

Mental Training Models in Physical Education, Sports and Health Subjects for Volleyball in Elementary School Students

Modelos de Entrenamiento Mental en Educación Física, Deportes y Materias de Salud para Voleibol en Estudiantes de Escuela Primaria

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Abstract. The association between mental and physical fitness is critical for young people participating in physical education and sports activities. However, current evidence shows that elementary schools need a mental training learning model and a course of play strategies for volleyball material. Therefore, it is necessary to design a particular model of mental training learning and a course of play strategy on volleyball material for elementary school students. The objective of the present study was to produce a model that meets valid, practical, and effective criteria for elementary school students using the Borg and Gall model. Observation, questionnaires, and tests were used to collect data from 22 elementary school students 10–11 years old. A mental training learning model and a course of play strategies were generated to meet the valid criteria, practical category, and effective criteria to be applied to volleyball material in elementary schools and to positively impact improving basic movement abilities and basic techniques of students' volleyball games. Results showed that elementary school students' basic movement abilities in volleyball were more efficient after using the mental training model and a course of play strategy than without using it. Such an outcome highlights the importance of implementing exercise imagery to lead to more engaging and effective school-based physical activity interventions.

Keywords: Youth, Mental Fitness, Physical Training, Volleyball

Resumen. La asociación entre la aptitud mental y física es crítica para los jóvenes que participan en actividades de educación física y deportes. Sin embargo, la evidencia actual muestra que las escuelas primarias necesitan un modelo de aprendizaje de entrenamiento mental y un curso de estrategias de juego para el voleibol. Por lo tanto, es necesario diseñar un modelo específico de aprendizaje de entrenamiento mental y un curso de estrategias de juego sobre el voleibol para estudiantes de escuela primaria. El objetivo del presente estudio fue producir un modelo que cumpla con criterios válidos, prácticos y efectivos para estudiantes de escuela primaria utilizando el modelo de Borg y Gall. Se utilizó observación, cuestionarios y pruebas para recopilar datos de 22 estudiantes de escuela primaria de 10 a 11 años. Se generó un modelo de aprendizaje de entrenamiento mental y un curso de estrategias de juego para cumplir con los criterios válidos, la categoría práctica y los criterios efectivos para ser aplicados al voleibol en las escuelas primarias y para impactar positivamente en la mejora de las habilidades básicas de movimiento y las técnicas básicas de los juegos de voleibol de los estudiantes. Los resultados mostraron que las habilidades básicas de movimiento de los estudiantes de escuela primaria en voleibol fueron más eficientes después de usar el modelo de entrenamiento mental y un curso de estrategias de juego que sin usarlo. Este resultado resalta la importancia de implementar la imaginación del ejercicio para lograr intervenciones en actividad física escolar más atractivas y efectivas.

Palabras clave: Juventud, Aptitud Mental, Entrenamiento Físico, Voleibol

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Introduction

The primary goal of physical education in elementary schools is to foster the development of physical abilities, cognitive skills, and fundamental movement skills to ensure their efficacy, aesthetics, and precision and to cultivate values such as sportsmanship, honesty, discipline, responsibility, cooperation, self-confidence, and democratic spirit through physical education lessons (Mustafa & Dwiyo, 2010; Astuti et al., 2023). Chin, Edginton, Tang, and Phua (2019) emphasize that children must be equipped for the 21st century to enhance their future readiness. The National Education Standards Agency posits that physical education, sports, and health education should aim to develop basic motor skills and competencies (Rosdiani, 2014). Additionally, the importance of mastering fundamental motor skills is underlined (Metzler, 2017).

It has been recognized that psychological skills training, also known as mental training, is aimed at diminishing mental weaknesses and enhancing motor skills as well as

physical performance in sports (Orlick & Partington, 1988). Hence, it is crucial to consider the interconnection between mental and physical fitness for young individuals engaging in diverse physical education and sports programs. In particular, such psychological training can substantially impact the long-term development of athletes, necessitating a multi-faceted approach that includes physical fitness, technical prowess, tactical preparedness, and mental robustness (Lindsay et al., 2023; Xiong, 2012).

Psychological skills training, or mental training, is designed to mitigate mental weaknesses while bolstering motor skills and physical performance in sports (Orlick & Partington, 1998). Therefore, the relationship between mental and physical fitness is essential for youth engaged in physical education and sports activities. Such psychological training can profoundly influence the long-term development of athletes, which demands a comprehensive approach that encompasses physical fitness, technical ability, tactical preparedness, and mental strength (Lindsay et al., 2023; Xiong, 2012).

Teaching basic movement skills to children at an early

age is crucial, as failure to acquire these fundamental skills can lead to difficulties in learning and performing more complex skills, such as sports technical skills, later in life (Donnla et al., 2022; Ridho Bahtra et al., 2022). These skills should be introduced during the formative years of 6-12, considered the pre-skills period when children can learn diverse skills (Bakhtiar, 2015). Eylon et al. (2017) and Sulistiyowati (2022) suggest that school sports education's main objective is continuously developing the physical activities required for each sport. Additionally, Anggraini (2014) posits that physical activity can lead to developing more sportive and democratic individuals. Notably, mental training, including exercise imagery, has been identified as a beneficial approach for enhancing physical education engagement among adolescent girls, potentially leading to increased participation in both in-school and after-school physical education activities (Ghyaour Najafabadi et al., 2017). This finding is pertinent for physical education teachers seeking to implement engaging and adequate physical activity interventions.

Research by Bakhtiar (2014a) indicates that the basic movement abilities of elementary school children in Indonesia are deficient due to several factors. One of the primary reasons is that teachers need to be more effectively trained to teach these skills, as they are accustomed to an outdated curriculum that does not include introductory motor skills courses, unlike the recently updated curriculum, which now incorporates these essential courses. Furthermore, Syahrial (2022) has noted that students' lack of fundamental movement skills hampers their ability to learn basic technical skills in sports like volleyball. This concern is underscored by data from the National Sports Grand Design (DBON), which reveals a mere 2.1% of student involvement in sports.

Physical education strategies in schools may encompass various courses such as games, exercises, and situations (Metzler, 2017). Bakhtiar (2014b) suggests that learning through a game course is more effective than exercising. This highlights the importance of adopting contemporary teaching methods for effective skill acquisition (Soytürk, 2019). While big ball games like volleyball, basketball, and football are integral to the curriculum, this research primarily focuses on volleyball (Karisman, 2023). Learning volleyball at school extends beyond merely grasping the technical skills of play; it is a sport embraced across various demographics (Destriani, 2020), with easily accessible facilities and infrastructure and a lower injury risk due to its non-contact nature (Ihsan Nurul et al., 2023). Yusmar (2017) indicates that psychomotor development in volleyball necessitates physical strength, which can be developed through play. Challenges in teaching volleyball in elementary schools have been identified (Rudi & Arhesa, 2020), and mental training has been shown to activate brain areas associated with observing specific movements (Scott et al., 2021). Mental fortitude, characterized by high dedication and perseverance despite technical or personal setbacks, can be enhanced through goal setting, physical

relaxation, attention control, and imagery (Festiawan, 2020; Ardani, 2018). Employing the right approach during training, such as mental training models and play strategies, is essential for fostering a positive mindset in students.

Adi (2016) posits that mental functions are instrumental in driving, controlling, and guiding motor activities, essential for learning and mastering motor skills. This is a significant area of psychological research in accelerated sports skill acquisition. Bakhtiar (2014b) elaborates that the course of play, enjoyed by individuals, facilitates comprehensive development—physical, intellectual, social, moral, and emotional. Hidayat (2020) suggests that game-based learning methods necessitate active student participation, with educators acting as facilitators, thereby expediting the development of fundamental movement skills. Widiastuti and Pratiwi (2017) note that a well-designed play approach can foster enjoyment, challenges, creativity, problem-solving, and motivation. Dini Rosdiani (2013) views physical education as treating children holistically rather than separating physical and mental aspects. Moreover, Mulyanto (2014) describes physical education as a deliberate selection of physical activities, play, and sports aimed at achieving educational objectives, taking into consideration the educational and associated social elements. Oktavia et al. (2021) further discuss how these considerations influence decisions in the educational sector, including school-based physical education policies.

As outlined by Vanluyten et al. (2023), the purpose of physical education in elementary schools is to establish and maintain physical activity habits for long-term health benefits. However, many children still need to meet the World Health Organization's recommended 60 minutes of daily moderate-to-vigorous school physical activity programs, which are comprehensive and offer numerous opportunities for children to be active while at school (Lemes et al., 2021). Physical education plays a critical role in the overall educational framework, targeting the development of fitness and mental, social, and emotional well-being through physical activity (Ashar et al., 2018). Volleyball, for instance, teaches basic motion control object skills, which are instrumental in improving life quality (Boardley, 2015) and encompasses basic movement abilities categorized as locomotor, non-locomotor, and manipulative (Goodway et al., 2012). Proficiency in these movements greatly influences everyday capabilities (Eri, 2017) and, according to Syafruddin et al. (2020), underpins complex sports movements and daily tasks. Bakhtiar (2013) found that misconceptions in teaching movement skills during formative years can negatively affect future sports participation. Furthermore, Gallahue et al. (2012) suggest that motion progresses from inefficiency to efficiency, and volleyball is a dynamic sport that integrates physical, technical, tactical, and mental skills (Syafruddin, 2011).

The mental health of children, a key demographic, involves an integrated self-condition that unifies emotional and intellectual responses, as discussed by Xiamin (2020). Liebmann et al. (2023) explore the concept of mental

training, distinguishing it as conceptualization—a type of task training where movements are internal rather than observable, aligning mental training with cognitive physical skill training. Tangkudung (2017) describes it as a process involving the function of ideas, introspection, and imaginary training. Mental structures and psychological processes, whether conscious or unconscious, are defined by Hoehne et al. (2022) as components of mental quality, which encompasses self-sacrifice, self-denial, and a solid disciplinary will, as further explicated by Xiong (2012). Mental toughness, characterized by confidence, focus, and the ability to take action optimally, especially under stress, is termed by Dimiyati (2018) as a "character in action.

Methods

Procedures

The research and development approach adopted in the study was based on the method outlined by Gall, Gall, and Borg (1983), which articulates a model consisting of 10 systematic steps: research and information gathering, planning, creating preliminary forms of products and frameworks, conducting preliminary field testing, revising the main product, executing main field testing, refining the operational product, undertaking operational field testing, finalizing the product revisions, and finally, dissemination and implementation. This study collected data from 22 elementary school students aged 10 to 11 years old through observations, questionnaires, and tests. A mental training learning model and a course of play strategies were generated to meet the valid criteria, practical category, and effective criteria to be applied to volleyball material in elementary schools and to positively impact improving basic movement abilities and basic techniques of students' volleyball games. Product trial subjects for small groups in this study were students from Padang State University's Elementary School of Laboratory Development, namely the Vb class, totalling eight people, and the experimental class or large group research product trials were 22 class Va students. Material experts, linguists, and educational technology experts completed a validation questionnaire for this instrument. The usefulness of the mental training learning model and playing strategy is determined by three factors: model implementation in learning, teacher response as a practitioner in using the model, and student response. More specifically, the mental training model used in the present study consisted of the five steps: i) association: the teacher provides an overview of the material to be taught and studied with the knowledge that students already have. Next, the teacher conveys the objectives of the expected learning material.

Then, students observe the movements demonstrated by the teacher or videos of game movements, especially volleyball, so that students can perform apperception and image the movements they see. Besides that, the teacher also motivates students to be able to carry out movements as seen, ii) imagery: a sensory experience that occurs in the

mind which provides a movement experience in a person's brain, making it possible to display movement patterns that have been explained by the teacher and seen in the video. After doing this imagery, students can also visualize or train mentally related to the activities they have carried out; iii) drill: a series of movement activities carried out by students with the concept of starting from simple movements to more complex movement levels. Among them is stretching to train the flexibility of the limbs to relax the muscles by making them contract. The stretching movements are warming up from the head first, down to the shoulders and hands, warming up the hips, stretching the legs, and warming up the legs. After that, students are given small games that can increase the student's body temperature; iv) application: Students actualized competencies in real situations in the field by practising competencies following learning objectives. Afterwards, the teacher provided feedback on the practices carried out by students, and v) closure: students conclude the competencies that have been learned. Then, the teacher follows up on the results of the drill that has been carried out. If there are students who have not been able to master the competencies, they are asked to repeat the drill process. The next series of activities is to cool down, and finally, the teacher will conclude the competencies that have been learned.

Instrument

The instrument used in the present study was a test of students' basic volleyball movement abilities by providing quantitative assessment categories, namely, using targets and time to carry out the test. Then, the quality assessment is assessed by judgment, namely by experts who provide assessments of basic volleyball movement abilities in terms of movement structure and students' mental indicators. In particular, judges were volleyball experts working as lecturers and physical education teachers at the national level. The valid and reliable basic movement ability test consisted of the following three items: a) service test, b) lower passing, c) and upper passing (Sujarwo, 2018). A Likert scale is used in the analysis technique for students' basic volleyball abilities. A paired sample t-test ($\alpha = 0,05$) was used to assess the developed model's effectiveness.

Instruments for							
No.	validating	Expert	Aiken' V	Status	ICC	Status	Cronbach' alpha
Instruments							
1	Model Book	5	0,606	Valid	0,588	Good stability	0,887
	Validation						
2	Model Book	5	0,667	Valid	0,420	Good stability	0,784
	Practicality						
3	Model Book	5	0,606	Valid	0,644	Good stability	0,901
	Effectiveness						

Figure 1. Conclusion of the results of the validity and reliability of the research instrument

Results

During the planning stage, a conceptual mental training learning model, a course of play strategies (MMTRB) and research instruments are developed. Furthermore, the MMTRB and research instruments were validated and revised during the development stage. The products designed must consider the capabilities of elementary school students based on the characteristics of elementary school students at an early age. Mental training learning models and course of play strategies have been designed to improve elementary school students' basic volleyball movement skills. In implementing the designed model, the indicators are training phases, training forms, intensity, sets, recovery between games, and duration. Several learning models were revised during the limited field test stage and this initial revision, particularly those related to the mental training learning model and the play sequence strategy. In this model, a unique table for mental training is required. Meanwhile, attention must be paid to the form of course of play that contains elements of students' physical fitness, as evidenced by the motion activities they carry out to improve students' basic volleyball abilities. The results of a practical questionnaire regarding the mental training learning model and the course of play strategy were given to teachers who teach volleyball material in class 5A SD Pembangunan during the broad field test stage and the final revision.

Table 1. Results of Practicality Questionnaire Data Analysis of Learning Models

No.	Rated aspect	Practicality Value	Category
1	Attractiveness	85.0%	Very Practical
2	Usage Process	90.0%	Very Practical
3	Ease of Use	84.0%	Practical
4	Time efficiency	80.0%	Practical
Average practicality value		84.8%	Practical

A critical assessment was conducted to evaluate the efficacy of the developed product and measure the enhancement of students' basic volleyball movements. Before introducing the mental training learning model and course of play strategy, a baseline assessment, or pretest, was administered to assess volleyball movement abilities. These initial results were then compared to a subsequent final or posttest assessment to gauge improvement. The analysis of effectiveness incorporated both qualitative judgments and quantitative values, as detailed in Appendix 3 on page 140. Table 20 presents a comparative view of the primary movement ability data before and after the implementation of the model.

Table 2. Description of Students' Volleyball Skills Data

Data	Quality Value		Quantity Value	
	Posttest	Pretest	Posttest	Pretest
Average	68,68	64,09	13,23	9,41
Max Value	77	70	21	22
Min Value	65	60	9	3
St. Dev	3,09	2,81	3,04	4,19

Table 3. Description of Initial and Final Test Data Categories for Volleyball Technical Abilities

Interval Class	Category	Pretest		Post-test	
		Absolute Frequency	Relative Frequency	Absolute Frequency	Relative Frequency
> 72	Excellent	0	0	2	9,09
68 – 72	Good	0	0	11	50
65 – 67	Fair	8	36,36	9	40,91
61 – 64	Poor	12	54,55	0	0
< 61	Very Poor	2	9,09	0	0
Total		22	100	22	100

Moreover, the following table shows the frequency distribution of the results of the initial test data and the final test of basic volleyball playing technique skills based on quantity values.

Table 4. Frequency Distribution of Preliminary and Final Test Data Results for Basic Volleyball Technical Skills from Quantity Values

Interval Class	Category	Pretest		Post-test	
		Absolute Frequency	Relative Frequency	Absolute Frequency	Relative Frequency
13,7 – 18,1	Excellent	1	4,55	2	9,09
9,1 – 13,6	Good	1	4,55	6	27,27
4,4 – 9,0	Fair	7	31,82	13	59,09
< 4,4	Poor	12	54,55	1	4,55
< 4,4	Very Poor	1	4,55	0	0
Total		22	100	2	100

The value of sig (0.200) > (0.05) was obtained from the results of the initial quality test's normality analysis and normalized data distribution. While the final test quality value obtained was sig (0.196) > $\alpha(0.05)$. Normalized data distribution. Meanwhile, the sig value (0.200) > $\alpha(0.05)$ is obtained from the quantity value results. The data is normally distributed at the conclusion, and the final test value for the quality value is obtained, with sig (0.200) > $\alpha(0.05)$ —normalized data distribution. Furthermore, the significant value for 2-tailed was obtained from the hypothesis testing results as 0.000: 2 = 0.000. Because the researcher conducted a one-way hypothesis test, the significant value for 2-tailed must be divided by 2 to 0.000: 2 = 0.000. Because the sig (0.000) < alpha (0.05) value rejects H_0 , H_1 is accepted. In other words, the ability to learn basic volleyball techniques after using the mental training learning model and course of play strategy is better in terms of quality value than without using the mental training learning model and course of play strategy.

The final learning model is obtained from the results of expert assessment of the model and empirical test data collected in the field, based on the research process that has been carried out based on the steps in the research on developing a mental training learning model and a course of play strategies (MMTRB). It was discovered that the model designed was valid, practical, and effective by the research objectives, with the characteristics of having a positive impact on improving elementary school students' basic movement abilities and basic volleyball technical skills. By the t-test results, the basic movement abilities of volleyball in elementary school students are better after using the mental training learning model and course of play strategy than before using the mental training learning model and course of play strategy. More on the modified development

research steps, specifically:

Discussion

The present study produced a particular model of mental training learning and a course of play strategy on volleyball material for elementary school students. According to the main results, elementary school students' basic movement abilities in volleyball were more efficient after using the mental training model and a course of play strategy than without using it. Such an outcome underlines the critical role of exercise imagery in school-based physical activity interventions, supporting sports coaches and physical education teachers working with young people aged 11-12 years.

Orlick and Partington (1988) have documented that mental fitness can lead to positive changes in mental weakness and enhance motor skills and physical performance in sports, underscoring the significance of the link between psychological skills training and motor fitness in school-based physical education and sports for youth. This training is pivotal for long-term athlete development, necessitating a comprehensive approach that includes physical, technical, tactical, and mental fitness components (Lindsay et al., 2023; Ziong, 2014). Notably, mental training has been identified as an effective method for not only improving mental health benefits but also for increasing engagement in physical education and sports activities, especially among pre-adolescent girls. Exercise imagery, in particular, has been recognized as a beneficial strategy for enhancing participation levels in school-based education (Ghayour Naiafabi et al., 2017). This insight is crucial for those working with students in an elementary school setting, as mental training can contribute to more effective physical education and team sports programs.

Mental training is increasingly recognized as a crucial element in the development of young athletes. Goal setting, self-talk, personal control, and imagery are among the mental skills extensively examined for their positive effects on adolescents' mental fitness, demonstrating substantial benefits for those engaged in physical education and sports (Diament, 2014). These skills have been linked to improvements in self-confidence and physical self-esteem and a decrease in negative thoughts and anxiety during competition, highlighting the combined impact of physical and mental training on reducing stress and enhancing performance in a competitive sports setting (Zourbanos et al., 2010; Hatzigeorgiadis et al., 2008). Furthermore, mental skill training is associated with increased sports motivation in adolescents, suggesting that physical education instructors and sports coaches should consider mental fitness an integral component of school-based physical activities and sports programs (Mariani, 2019).

Learning motion encompasses processes related to training or experience that lead to proficiency in skilled movements (Rahyubi, 2014). Syahrial (2022a) posits that effective education should be inclusive, provide ample practice opportunities, and promote assignments that

reinforce learning and the development of lifelong habits while also eschewing physical activity as punishment and implementing regular assessments to enhance student learning. Mental training, encompassing relaxation and concentration exercises, forms a vital component of an annual training regimen and can be integrated into sports training (Adi, 2016). This approach to mental training aims to foster high motivation levels in students, serving as a stimulant, regulator, and director of limb movement, culminating in mastering fundamental volleyball techniques. Moreover, mental training is beneficial in bolstering confidence, fostering a positive focus, and mitigating negative emotions like anxiety and the anticipation of failure (Subathra et al., 2021). The concept of early childhood as a pivotal, creative, playful, and social period is emphasized, with the notion that mental training activities, including courses of play strategies, are considered adequate for developing basic movement and volleyball technical skills in elementary school students. Integrating these four periods into the course of play strategies aligns with the educational process, facilitating training congruent with the learning implementation stages.

To summarize, while the concurrent application of physical and mental training is advised, it is only sometimes practised under practical conditions. This is mainly because integrated mental and physical training programs are predominantly tailored for individual sports, necessitating further investigation into their application in team sports involving young athletes (Diment, 2014). Nevertheless, physical education instructors are ideally situated to equip elementary school students with mental strategies and skills during physical education sessions to enhance young athletes' physical performance through systematic training of both mental and physical aspects.

The limitations of this study are notably its restricted generalizability, which applies only to elementary school students aged 10-11 years, and its inability to extend to other age groups. The research did not address the impact of a mental training model on various psychological health markers, nor did it consider performance in sports other than volleyball. Future research should acknowledge these constraints and broaden the scope to include diverse individual and team sports. This would facilitate a more comprehensive understanding of how mental fitness enhances multiple aspects of physical fitness in young students.

Conclusion

The mental training learning model and course of play strategy meet valid criteria, are practised effectively, and positively impact elementary school students' basic volleyball skills. The pretest and posttest results show that the basic movement abilities of volleyball in elementary school students are better after using the mental training learning model and course of play strategy than before using the

mental training learning model and course of play strategy. Moreover, limited field test results demonstrate that the teacher and students' mental training learning model and play sequence strategy are practical for basic volleyball movement skills.

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