

Original article. Sports and physical activity program implementation and perceived motor development among university student-athletes. Vol. 12, n. ° 2; p. 1-31, April 2026.  
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## **Sports and physical activity program implementation and perceived motor development among university student-athletes**

## **Implementación de programas de deporte y actividad física y desarrollo motor percibido en estudiantes-atletas universitarios**

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## Abstract

This study examined the relationship between the extent of sports and physical activity program implementation and perceived motor development among university student-athletes at Batangas State University – The National Engineering University (BatStateU-TNEU). Using a quantitative correlational research design, the study assessed four dimensions of program implementation—training and organization, resource and facility management, coaching and instructional support, and monitoring and performance evaluation—and their association with perceived motor development in terms of locomotor, non-locomotor, and manipulative skills. Data were collected from 300 campus-based student-athletes across five constituent campuses using a validated researcher-made questionnaire, with motor development measured as self-reported or perceived competence adapted from the Movement Assessment Battery for Children–Second Edition (MABC-2). Descriptive statistics and Pearson’s product–moment correlation coefficient were employed for data analysis. Results indicated that sports and physical activity programs were implemented to a very great extent ( $M = 3.45$ ), while student-athletes reported a highly developed level of perceived motor competence ( $M = 3.49$ ). A strong and statistically significant positive association was found between overall program implementation and perceived motor development ( $r = 0.763$ ,  $p < 0.05$ ), with coaching and instructional support demonstrating the strongest relationship. The findings indicate that higher levels of structured training, coaching support, and program organization are meaningfully associated with higher levels of perceived motor competence among university student-athletes. While causal conclusions cannot be drawn, the results provide empirical support for strengthening sports and physical activity program implementation in higher education. An enhancement framework is proposed to guide evidence-informed program development and support student-athlete motor competence within institutional sports systems.

**Keywords:** physical literacy; student-athlete development; sports program management; motor competence perception; higher education sport

## Resumen

Este estudio examinó la relación entre el grado de implementación de los programas de deporte y actividad física y el desarrollo motor percibido en estudiantes-atletas universitarios de la Batangas State University – The National Engineering University (BatStateU-TNEU). Mediante un diseño de investigación cuantitativo correlacional, se evaluaron cuatro dimensiones de la implementación de los programas—entrenamiento y organización, gestión de recursos e instalaciones, apoyo de entrenamiento e instrucción, y seguimiento y evaluación del rendimiento—y su asociación con el desarrollo motor percibido en términos de habilidades locomotoras, no locomotoras y manipulativas. Los datos se recopilaron de 300 estudiantes-atletas de campus pertenecientes a cinco campus constituyentes, utilizando un cuestionario validado elaborado por el investigador, en el que el desarrollo motor se midió como competencia autoinformada o percibida, adaptada de la Batería de Evaluación del Movimiento para Niños–Segunda Edición (MABC-2). Para el análisis de los datos se emplearon estadísticas descriptivas y el coeficiente de correlación producto–momento de Pearson. Los resultados indicaron que los programas de deporte y actividad física se implementaron en un grado muy alto ( $M = 3,45$ ), mientras

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que los estudiantes-atletas reportaron un nivel altamente desarrollado de competencia motora percibida ( $M = 3,49$ ). Se encontró una asociación positiva fuerte y estadísticamente significativa entre la implementación global de los programas y el desarrollo motor percibido ( $r = 0,763$ ,  $p < 0,05$ ), siendo el apoyo de entrenamiento e instrucción la dimensión con la relación más fuerte. Los hallazgos indican que niveles más altos de entrenamiento estructurado, apoyo del entrenamiento y organización del programa se asocian de manera significativa con niveles más altos de competencia motora percibida en estudiantes-atletas universitarios. Si bien no pueden establecerse conclusiones causales, los resultados proporcionan respaldo empírico para fortalecer la implementación de programas de deporte y actividad física en la educación superior. Se propone un marco de mejora para orientar el desarrollo de programas basados en evidencia y apoyar la competencia motora de los estudiantes-atletas dentro de los sistemas deportivos institucionales.

**Palabras clave:** alfabetización física; desarrollo del estudiante-atleta; gestión de programas deportivos; percepción de la competencia motora; deporte en la educación superior.

## Introduction

Motor development is a vital component of human movement, encompassing the progressive acquisition and refinement of fundamental motor skills essential for participation and performance in sports and physical activities. In higher education settings, student-athletes are immersed in structured training environments that support the development of these motor competencies, which are associated with athletic performance, injury prevention, and overall physical well-being. The implementation of sports and physical activity programs is therefore closely linked to the development of athletes' locomotor, non-locomotor, and manipulative abilities—domains that collectively define motor proficiency and movement adaptability (Guo et al., 2024; Lopes et al., 2025).

Universities serve as key environments for fostering physical literacy and athletic development through organized sports and physical activity programs. These programs typically integrate systematic training, coaching, and resource management practices that are associated with improvements in physical fitness, coordination, and motor skill competence (Li, 2023). Program implementation characterized by goal-oriented instruction, appropriate facility utilization, and structured performance evaluation has been found to be significantly associated with variations in motor development among student-athletes (Pham & Nguyen, 2025). Conversely, limited training structures or

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insufficient instructional support have been linked to lower levels of motor skill development and athletic readiness (Choi et al., 2021).

Although this study is situated within the Philippine higher education context, the implementation of sports and physical activity programs remains a global concern. Universities worldwide encounter common challenges related to sustaining effective training systems, ensuring equitable access to facilities, and maintaining consistent coaching quality (Meroño et al., 2022; Gómez-López et al., 2023). These challenges are often intensified in developing regions due to disparities in institutional resources and policy priorities. Consequently, examining the relationship between program implementation and motor development within a national context such as the Philippines may offer transferable insights for higher education institutions operating under similar conditions.

At the national level, institutions such as Batangas State University – The National Engineering University (BatStateU-TNEU) implement campus-based sports and physical activity programs designed to support student-athlete development and institutional competitiveness in both academic and athletic domains. These initiatives align with the Commission on Higher Education (CHED) advocacy for holistic education through the integration of sports and wellness programs in tertiary institutions (CHED Memorandum Order No. 9, s. 2013). However, variations in program implementation across campuses—particularly in terms of facility accessibility, coaching support, and organizational consistency—may be associated with differences in student-athletes' motor development and physical competence.

Previous studies have highlighted the role of structured physical activity programs in supporting the development of coordination, balance, strength, and flexibility among athletes (González Bustamante et al., 2022; Ateljević & Nanda, 2023). Despite this growing body of literature, limited empirical evidence has examined the relationship between the extent of sports and physical activity program implementation and motor development within higher education institutions, particularly in developing countries. Addressing this gap contributes to a broader discourse on how institutional practices and training environments are associated with physical literacy, athletic engagement, and sustained participation in physical activity.

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Therefore, this study aims to examine the relationship between the extent of sports and physical activity program implementation and the motor development of university student-athletes. Specifically, it seeks to assess the level of program implementation in terms of training and organization, resource and facility management, coaching and instructional support, and monitoring and performance evaluation, and to determine their relationship with athletes' locomotor, non-locomotor, and manipulative skill development. The findings are expected to inform the development of an enhancement framework that supports evidence-informed sports programming and physical education practices in the Philippines, while offering adaptable insights for higher education institutions in other contexts.

## **Sports and Physical Activity Program Implementation in Higher Education**

Sports and physical activity programs in higher education serve as institutional mechanisms for promoting athlete development, wellness, and excellence. Their effectiveness depends on structured planning, adequate resources, and competent leadership aligned with educational goals (Valiyev et al., 2025). Well-managed programs integrate training, facility management, coaching, and monitoring, forming a holistic approach to athletic performance (Pineda & Nabor, 2025; Russell & Moore, 2022).

Effective implementation requires coordination across training and organization, resource and facility management, coaching and instructional support, and monitoring and evaluation. Universities with clear frameworks report higher participation and skill outcomes (Wandersman & Scheier, 2024; Yang & Feng, 2024). However, disparities in resources and inconsistent policy enforcement remain challenges. Global and national policies, such as the WHO Guidelines on Physical Activity (2020) and CHED Memorandum Order No. 8, s. 2022, emphasize institutional responsibility in fostering active lifestyles. Strengthening evidence-based monitoring, professional coaching, and facility investment is essential to enhance motor and athletic development in higher education settings.

## **Motor Development as a Core Outcome of Athletic Participation**

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Motor development refers to the progressive refinement of movement skills essential for effective performance in physical activities. It involves both biological maturation and experiential learning influenced by environment and instruction (Nazário & Vieira, 2022). Within the athletic context, it serves as the foundation for coordination and adaptability (Becerra Patiño et al., 2023; Filho & Oliveira, 2025).

Motor development emerges from the continuous interaction among the individual, task, and environmental constraints that shape how movement skills are acquired and refined (Liu, 2023). It encompasses locomotor, non-locomotor, and manipulative skills, which, when developed during adolescence, enhance athletic efficiency and reduce the risk of injury (Suresh & Subash, 2023). Structured training, high-quality coaching, and timely feedback have been shown to accelerate motor learning and skill acquisition (Newell, 2020). Standardized assessment tool such as the Movement Assessment Battery for Children–Second Edition (MABC-2) provide valid and reliable measures of motor proficiency (Arbi et al., 2025). Within higher education, integrating motor skill assessment into sports programs supports athletic performance and promotes holistic physical literacy (Adolph & Hoch, 2020).

## **Relationship Between Sports Program Implementation and Motor Development**

Empirical studies affirm a strong association between the quality of sports program implementation and athletes' motor competence. Structured training, individualized instruction, and evidence-based monitoring enhance coordination, agility, and performance (Ardiansyah et al., 2024; Synott et al., 2025). Training design and coaching delivery are crucial, as programs with goal-oriented drills and feedback-driven instruction yield higher motor proficiency (Wandersman & Scheier, 2024).

Consistent participation in organized physical activity predicts better motor competence and fitness outcomes (da Rocha Queiroz et al., 2022). This reciprocal relationship suggests that improved motor skills encourage greater engagement in physical activity, which in turn enhances motor proficiency. Factors such as gender, sport type, and environmental support also influence developmental outcomes (Algurén et al., 2024). Overall, effective and well-managed sports programs are essential in cultivating athletic efficiency and promoting lifelong physical engagement.

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## **Institutional and Environmental Factors Affecting Student-Athlete Development**

Institutional support significantly shapes the athletic and motor development of student-athletes. Access to quality facilities, competent coaching, and consistent management enhances performance outcomes (Singh, 2024). Well-equipped universities foster engagement and skill progression, while resource limitations hinder progress (Prasanna et al., 2025). Coach education, leadership competence, and organizational coordination further contribute to sustained athlete development (Zaitseva et al., 2025).

Motivational and socio-environmental factors—such as peer interaction and academic balance—promote intrinsic motivation and continuous training (Dénarié, 2023). Supportive coaching behaviors that cultivate autonomy and competence, as proposed by Ryan and Deci's (2020) Self-Determination Theory, enhance both performance and well-being. Cross-national research also reveals disparities: Western institutions emphasize holistic welfare, while Asian universities face challenges in funding and modernization (Gano-Overway & Harrison, 2024). In the Philippines, despite CHED's Tertiary Sports Development Program (2022), variations across campuses persist, underscoring the need for governance and policy enhancement to optimize athlete development.

Collectively, the reviewed literature establishes that well-implemented sports and physical activity programs—marked by organized training, qualified coaching, resource efficiency, and systematic evaluation—significantly influence motor development and athletic success. Conversely, institutional disparities and inconsistent implementation hinder sustained progress. Guided by these insights, the present study investigates the relationship between program implementation and motor development among university student-athletes of Batangas State University – The National Engineering University, aiming to propose an enhancement framework that strengthens sports development and motor proficiency in higher education.

## **Methods**

### ***Research Design***

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This study employed a quantitative correlational research design to examine the relationship between sports and physical activity program implementation and perceived motor development among university student-athletes. The design was appropriate as it focused on identifying the degree and direction of association between the variables without manipulating any conditions or attempting to establish causal relationships.

Descriptive statistics were used to determine the levels of sports and physical activity program implementation and perceived motor development. Inferential analysis using Pearson's product-moment correlation coefficient was conducted to examine the strength and significance of the relationships between program implementation dimensions—training and organization, resource and facility management, coaching and instructional support, and monitoring and performance evaluation—and perceived motor competence across locomotor, non-locomotor, and manipulative domains.

Accordingly, the study adopted a perception-based measurement approach, emphasizing self-reported motor competence rather than objective motor performance testing. This approach is consistent with correlational research practices in sports and educational sciences (Putri et al., 2025) and supports the study's objective of generating evidence to inform program enhancement strategies for student-athlete development.

### ***Participants, Sampling Technique, and Sample Size***

The participants of this study were student-athletes enrolled across the five constituent campuses of Batangas State University – The National Engineering University (BatStateU-TNEU) during Academic Year 2025–2026. These campuses included Pablo Borbon, Alangilan, Lipa, JPLPC–Malvar, and ARASOF–Nasugbu. Each campus maintained approximately 120 active student-athletes participating in both team sports (basketball, volleyball, futsal) and individual or dual sports (table tennis, badminton, chess, and athletics). The total student-athlete population was estimated at 600 individuals, consisting of approximately 300 male and 300 female participants.

To ensure equitable representation across campuses and sport categories, the study employed a stratified random sampling technique. Each campus served as a stratum from which participants were proportionally selected, thereby ensuring diversity in gender,

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sport classification, and campus affiliation while minimizing sampling bias (Creswell & Creswell, 2023).

From the estimated population of 600 student-athletes, a total of 300 respondents, representing approximately 50% of the population, were selected for participation. Each campus contributed approximately 60 student-athletes, proportionally distributed between team and individual or dual sports. This sample size was considered statistically adequate for both descriptive and correlational analyses, consistent with recommended standards for quantitative research in the behavioral and sports sciences.

Participation in the study was voluntary and coordinated through each campus's sports coordinator and coaching staff. Only campus-based student-athletes who were actively involved in institutional and inter-campus sports and physical activity programs were included in the study. Members of the official university varsity teams (Basketball Men, Volleyball Men, Volleyball Women, Softball, and Baseball) were excluded to ensure that the investigation focused on participants directly engaged in regular campus-level sports and physical activity programs.

Prior to data collection, informed consent was obtained from all participants. Ethical considerations regarding confidentiality, anonymity, and voluntary participation were strictly observed in accordance with the ethical research protocols of Batangas State University – The National Engineering University Research Ethics Committee.

## ***Instruments***

The study utilized a researcher-made questionnaire as the primary data-gathering instrument to measure the extent of sports and physical activity program implementation and the perceived motor development of university student-athletes. The instrument was developed based on an extensive review of related literature and established frameworks in sports science, physical education, and motor competence assessment (Nazário & Vieira, 2022). It consisted of two main parts corresponding to the study variables.

The first part assessed the extent of implementation of sports and physical activity programs across four dimensions: training and organization, resource and facility management, coaching and instructional support, and monitoring and performance

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evaluation. Each item was rated using a four-point Likert scale, where 4 indicated Very Great Extent, 3 Great Extent, 2 Moderate Extent, and 1 Low Extent.

The second part measured student-athletes' perceived motor competence across three domains: locomotor, non-locomotor, and manipulative skills. The items in this section were adapted and contextualized from the Movement Assessment Battery for Children–Second Edition (MABC-2). While the original MABC-2 is a performance-based assessment tool, its structured indicators were transformed into self-report items to suit large-scale survey administration within a higher education context. Responses were rated on a four-point scale, where 4 indicated Highly Developed, 3 Developed, 2 Developing, and 1 Needs Improvement. Accordingly, motor development in this study reflects self-reported perceptions of motor competence rather than directly observed motor performance.

Content validity of the instrument was established through expert evaluation by five specialists in physical education, sports science, and research methodology. A pilot test conducted among 30 student-athletes from a non-participating campus yielded a Cronbach's alpha coefficient of 0.93, indicating excellent internal consistency and reliability. Ethical clearance was obtained from the Batangas State University – The National Engineering University Research Ethics Committee, and informed consent was secured from all participants prior to data collection.

### ***Data Collection Procedure***

The data were collected using a self-administered questionnaire distributed to student-athletes during scheduled team meetings and training sessions, with the coordination of campus sports coordinators and coaching staff. Prior to administration, participants were briefed on the purpose of the study and the instructions for completing the instrument. The questionnaire required approximately 15–20 minutes to complete and was accomplished under supervised conditions to ensure clarity of instructions and completeness of responses.

Motor development in this study was measured as perceived or self-reported motor competence using a questionnaire adapted from the Movement Assessment Battery

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for Children–Second Edition (MABC-2), rather than through direct observation or performance-based motor assessment.

### ***Data Analysis***

The data collected through the validated questionnaire were tallied, encoded, and analyzed using descriptive and inferential statistical techniques consistent with the study's quantitative correlational design. All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS).

To address the first two research questions, descriptive statistics—including frequency, percentage, weighted mean, and standard deviation—were computed to determine the extent of implementation of sports and physical activity programs and the level of perceived motor development among university student-athletes. Mean scores were interpreted using the following scale: 3.26–4.00 (Very Great Extent/Highly Developed), 2.51–3.25 (Great Extent/Developed), 1.76–2.50 (Moderate Extent/Developing), and 1.00–1.75 (Low Extent/Needs Improvement).

To address the third research question concerning the relationship between sports and physical activity program implementation and perceived motor development, Pearson's product–moment correlation coefficient ( $r$ ) was employed to determine the strength and direction of association between the independent and dependent variables. Correlation coefficients were interpreted following standard conventions: 0.00–0.19 (Very Weak), 0.20–0.39 (Weak), 0.40–0.59 (Moderate), 0.60–0.79 (Strong), and 0.80–1.00 (Very Strong) (Cohen, 2013).

The results of the descriptive and correlational analyses were synthesized to provide empirical support for the proposed enhancement framework aimed at strengthening the implementation of sports and physical activity programs at Batangas State University – The National Engineering University, with the goal of supporting student-athletes' perceived motor development.

### ***Ethical Statement***

This study adhered to established ethical standards governing educational and social research. Prior to data collection, formal ethical clearance was obtained from the

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Research Ethics Committee of Batangas State University – The National Engineering University (BatStateU-TNEU). All participants were fully informed of the study's purpose, procedures, potential risks, and anticipated benefits. Participation was entirely voluntary, and respondents were informed of their right to decline participation or withdraw from the study at any stage without penalty or adverse consequence.

Written informed consent was obtained from all participants prior to questionnaire administration. Anonymity and confidentiality were strictly maintained, as no personally identifying information was collected during the research process. All responses were treated with utmost confidentiality and were securely stored in password-protected files accessible only to the researcher. The collected data were used exclusively for academic and research purposes and were disposed of after the completion of the study to ensure the protection of participant privacy.

The conduct of this research complied with the ethical principles outlined in the Declaration of Helsinki (World Medical Association, 2013) and the Commission on Higher Education (CHED) Memorandum Order No. 15, Series of 2019, which emphasize respect for persons, beneficence, justice, and the promotion of integrity in higher education research.

## Results

This section presents the results of the study in relation to the stated research objectives. The findings are organized according to the major variables examined: (1) the extent of implementation of sports and physical activity programs, (2) the level of perceived motor development among university student-athletes, and (3) the relationship between the extent of program implementation and perceived motor development. Descriptive statistics, including frequency, percentage, weighted mean, and standard deviation, were used to summarize respondents' assessments of program implementation and perceived motor competence. Inferential analysis using Pearson's product-moment correlation coefficient was employed to determine the strength and direction of the relationships between the independent and dependent variables. The results provide the empirical basis for the proposed enhancement framework aimed at strengthening sports

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and physical activity program implementation across the constituent campuses of Batangas State University – The National Engineering University (BatStateU-TNEU).

## Extent of Implementation of Sports and Physical Activity Programs

This subsection presents the respondents' assessment of the extent of implementation of sports and physical activity programs at Batangas State University – The National Engineering University (BatStateU-TNEU). Program implementation was examined across four dimensions: training and organization, resource and facility management, coaching and instructional support, and monitoring and performance evaluation. Responses were measured using a four-point Likert scale and interpreted as follows: 3.26–4.00 (Very Great Extent), 2.51–3.25 (Great Extent), 1.76–2.50 (Moderate Extent), and 1.00–1.75 (Low Extent). Table 1 presents the mean scores, verbal interpretations, and rank order for each dimension of sports and physical activity program implementation.

**Table 1.** *Extent of Implementation of Sports and Physical Activity Programs*

Dimensions	Mean	Verbal Interpretation	Rank
Training and Organization	3.54	Very Great Extent	1
Coaching and Instructional Support	3.48	Very Great Extent	2
Resource and Facility Management	3.42	Great Extent	3
Monitoring and Performance Evaluation	3.36	Great Extent	4
<b>Composite Mean</b>	<b>3.45</b>	<b>Very Great Extent</b>	

As shown in Table 1, the overall extent of implementation of sports and physical activity programs yielded a composite mean of 3.45, interpreted as Very Great Extent. This result indicates that sports and physical activity programs across the university's constituent campuses are implemented at a consistently high level.

Among the four dimensions, training and organization obtained the highest mean score ( $M = 3.54$ ), suggesting that structured planning, scheduling, and coordination of sports activities are widely practiced across campuses. Coaching and instructional support ranked second ( $M = 3.48$ ), reflecting respondents' positive assessments of coaching guidance and instructional practices provided within the sports programs.

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In comparison, resource and facility management ( $M = 3.42$ ) and monitoring and performance evaluation ( $M = 3.36$ ) were rated to a Great Extent. While these findings indicate that facilities, equipment, and evaluation mechanisms are generally available and functional, they also suggest potential areas for further strengthening, particularly in terms of standardization, accessibility, and systematic documentation across campuses.

Overall, the results indicate that BatStateU-TNEU maintains a well-organized and consistently implemented sports and physical activity program, characterized by strong training structures and instructional support, with opportunities for continued improvement in resource management and evaluation practices.

### Level of Perceived Motor Development of Student-Athletes

This subsection presents the respondents' assessment of their perceived motor development as associated with participation in sports and physical activity programs at Batangas State University – The National Engineering University (BatStateU-TNEU). Perceived motor development was examined across three domains: locomotor skills, non-locomotor skills, and manipulative skills. Responses were measured using a four-point Likert scale and interpreted as follows: 3.26–4.00 (Highly Developed), 2.51–3.25 (Developed), 1.76–2.50 (Developing), and 1.00–1.75 (Needs Improvement). Table 2 presents the mean scores and verbal interpretations for each domain of perceived motor development.

**Table 2.** *Level of Perceived Motor Development Among Student-Athletes*

<b>Domains of Motor Development</b>	<b>Mean</b>	<b>Verbal Interpretation</b>
Locomotor Skills	3.58	Highly Developed
Manipulative Skills	3.46	Highly Developed
Non-locomotor Skills	3.42	Highly Developed
<b>Composite Mean</b>	<b>3.49</b>	<b>Highly Developed</b>

As shown in Table 2, the overall level of perceived motor development among student-athletes yielded a composite mean of 3.49, interpreted as Highly Developed. This indicates that respondents reported high levels of motor competence across the three assessed domains.

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Among the domains, locomotor skills obtained the highest mean score ( $M = 3.58$ ), suggesting that student-athletes perceived themselves as highly proficient in fundamental movement abilities such as running, jumping, and hopping. Manipulative skills ranked second ( $M = 3.46$ ), indicating a high level of perceived control and coordination in handling sports equipment, such as balls or rackets.

Non-locomotor skills ( $M = 3.42$ ) were also rated as highly developed, reflecting respondents' perceived competence in balance, stability, and body control. These skills are essential for maintaining movement efficiency and postural control during both training and competition.

Overall, the results indicate that student-athletes at BatStateU-TNEU report well-developed motor competence across locomotor, non-locomotor, and manipulative domains. This balanced profile reflects consistent engagement in structured sports and physical activity programs and alignment with fundamental and sport-specific movement demands.

### **Relationship Between the Extent of Sports and Physical Activity Program Implementation and the Level of Perceived Motor Development**

This subsection presents the relationship between the extent of implementation of sports and physical activity programs and the level of perceived motor development among university student-athletes at Batangas State University – The National Engineering University (BatStateU-TNEU). Pearson's product-moment correlation coefficient ( $r$ ) was employed at a 0.05 level of significance to determine the strength and direction of the associations between program implementation dimensions and perceived motor development. Table 3 presents the correlation coefficients between the dimensions of sports and physical activity program implementation and perceived motor development.

**Table 3.** *Correlation Between Sports and Physical Activity Program Implementation and Perceived Motor Development*

Variables	r-value	P-value	Interpretation
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Training and Organization vs. Locomotor Skills	0.746**	0.000	Significant
Resource and Facility Management vs. Perceived Motor Development	0.703**	0.000	Significant
Coaching and Instructional Support vs. Perceived Motor Development	0.781**	0.000	Significant
Monitoring and Performance Evaluation vs. Perceived Motor Development	0.719**	0.000	Significant
<b>Overall Program Implementation vs. Overall Perceived Motor Development</b>	<b>0.763</b>	<b>0.000</b>	<b>Significant Positive Correlation</b>

Legend:  $p < 0.05$  (Significant),  $p \geq 0.05$  (Not Significant), Note:  $r$  = Pearson's correlation coefficient; (2-tailed test)

As shown in Table 3, a strong and statistically significant positive association was observed between the overall extent of sports and physical activity program implementation and the level of perceived motor development among student-athletes ( $r = 0.763$ ,  $p < 0.05$ ). This indicates that higher levels of program implementation are associated with higher levels of perceived motor competence.

Among the program dimensions, coaching and instructional support exhibited the strongest association with perceived motor development ( $r = 0.781$ ,  $p < 0.05$ ), followed by training and organization ( $r = 0.746$ ,  $p < 0.05$ ). These results suggest that respondents who reported higher levels of coaching support and more structured training arrangements also tended to report higher levels of motor competence.

Monitoring and performance evaluation ( $r = 0.719$ ,  $p < 0.05$ ) and resource and facility management ( $r = 0.703$ ,  $p < 0.05$ ) likewise demonstrated significant positive associations with perceived motor development. These findings indicate that the availability of facilities, equipment, and systematic evaluation practices is meaningfully related to student-athletes' perceptions of their motor competence.

Overall, the results demonstrate that all dimensions of sports and physical activity program implementation are significantly associated with perceived motor development among university student-athletes. The findings underscore the relevance of structured training, coaching support, resource provision, and evaluation practices within higher education sports programs, while remaining consistent with the correlational nature of the study.

## Discussion

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The findings of this study indicate that sports and physical activity programs at Batangas State University – The National Engineering University (BatStateU-TNEU) are implemented to a very great extent, while student-athletes report a highly developed level of perceived motor competence across locomotor, non-locomotor, and manipulative domains. In addition, the results revealed a strong and statistically significant positive association between the extent of program implementation and perceived motor development. These findings suggest that higher levels of structured and well-managed sports programming are closely linked to higher levels of perceived motor competence among university student-athletes. This pattern is consistent with international literature emphasizing the role of well-organized sports and physical education systems in supporting physical literacy and sustained engagement in physical activity (Stodden et al., 2008; Burton, 2023; WHO, 2018).

The very great extent of program implementation observed across BatStateU-TNEU's constituent campuses reflects a relatively robust institutional sports system characterized by organized training structures and instructional support. The highest-rated dimensions—training and organization and coaching and instructional support—indicate that respondents perceived training schedules, activity coordination, and coaching guidance to be consistently implemented. These findings align with the observations of Valiyev et al. (2025) and Pineda and Nabor (2025), who emphasized that systematic program planning, coordinated execution, and instructional consistency are strongly associated with positive athletic and developmental outcomes in higher education settings. Similarly, Wandersman and Scheier (2024) noted that coaching practices emphasizing feedback, structure, and instructional clarity are closely linked to learners' engagement and skill development. The present findings are also consistent with global best practices that highlight coach education and pedagogical competence as central elements associated with motor development and athletic participation (Meroño et al., 2022; Gómez-López et al., 2023).

In contrast, although still rated at a high level, resource and facility management and monitoring and performance evaluation ranked slightly lower than the other dimensions. These results suggest that while facilities, equipment, and evaluation mechanisms are generally available and functional, there may be variations in

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accessibility, standardization, and documentation across campuses. Similar patterns have been reported in previous studies, which noted that equitable resource allocation and systematic assessment practices are critical factors associated with the sustainability and consistency of sports programs (Singh, 2024; Prasanna et al., 2025). These challenges are particularly evident in developing contexts, where institutional and infrastructural disparities may limit uniform program implementation (Li, 2023). Nevertheless, the overall findings reflect BatStateU-TNEU's alignment with national policies advocating the institutionalization of sports and physical activity as integral components of student development (CHED, 2022), as well as with the WHO Global Action Plan on Physical Activity 2018–2030, which promotes system-level approaches to active living.

Student-athletes' assessments of their perceived motor development revealed highly developed competencies across all three domains, with locomotor skills emerging as the strongest area. This pattern suggests that respondents who regularly engage in structured sports and physical activity programs tend to perceive themselves as proficient in fundamental movement abilities such as running, jumping, and hopping. Nazário and Vieira (2022) emphasized that repeated movement practice within supportive and structured environments is associated with improved neuromuscular coordination and skill refinement. The high ratings in manipulative skills further reflect respondents' perceived competence in object control and hand–eye coordination, which aligns with findings by Ardiansyah et al. (2024) showing that structured practice environments are associated with improved object manipulation and decision-making in sport contexts. Although slightly lower, non-locomotor skills were also rated as highly developed, underscoring the importance of balance, stability, and postural control in supporting movement efficiency and physical readiness. Collectively, these findings are consistent with prior research emphasizing that structured sports participation is closely linked to the development of both fundamental and sport-specific motor competencies (Gallahue & Ozmun, 2022; Payne & Isaacs, 2021).

However, it is important to interpret these findings in light of the study's reliance on self-perceived motor development rather than direct performance-based assessment. Perceived motor competence reflects individuals' self-evaluations of their movement abilities and may be influenced by factors such as confidence, motivation, prior

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experiences, and social comparison. As a result, the strength of the observed associations between program implementation and motor development may partly reflect athletes' subjective perceptions rather than objectively measured motor performance. While perceived competence is a meaningful construct linked to engagement and persistence in physical activity, it may not always correspond precisely with actual motor proficiency. Consequently, the associations identified in this study should be interpreted with caution, and future research may benefit from combining self-report measures with objective motor assessments to provide a more comprehensive understanding of motor development.

The strong positive correlation between the extent of sports and physical activity program implementation and perceived motor development ( $r = 0.763$ ,  $p < 0.05$ ) indicates a robust association between institutional sports practices and student-athletes' perceptions of their motor competence. Rather than implying causation, this relationship suggests that student-athletes who experience higher levels of program implementation also tend to report higher levels of perceived motor development. This finding is consistent with Synott et al. (2025), who reported significant associations between participation in structured physical activity programs and indicators of motor competence and coordination. Among the program dimensions, coaching and instructional support demonstrated the strongest association with perceived motor development, highlighting the importance of instructional quality and feedback-oriented coaching practices. This supports the work of Wandersman and Scheier (2024), who emphasized that adaptive instruction and personalized feedback are closely linked to learners' engagement and skill acquisition. Training and organization also exhibited a strong association, consistent with Kadlec and Groeger's (2021) assertion that structured and goal-oriented training environments are associated with higher levels of skill proficiency.

The significant associations observed for resource and facility management and monitoring and performance evaluation further indicate that the availability of appropriate facilities, equipment, and systematic evaluation practices is meaningfully related to student-athletes' perceptions of their motor competence. Algurén et al. (2024) emphasized that supportive training environments and structured monitoring systems are associated with sustained engagement and continuous skill refinement. Taken together,

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the findings suggest a reciprocal relationship between program implementation and perceived motor development, wherein supportive program structures are associated with higher perceived competence, which may in turn encourage continued participation in sports and physical activity (Stodden et al., 2008; Lopes et al., 2025).

Overall, the findings indicate that BatStateU-TNEU's sports and physical activity programs are closely associated with student-athletes' perceived motor development. The consistent relationships observed across program dimensions underscore the relevance of structured training, instructional support, resource provision, and evaluation practices within higher education sports programs. While the correlational nature of the study and the use of perception-based measures preclude causal conclusions, the results provide empirical support for strengthening institutional sports systems as part of broader efforts to promote physical literacy, sustained participation, and holistic student development. These findings reinforce the view that sports and physical activity programs in higher education function not only as avenues for athletic engagement but also as important institutional contexts associated with lifelong physical competence and active living (WHO, 2018; Burton, 2023; Meroño et al., 2022).

### **Proposed Enhancement Framework for Sports and Physical Activity Program Implementation and Perceived Motor Development**

Building upon the results and interpretations of the preceding sections, this study proposes an enhancement framework intended to strengthen the implementation of sports and physical activity programs in relation to perceived motor development among university student-athletes at Batangas State University – The National Engineering University (BatStateU-TNEU). The framework serves as an institutional guide that translates empirical findings into evidence-informed and contextually appropriate initiatives that support athletic skill development, coaching practices, facility management, and performance monitoring.

The proposed enhancement framework is grounded in the study's correlational findings, which indicate that training and organization, coaching and instructional support, resource and facility management, and monitoring and performance evaluation are significantly associated with student-athletes' perceived locomotor, non-locomotor,

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and manipulative skills. Strengthening these program components is intended to support systematic training environments, optimize institutional resources, and promote consistent and reflective practices that are aligned with higher levels of perceived motor competence and sustained athletic engagement.

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**Table 6.** *Proposed Enhancement Framework for Sports and Physical Activity Program Implementation and Perceived Motor Development*

Framework Component	Strategic Focus	Key Actions / Recommendations	Expected Outcomes
<b>1. Training and Organization</b>	Establish structured and periodized training systems	<ul style="list-style-type: none"> <li>• Develop standardized training and competition calendars per sport.</li> <li>• Integrate the FITT principle (Frequency, Intensity, Time, Type) into training plans.</li> <li>• Conduct interdisciplinary planning sessions among PE faculty, sports coordinators, and coaches.</li> </ul>	Greater training consistency, improved coordination of activities, and stronger alignment between training practices and perceived motor skill development.
<b>2. Coaching and Instructional Support</b>	Enhance coaching competence and evidence-informed pedagogy	<ul style="list-style-type: none"> <li>• Provide continuous professional development and certification opportunities for coaches.</li> <li>• Integrate motor learning and control principles into instruction.</li> <li>• Establish mentorship and peer coaching networks across campuses.</li> </ul>	Improved instructional consistency, enhanced feedback mechanisms, and stronger alignment between coaching practices and student-athletes' perceived motor competence.
<b>3. Resource and Facility Management</b>	Ensure equitable access to quality sports infrastructure	<ul style="list-style-type: none"> <li>• Implement a centralized inventory and maintenance system for sports facilities.</li> <li>• Allocate equitable budgets across campuses for facility improvement.</li> <li>• Establish partnerships with LGUs and private stakeholders for resource support.</li> </ul>	More accessible and functional training environments that support regular participation and perceived motor skill engagement.
<b>4. Monitoring and Performance Evaluation</b>	Institutionalize reflective and data-informed assessment practices	<ul style="list-style-type: none"> <li>• Develop a standardized motor development monitoring system using adapted PE assessment tools.</li> <li>• Conduct semester-based skill monitoring and feedback sessions.</li> <li>• Utilize digital record-keeping for athlete</li> </ul>	Consistent feedback practices and improved documentation that support reflective training and perceived skill progression.

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		tracking and documentation.	
<b>5. Institutional Policy and Governance Support</b>	Strengthen institutional coordination and sustainability	<ul style="list-style-type: none"> <li>• Enforce CHED CMO No. 8, s. 2022 on sports development in higher education.</li> <li>• Establish a University Sports Development Committee for inter-campus coordination.</li> <li>• Integrate research and extension initiatives focused on motor development and physical literacy.</li> </ul>	Sustainable, policy-aligned governance structures that support long-term sports program implementation and student-athlete development.

### Limitations of the study

While this study provides valuable insights into the relationship between sports and physical activity program implementation and perceived motor development among university student-athletes, several limitations must be acknowledged to properly contextualize the findings and guide future research.

First, the study was conducted exclusively among student-athletes from the five constituent campuses of Batangas State University – The National Engineering University (BatStateU-TNEU) during Academic Year 2025–2026. Consequently, the findings may not be fully generalizable to other higher education institutions with different organizational structures, resource availability, or administrative policies. Variations in coaching practices, training culture, and facility access across institutions may be associated with different outcomes in comparable settings.

Second, the study relied primarily on self-reported data collected through a Likert-type questionnaire, supplemented by coach verification. Although this approach enabled comprehensive data collection across multiple campuses, it is subject to response bias, as participants may have overestimated or underestimated the extent of program implementation or their own level of motor competence. While the inclusion of objective motor performance assessments (e.g., TGMD-2, AAHPERD) could have strengthened the measurement of motor development, these tools were not uniformly administered across campuses due to logistical and scheduling constraints.

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Third, the cross-sectional correlational design limited the ability to draw causal conclusions regarding the relationship between sports and physical activity program implementation and perceived motor development. Although significant associations were identified, longitudinal or experimental research designs would be necessary to examine changes over time and to better understand developmental trajectories and potential causal mechanisms.

Fourth, variations in sport type and event category (team versus individual or dual sports) may have introduced heterogeneity that was not fully controlled in the analysis. Differences in training intensity, competition frequency, and sport-specific skill demands may be associated with variations in perceived motor development. Future studies may address this limitation by stratifying analyses according to sport classification or performance level.

Lastly, several contextual factors that may also be associated with motor development—such as academic workload, motivation, nutritional status, and psychological readiness—were not directly measured in this study. Incorporating these variables in future research would provide a more comprehensive understanding of the multidimensional factors related to student-athlete development and physical literacy.

Despite these limitations, the study contributes meaningful empirical evidence to the growing body of literature on sports and physical activity program implementation in higher education. The findings provide a sound basis for institutional reflection, program enhancement, and future research aimed at supporting student-athlete development through evidence-informed sports and physical education practices.

## Conclusion

This study examined the relationship between the extent of sports and physical activity program implementation and perceived motor development among university student-athletes at Batangas State University – The National Engineering University (BatStateU-TNEU). The findings indicate that the institution's sports and physical activity programs are implemented to a very great extent, characterized by structured training and organization, coaching and instructional support, resource and facility management, and monitoring and performance evaluation. Correspondingly, student-

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athletes reported a highly developed level of perceived motor competence across locomotor, non-locomotor, and manipulative domains.

The significant positive correlation between program implementation and perceived motor development suggests that higher levels of structured training, coaching support, and program organization are closely associated with higher levels of student-athletes' perceived motor competence. Among the program dimensions, coaching and instructional support demonstrated the strongest association, highlighting the relevance of feedback-oriented and pedagogically sound coaching practices within higher education sports programs.

These findings support the premise that the quality and consistency of sports and physical activity program implementation are meaningfully related to student-athletes' perceptions of their motor development. While the correlational nature of the study does not permit causal conclusions, the results provide empirical evidence that well-structured institutional sports systems are aligned with higher levels of perceived motor competence among student-athletes. It is emphasized that the reported "high motor development" in this study refers to self-reported or perceived motor competence and not to objectively measured or performance-based motor outcomes. The proposed enhancement framework offers an evidence-informed model for strengthening sports program implementation through systematic training design, resource optimization, consistent monitoring practices, and institutional governance support.

At a broader level, this study underscores the relevance of sports and physical activity programs in higher education not only within the Philippine context but also for institutions in similar educational and developmental settings globally. The framework highlights widely applicable principles—organized training systems, competent coaching, and equitable resource management—that are consistently associated with student-athletes' perceived motor development and sustained engagement in physical activity.

Overall, the study concludes that when higher education institutions invest in coherent, inclusive, and evidence-informed sports and physical activity programs, they create supportive environments that are associated with enhanced perceived motor competence, physical literacy, and holistic student development. These findings reinforce

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the integral role of sports and physical education within higher education, aligning with global initiatives such as the WHO Global Action Plan on Physical Activity (2018–2030), which advocates for active, healthy, and sustainable learning environments.

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