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Development of a game-based physical training model to improve motivation and smashing ability in volleyball athletes aged 15-18 years

Andriansyah[1ABDE], Sumaryanto[1ABDE], Ngatman[1ABDE], Trisnar Adi Prabowo[2ABCDE]

[1] *Faculty of Sports and Health Sciences, Universitas Negeri Yogyakarta, Indonesia*
[2] *Faculty of Education, Universitas Muhammadiyah Brebes, Indonesia*

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Abstract

Background and Study Aim: Game-based training has become an important approach in modern volleyball, as it combines physical development with engaging and sport-specific activities. These models are widely used to enhance coordination, technical execution, and motivation among young players. Although different game-based strategies are applied in practice, their relative effectiveness in improving motivation and smashing ability among volleyball athletes aged 15–18 years remains a matter of practical interest. The aim of this study was to develop a structured and scientifically validated game-based physical training model specifically designed for volleyball athletes aged 15–18 years, with a focus on motivation and smashing ability.

Material and Methods: This study is Research and Development (R&D) using the ADDIE model. The sample consisted of 60 students aged 15–18 years (30 male and 30 female) from senior high schools in Indragiri Hilir Regency, Riau Province, Indonesia. They were students who participated in volleyball extracurricular activities at their schools. Motivation was measured using an instrument adapted and modified from previous research, while smashing ability was assessed using the Spike Accuracy Test. Data analysis involved product validation and effectiveness testing over an 8-week period (24 sessions) using the Game-Based Physical Training Model. Results were analyzed with t-tests ($p < 0.05$).

Results: This study developed and validated a Game-Based Physical Training Model consisting of four training objectives: improving coordination and motivation (weeks 1–2), improving smashing technique and accuracy (weeks 3–4), increasing intensity and strength (weeks 5–6), and conducting match simulations and evaluations (weeks 7–8). The validation results indicated several aspects: suitability of the training model for improving motivation and smashing ability in volleyball players aged 15–18 years, practicality, safety, and feasibility of implementation, with Aiken's V validity > 0.7. The effectiveness test through pretest–posttest showed $p = 0.000 < 0.05$ for both motivation and smashing ability variables.

Conclusions: This study produced a Game-Based Physical Training Model to improve motivation and smashing ability in 15–18-year-old volleyball athletes. In practice, this model provides a structured and adaptable program framework that can be used by coaches with adjustments tailored to athletes' profiles, playing positions, and available facilities and equipment. Future studies are expected to include the design of developmental research using a pre-experimental design with elements such as a control group, advanced objective measurements, and detailed statistical reporting.

Keywords: volleyball, game-based training, youth athletes, motivation, smashing ability

Introduction

Volleyball is a dynamic team sport that requires a combination of physical fitness, technical skills, and tactical awareness. Among the different components of performance, motivation influences athletes' commitment to training, while the smashing technique is one of the central skills contributing to competitive success. The development of these aspects has specific relevance during adolescence, as athletes aged 15–18 years are in a phase of physical growth, skill acquisition, and psychological adaptation. In this context, designing training approaches that integrate physical preparation with game-like situations is a complex and necessary process for supporting both performance outcomes and long-term athletic development.

Motivation plays a crucial role in volleyball. Without strong motivation, an athlete will find it difficult to maintain commitment to an intense training schedule, face challenges during matches, or bounce back from defeat [1]. High motivation serves as the primary foundation for a champion mindset developing in the competitive environment of volleyball [2]. Therefore, maintaining and enhancing athletes' motivation is the key to achieving peak performance and sustaining a successful career as a

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volleyball athlete [3].

Strong motivation tends to lead to greater discipline in adhering to a regular physical training program [4], which in turn improves performance. This improvement in performance, among other things, significantly enhances smash ability in volleyball. The smash is one of the fundamental attacking techniques that requires a combination of muscle strength, precise coordination, and reaction speed [5]. Athletes with high motivation are more likely to attempt varied smash techniques, be more persistent in correcting mistakes, and more self-confident in executing smashes during matches [6]. This directly contributes to the effectiveness of team attacks and the likelihood of scoring points [7].

Motivation and smash ability are crucial to develop at a young age, particularly between 15 and 18 years [8, 9]. During this age range, athletes undergo an important stage of talent development [10]. Additionally, the rapid physical growth and motor development during this period [11] make it an optimal time to intensify physical training and technical skill development. At the same time, athletes require consistent motivational support to continue progressing [12]. Enhancing motivation and smash ability provides them with a solid foundation for transitioning to higher levels of competition and prepares them to become accomplished senior athletes [13].

Improving motivation and smash ability in volleyball athletes aged 15–18 years requires an innovative and relevant training approach tailored to their developmental characteristics. One promising approach is the use of a game-based physical training model [14]. Game-based physical training has been shown to enhance aerobic capacity and change of direction in basketball [15]. In handball, the combination of match simulation training with games influences sprint performance and jumping ability [16]. Furthermore, physical training using the game model, combined with small-sided games and technical drills, can enhance passing skills in volleyball [17, 18]. Research in volleyball indicates that the Game-Based Training Group method is more effective in improving performance in male athletes compared to the Traditional Training Group method [19]. Therefore, based on previous research findings, game-based methods have been shown to enhance athletic performance.

Analysis of research findings has shown that game-based training contributes to the improvement of physical, technical, and motivational components across different sports. Researchers emphasize that for volleyball athletes, motivation and smashing ability are central elements that influence both individual performance and team success. At the same time, the complexity of adolescence as a developmental stage highlights the importance of training approaches that are adaptable, engaging, and effective for athletes aged 15–18 years. This ongoing challenge continues to limit the full integration of structured game-based physical training models specifically tailored to volleyball.

However, to date, there has been no structured and scientifically tested physical training model specifically designed for volleyball athletes aged 15–18 years with a focus on motivation and smash ability. Furthermore, many existing training programs tend to be general in nature and do not explicitly integrate game elements for the simultaneous development of motivation and smash ability. Therefore, this study aims to develop a game-based physical training model that is expected to provide a concrete solution for enhancing motivation and smash ability in volleyball athletes aged 15–18 years. With this model, it is expected that coaches will have a systematic and innovative guide to optimize the potential of young athletes.

Materials and Methods

Participants

The population in this study consisted of all students from senior high schools in Indragiri Hilir Regency, Riau Province, Indonesia. The sample was selected using total sampling based on the extracurricular volleyball program at the schools, resulting in a sample size of 60 students (30 male and 30 female). The characteristics of the male participants were as follows: age 15–18 years, mean ± SD = 16.5 ± 0.6 years, height 169.1 ± 1.7 cm, weight 63.6 ± 2.2 kg, and training experience 2.8 ± 0.7 years. The characteristics of the female participants were: age 15–18 years, mean ± SD = 16.1 ± 0.5 years, height 167.0 ± 1.5 cm, weight 54.2 ± 1.2 kg, and training experience 2.5 ± 0.5 years. Additional inclusion criteria required participants to be free from illness or injury. Participants were also required to have engaged in regular volleyball training (minimum twice per week) over the past six months, and be physically cleared for high-intensity activity by a school physician. Students with chronic illness, orthopedic limitations, or whose legal guardians did not provide consent were excluded.

This study obtained a research permit from the university (B/1067/UN34.16/PT.01.03/2025) and ethical approval. The study was approved by the Research Ethics Committee of Yogyakarta State University and conducted in accordance with the Declaration of Helsinki. Approval was also obtained from the school principals and physical education teachers. Prior to participation, written informed consent was obtained from the parents or legal guardians of all student participants. To ensure proper implementation and monitoring, the research was conducted at the volleyball court of Indragiri University.

Research Design

This study employed a development research design oriented toward the creation, testing, and refinement of a specific product or model aimed at achieving defined objectives. The development process adopted the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model. The advantages of using ADDIE include providing a systematic and comprehensive framework from needs analysis to final evaluation, ensuring that each stage of development is carefully planned [20, 21, 22].

The first stage is analysis, which aims to identify problems based on a literature review, training needs, target characteristics, available resources, and expected constraints. The second stage is design, which aims to develop a detailed plan for the product or model to be produced. The third stage is development, which aims to transform the design into a tangible product or model that is ready for testing. The fourth stage is implementation, which aims to apply the developed model or product on a larger scale or in real-world conditions to collect data on its effectiveness and practicality. The fifth stage is evaluation, which aims to assess the effectiveness, efficiency, and appeal of the developed product or model, as well as to identify areas for further improvement. This stage takes place not only at the end but is also integrated into each stage (formative evaluation) and at the conclusion of the process (summative evaluation).

The study followed a single-group pretest–posttest design without a control group. While this design limits causal inferences, it allows for initial validation and pilot-level assessment of the training model's effectiveness. To strengthen internal validity, consistent intervention delivery, participant supervision, and environmental conditions were maintained throughout the 8-week period.

Each phase of the ADDIE model was operationalized in alignment with sport pedagogy: the analysis stage incorporated field interviews with coaches and athletes; the design phase involved structuring a week-by-week training schedule with specific physical and technical objectives; the development phase produced visual training diagrams and activity protocols; implementation included 24 guided sessions supervised by certified trainers; and evaluation utilized both expert validation and statistical testing of outcome variables.

Although the core procedures were described narratively, a schematic representation of the 8-week intervention schedule was also developed to ensure clarity, standardization, and replicability of the training structure.

The instruments used in this study for the motivation variable were adapted and modified based on the results of previous studies [23, 24, 25], which have been shown to be effective for measuring athletes from junior to senior levels and across different sports. The motivation variable consisted of six factors: (1) Approach-Success, (2) Avoidance-Failure, (3) Approach-Success in Competition, (4) Approach-Success in Training, (5) Avoidance-Failure in Competition, and (6) Avoidance-Failure in Training. The instrument for measuring smash ability was adapted and modified from the Spike Accuracy Test. The main strength of this test is its ability to assess an athlete's accuracy in directing a smash to specified target areas [26, 27, 28, 29]. The procedure involves placing targets in different areas of the opponent's court (e.g., corners, open zones) and counting the number of successful smashes that land within the target from a predetermined number of attempts.

Statistical Analysis

The first stage of this research analysis was the validity test of the game-based physical training product, using the Aiken's V validity test. This validity test was evaluated by experts, including lecturers with volleyball coaching experience and a minimum doctoral qualification, as well as coaches with at least a national license. The expert panel consisted of nine individuals: three doctoral-level university lecturers specializing in volleyball coaching, three national-level coaches with A licenses, and three with B licenses. All experts independently assessed the draft training model using a structured Likert-scale questionnaire.

The second stage of this research analysis was the effectiveness test. The effectiveness test in this study used a paired t-test by comparing pretest and posttest scores ($p < 0.05$). This test was selected to evaluate within-subject changes in motivation and smash ability following the intervention. Prior to conducting the t-test, assumptions of normality (Shapiro-Wilk test) and homogeneity of variance (Levene's test) were verified. The use of a paired t-test is appropriate given the single-group pre–post design; however, the absence of a control group limits the generalizability of findings. No covariates were included in the model.

Sample size justification was based on previous literature indicating moderate to large effect sizes for similar game-based training interventions. Although no formal power analysis was performed, a sample of 60 participants is generally sufficient to detect moderate effects with adequate statistical power ($\geqslant 0.80$) in within-subject designs.

The formula for Aiken's V is:

$$V = \frac{\sum s}{n(c-1)}$$

where: $s=r-l0$; r = rating given by an expert; l0 = lowest score on the rating scale; n = number of experts; c = number of categories on the rating scale.

Results

The first stage in this analysis involved reviewing scientific literature from previous studies, as well as conducting interviews with coaches and athletes to formulate the research problem. The objectives of this stage were: (1) to identify problems based on field observations, (2) to determine whether these problems could be addressed through previous research findings, (3) to provide solutions by developing the product using scientific procedures, (4) to produce an original product accompanied by publication in a Scopus-indexed journal, and (5) to avoid plagiarism in all aspects, including the product, training program, research variables, and research samples.

The results of the analysis phase included: (1) identifying why motivation and smash skills need to be improved and why a game-based training model is relevant, (2) understanding the characteristics of 15–18-year-old volleyball players, including their initial knowledge, training style, motivation, and physical and psychological abilities, (3) determining the skills or content that need to be taught or developed, and (4) identifying available resources (facilities, equipment, coaches) as well as research limitations.

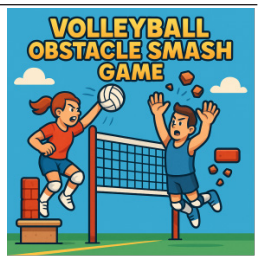
The second stage, Design, produced the following outcomes: (1) determining the type of physical training, (2) determining the type of games, (3) selecting the tools and materials to be used in the product, (4) designing the flow and components of the training model, including the sequence of activities, duration, and methods of assessment, and (5) determining how the success of the model would be measured, including pretest and posttest instruments, questionnaires, and evaluations.

The third stage, Development, aimed to produce an initial draft of a game-based physical training product. This draft was based on Table 1 and contained information about the training period in weeks, training objectives, game names, activity descriptions, physical focus, and corresponding movement illustrations.

Table 1. Game-based physical training model for improving motivation and smash ability in volleyball athletes aged 15–18 years

Week	Training Objectives	Game Name	Activity Description	Physical Focus	Movement Diagram
1–2	Improving coordination and motivation	Volley Target Hunt	Students are divided into groups and perform smashes to hit targets in different zones of the court.	Coordination, interest, smash technique	
		Jump and Catch	Vertical jumps to catch a balloon or ball suspended in the air.	Vertical jump, explosiveness	
3–4	Improving smash technique and accuracy	Smash Zone Challenge	Players perform smashes into the opponent's court according to designated value zones.	Smash technique, accuracy, competitive motivation	
		Jump Volley Race	Team competition: vertical jump followed by passing the ball to the net after landing.	Jumping, leg muscle stability	

Table 1. (Continued)

Week	Training Objectives	Game Name	Activity Description	Physical Focus	Movement Diagram
5	Increasing intensity and strength	Obstacle Smash Game	Smashes performed after overcoming light obstacles (zig-zag running, small hurdles).	Power, concentration, muscle endurance	
		Explosive Square Drill	Four-point jump combined with receiving and hitting the ball from different directions.	Vertical jump, explosiveness	
7–8	Game simulation and evaluation	Mini Volleyball Game	3 vs. 3 or 4 vs. 4 with modified rules, requiring attacks to be completed with a smash.	Application of techniques, motivation	
		Smash Point Rally	Points awarded only if the smash hits the target in the high-value zone.	Accuracy, power, endurance	

The results of the draft, as shown in Table 1, indicate that the game-based physical training program spans 8 weeks and is divided into four training objectives, each lasting 2 weeks. This draft then underwent product validation by experts, consisting of three doctoral-level lecturers with expertise in volleyball coaching, three volleyball coaches with A licenses, and three volleyball coaches with B licenses.

The results of this product validation are presented in Table 2, which contains a questionnaire covering four aspects: items 1–5 assess the suitability of the training model for improving motivation and smashing ability in volleyball players aged 15–18 years; items 6–9 assess practicality; items 10–12 assess safety; and items 13–15 assess ease of implementation.

Based on the results of Table 2, the validation results show that all statement items have a validity value > 0.7, so this development product is considered valid because each item is greater than 0.6 [30, 31]. After the product development was deemed valid, the next step was to implement the product through an effectiveness test via an experiment. Therefore, a pretest and posttest were required to assess the effectiveness of this product.

In the fourth stage, Implementation, data related to the athletes' motivation and smash ability before and after the implementation of the model were collected, as well as feedback from athletes and coaches regarding the practicality and effectiveness of the model. Volleyball players aged 15–18 then applied the model for 24 sessions. The evaluation of this model used a paired t-test. However, prior to this, normality and homogeneity tests were required. The results of the normality test are presented in Table 3.

Based on the results in Table 3, the residual-based normality test showed significance values for the motivation and smash ability variables greater than 0.05 ($p > 0.05$). These results indicate that the residuals did not deviate from normality. After confirming normality, we proceeded to a homogeneity test. The homogeneity test results are presented in Table 4.

Based on the results in Table 4, the research data for both the motivation variable and the smash ability variable showed significance values greater than 0.05 ($p > 0.05$), indicating that the sample

Table 2. Expert Validation Results [n(c–1) = 3]

No.	Statement Item	ΣS	Aiken V	Description
1	The training model developed is in accordance with the principles of physical training in volleyball.	27	0.750	Valid
2	The game-based training model developed is relevant for improving the motivation of extracurricular participants.	28	0.778	Valid
3	The training model developed is effective in improving participants' smash skills.	26	0.722	Valid
4	The training model developed is effective in improving participants' jump height.	28	0.778	Valid
5	The developed training model introduces an innovative approach to volleyball coaching in schools.	27	0.750	Valid
6	The training model developed is easy to understand by coaches and participants.	28	0.778	Valid
7	The training model developed can be implemented with equipment available at schools.	28	0.778	Valid
8	The duration of the training is consistent with the school's extracurricular schedule.	28	0.778	Valid
9	The training model developed can be applied by coaches without the need for additional complex training.	27	0.750	Valid
10	The training model developed is safe for participants in extracurricular activities.	28	0.778	Valid
11	The risk of injury in this training model has been minimized effectively.	27	0.750	Valid
12	This model complies with safety standards for physical training and volleyball.	28	0.778	Valid
13	This training model can be implemented by schools with existing resources.	27	0.750	Valid
14	This training model can be applied by participants with different levels of ability.	28	0.778	Valid
15	This training model can be combined with other training methods without difficulty.	27	0.750	Valid

Table 3. Results of the normality test for pretest–posttest data

Variable	Kolmogorov–Smirnov			Shapiro–Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual – Motivation	0.079	60	.200*	0.969	60	0.126
Unstandardized Residual – Smash Ability	0.111	60	0.072	0.970	60	0.142

Table 4. Results of the homogeneity test of the data

Variable	Test Type	Levene Statistic	df1	df2	Sig.
Motivation	Based on Mean	0.120	1	118	0.727
	Based on Median	0.118	1	118	0.732
Smash Ability	Based on Mean	0.650	1	118	0.420
	Based on Median	0.693	1	118	0.407

data came from a similar population group. After the research data were found to be normal and homogeneous, the paired t-test could be conducted. The paired t-test was used to analyze the differences before and after the volleyball players completed the game-based physical training program that had been developed.

Based on the results in Table 5, the implementation of the developed game-based physical training product showed a significant effect on the motivation variable (p = 0.000, two-tailed) and on the smash ability variable (p = 0.000, two-tailed). Therefore, this product demonstrated a high level of effectiveness when tested on volleyball players aged 15–18 years.

The fifth stage, Evaluation, consisted of both formative and summative evaluations. The formative evaluation was carried out throughout the

Table 5. Results of the pretest–posttest effectiveness test

Variable	Mean	Std. Dev	Std. Error Mean	t	df	Sig. (two-tailed)
Pretest Motivation – Posttest Motivation	-14.850	3.901	0.504	-29.490	59	0.000
Pretest Smash Ability – Posttest Smash Ability	-13.317	3.587	0.463	-28.759	59	0.000

research and development process (after analysis, design, and development) to ensure that each phase was conducted according to plan and that the products produced met expectations. No evaluation was conducted after the analysis stage, as this stage was implemented through a focus group discussion (FGD). In the design stage, the results indicated that the quality of the images needed improvement. In the development stage, the results were reviewed during expert validation testing, which highlighted that the objectives of the training and the focus areas required more detailed explanation.

The summative evaluation was conducted after the implementation stage through effectiveness testing, involving statistical analysis and interpretation of findings. The results of this summative evaluation showed no revisions or product suggestions from the users who tested the product. Nevertheless, the researchers will continue to review the product, even though it has been successfully developed and published. The goal is for this product to serve as a scientific foundation for future development, particularly in relation to training programs and expanded variables.

Discussion

The aim of this study was to develop a game-based physical training model designed to improve motivation and smash ability in volleyball athletes aged 15–18 years. The results demonstrated that the model met the criteria of validity, practicality, safety, and ease of implementation, as confirmed through expert validation. Furthermore, the effectiveness test showed significant improvements in both motivation and smash ability after athletes completed the 8-week training program.

Development of the eight-week game-based physical training model is consistent with evidence that game-based approaches effectively enhance technical learning and athlete engagement. Previous research indicates that varying basic volleyball techniques through a game-based approach makes learning more engaging and contextual, particularly for the smash as one of the core techniques [32]. Pedagogically, these findings are in line with the Teaching Games for Understanding (TGfU) framework, especially in relation to the overhead pass technique, which has been validated through expert-reviewed game-based training models and recognized as suitable for practical application [17]. Taken together, this supports the present study's training product, which emphasizes games as a medium to facilitate the transfer of smash skills into real-game situations.

The step-by-step structure of the development program—coordination and motivation in weeks 1–2, technique and accuracy in weeks 3–4, intensity and strength in weeks 5–6, and match simulations in weeks 7–8—aligns with the principles of periodization and progressive overload. A similar "combined impact" approach applied in the preparation macrocycle has been shown to significantly improve specific readiness and the quality of game techniques, particularly when training tasks replicate the spatio-temporal and dynamic characteristics of core skills [33]. With regard to physical abilities supporting the smash, a 6-week program emphasizing speed and agility drills for junior players demonstrated significant improvements in motor skill indicators [34]. This finding corresponds to weeks 5–6 of the present model, which combine increases in intensity and strength with coordinative demands. Overall, the layered design implemented here is grounded in both periodization theory and empirical evidence from studies on adolescent athletes.

The effectiveness of the model yielded statistically significant improvements in motivation and smash ability, consistent with the literature on the development of smash training devices and media. Subagio et al. successfully developed a smash training model using rubber tires, which was found to be valid and accepted in a pilot test [35]. In a subsequent study, the same authors reported that a smash training aid demonstrated high feasibility in expert testing and effectiveness in both small and large group trials [36]. These findings confirm that specific, validated, and engaging training devices or designs directly contribute to improvements in smash performance. In the context of the present study, the integration of game elements functions as a pedagogical tool that simulates pressure, timing, and real-time decision-making, ensuring that performance gains result not only from physical training but also from the alignment of training conditions with the demands of the game.

From a motivational perspective, game-based approaches are underpinned by psychological mechanisms aligned with Self-Determination Theory (SDT). Research on elite young volleyball

athletes applying SDT has shown that task orientation significantly predicts relative autonomy, while ego orientation does not [37]. Game-based practices that provide clear goals, rapid feedback, and opportunities for strategic exploration foster competence, autonomy, and connectedness, thereby enhancing motivation in volleyball players aged 15–18 years within the developed product. Evidence from younger age groups also supports these findings: for example, game-based methods for athletes aged 10–12 years effectively improved speed skills and increased training motivation [38], while mobile-based learning media for volleyball content received "very good" validation and positive responses from students [39]. Collectively, these studies reinforce the role of innovation and enjoyable learning experiences in sustaining athlete engagement, as reflected during weeks 1–2 of the present development program.

The key physical components determining the quality of smashes, speed, agility, and leg power, are also emphasized in previous literature. Studies on junior players highlight the need for a high level of both general and specific motor skills [40], and cross-country comparisons reveal room for improvement in agility and leg power in some populations. Therefore, the focus on intensity, strength, and accuracy in phases 3–6 of this development model is performance-relevant. By incorporating game constraints such as target zones, touch rules, and scoring, the program directs athletes' attention to external cues, enriches variations in smash execution, and reduces anxiety during technique application. Findings from Boichuk et al. further support these results, showing that training tools and formats resembling core technical characteristics improve intermuscular coordination and enhance the transfer of skills to match-like situations [33], which corresponds to weeks 7–8 of the present development program.

Overall, the developed game-based physical training model has substantial theoretical and empirical support. This is evidenced by valid results regarding both the content of the game model and its implementation, which effectively enhanced motivation and smash ability, while also aligning with the literature on applied periodization and the development of performance-related physical capacities. With further refinement of evaluation tools and impact reporting, this model appears suitable for wider adoption in the training of volleyball players aged 15–18 years.

Limitations

This study has several limitations. First, the research design did not employ the strongest experimental framework, which requires caution when making causal inferences. Second, the measurement instruments may not fully capture objective and comprehensive outcomes. Third, the program lacked personalization based on playing position, gender, and maturation status, and there was insufficient systematic monitoring of workload and safety. Therefore, future studies are encouraged to use developmental research designs that incorporate experimental elements, such as control groups, advanced objective measurement tools, and detailed statistical reporting, to generate more reliable evidence.

Conclusions

This study successfully developed a Game-Based Physical Training Model to improve motivation and smash ability in 15–18-year-old volleyball athletes. The model was structured into four stages over eight weeks: weeks 1–2 focused on coordination and motivation, weeks 3–4 on smash technique and accuracy, weeks 5–6 on intensity and strength, and weeks 7–8 on match simulation and evaluation. Effectiveness testing showed statistically significant improvements in both motivation and smash ability ($p = 0.000$), confirming that the game-based approach can integrate physical strengthening, technical refinement, and match context. Practically, this model provides a structured, engaging, and adaptable program framework that coaches can adopt with adjustments based on athletes' profiles, playing positions, and available facilities. Thus, the research objectives of developing, validating, and testing the effectiveness of a game-based physical training model have been achieved, and the model is recommended as a guideline for interventions aimed at enhancing motivation and smash ability in 15–18-year-old volleyball athletes.

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Conflict of Interest

The researcher declares no conflict of interest.

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Information about the authors:

Andriansyah Andriansyah; https://orcid.org/0009-0004-9011-207X; andriansyah.2023@student.uny.ac.id; Faculty of Sports and Health Sciences, Universitas Negeri Yogyakarta; Indonesia.

Sumaryanto Sumaryanto; https://orcid.org/0000-0003-3093-3488; sumaryanto@uny.ac.id; Faculty of Sports and Health Sciences, Universitas Negeri Yogyakarta; Indonesia.

Ngatman Ngatman; https://orcid.org/0000-0002-3303-8529; ngatman@uny.ac.id; Faculty of Sports and Health Sciences, Universitas Negeri Yogyakarta; Indonesia.

Trisnar Adi Prabowo; (Corresponding author); https://orcid.org/0000-0001-6977-0503; trisnar.prabowo@umbs.ac.id; Faculty of Education, Universitas Muhammadiyah Brebes; Indonesia.

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