در این تحقیق شامل مجموعه ارزیابی حرکتی برای کودکان، مقیاس متعادل وزنه استاندارد برای اندازه گیری وزن، استادیومتر برای اندازه گیری قد و دستگاه ترکیب بدن امپدانس بیوالکتریک برای اندازه گیری توده چربی (FM)، توده بدون چربی (FFM) و ترکیب بدن (BMI) بود. در ابتدا، عملکرد حرکتی، اندازه های ترکیب بدن، قد، وزن و BMI به عنوان نمرات پیش آزمون گروه ها ثبت گردید. دوره تمرین شامل ۸ ماه، دو جلسه در هفته و ۳۰ دقیقه فعالیت بود. پس از اتمام مداخله ۸ ماهه تمرینی مجدداً پس آزمون عملکرد حرکتی، اندازه های ترکیب بدن، قد، وزن و BMI از آزمودنی ها گرفته شد. نتایج داده های آماری بهبود عملکرد حرکتی ($P=0/001$)، کاهش معنادار توده چربی ($P=0/001$) و ترکیب بدنی ($P=0/001$) و افزایش معنادار توده بدون چربی ($P=0/001$) را در نتیجه هشت ماه تمرینات مهارت های حرکتی بنیادی نشان داد. یافته های مطالعه حاضر نشان داد که این مداخله می تواند سبب بهبود عملکرد حرکتی شود و افزایش FM را به تأخیر بیندازد. در کل، پیشنهاد می شود که برای پیشگیری از چاقی از این رویکرد استفاده شده و بر اهمیت اندازه گیری ترکیب بدن در کودکان تاکید شود.

کلید واژه ها: مهارت حرکتی بنیادی، جو انگیزشی-خبرگی، ترکیب بدن، کودکان با وضعیت اقتصادی پایین.