



# Determinants of athlete motivation and engagement in collegiate team sports: Toward a sports development framework

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## ABSTRACT

**Background:** Athlete motivation and sustained engagement are essential for retention in collegiate sports programs; however, the institutional and environmental factors that influence these outcomes remain underexplored.

**Objectives:** This study aimed to examine the determinants of athlete motivation and engagement in collegiate team sports using a Self-Determination Theory perspective, with engagement serving as a proxy for retention behavior.

**Methods:** A mixed-methods design was employed involving 75 collegiate student-athletes representing basketball, volleyball (men and women), baseball, and softball teams. Quantitative data were collected using a validated, researcher-developed questionnaire based on Self-Determination Theory and analyzed using descriptive statistics, Pearson's correlation, multiple regression, and Structural Equation Modeling (SEM). In contrast, qualitative data were analyzed using thematic analysis.

**Results:** Findings revealed that organizational commitment ( $M = 3.42$ ) and environmental support ( $M = 3.47$ ) were rated very high, while incentives and facilities were rated high. All program components were significantly associated with athlete engagement ( $p < .05$ ). Regression analysis showed that environmental support ( $\beta = .36$ ) and perceived support ( $\beta = .31$ ) were the strongest predictors, explaining 68% of the variance ( $R^2 = 0.68$ ). SEM results indicated a good model fit (CFI = 0.95; RMSEA = 0.061).

**Conclusions:** Qualitative findings highlighted intrinsic motivations, such as passion and belonging, as well as extrinsic motivators, including scholarships and rewards, alongside barriers, including financial delays, academic conflicts, and burnout. The study concludes that environmental and perceived support are the primary determinants of athlete engagement, emphasizing the critical role of competence-supportive environments in sustaining motivation and improving athlete retention.

**Keywords:** athlete engagement, athlete motivation, collegiate sports, retention, self-determination theory.

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## INTRODUCTION

Participation in collegiate team sports plays a significant role in promoting physical fitness, psychological well-being, and social development among student-athletes. However, maintaining athlete motivation and sustained engagement remains a critical challenge for sports programs in higher education institutions. Increasing academic demands, limited resources, and competitive pressures often contribute to decreased participation, burnout, and potential dropout among athletes. These issues highlight the need to understand the underlying factors that influence motivation and long-term engagement in collegiate sports settings. Recent international studies support this concern, emphasizing that student-athletes' participation and continued involvement in sports are shaped by a combination of psychological, academic, and environmental factors (Edris et al., 2025; Kang et al., 2025). Furthermore, research on collegiate athletes highlights that balancing academic and athletic roles significantly influences motivation and engagement, with challenges in role management potentially leading to reduced participation and performance (Choi & Smith, 2024).

Motivation in sports is widely explained through Self-Determination Theory, which emphasizes that individuals are more likely to sustain behaviors when their basic psychological needs (autonomy, competence, and relatedness) are satisfied (Dénarié, 2023; Van Yperen, 2025). In the context of sports, intrinsic motivation is associated with enjoyment, personal growth, and passion for the game, while extrinsic motivation is influenced by external rewards such as incentives, recognition, and institutional support (Alkasasbeh & Akroush, 2025; Sutriawan et al., 2025). When these motivational dimensions are properly supported, athletes are more likely to demonstrate higher levels of engagement, persistence, and performance.

Previous studies have shown that competence-supportive environments, including access to adequate facilities and equipment, significantly enhance athletes' motivation and skill development (Sharifi et al., 2024; Nicol & Allen, 2024). Similarly, organizational commitment, reflected in recruitment strategies, retention initiatives, and administrative support, fosters a sense of belonging and stability among athletes, which is essential for sustained participation (Latino et al., 2025). Extrinsic factors such as scholarships, incentives, and competitive opportunities also contribute to motivation, though their effectiveness depends on how they complement rather than diminish intrinsic motivation (Kruļj et al., 2024).

Despite these findings, the literature remains unclear about how multiple program components interact to influence athlete engagement as a behavioral indicator of motivation and retention. Many studies have examined motivation, performance, or injury prevention independently; however, limited research has integrated institutional, environmental, and psychological factors within a single analytical framework. Existing literature tends to focus on isolated dimensions of athlete development, such as psychological motivation and well-being (Kang et al., 2025), role balance and motivational perspectives (Choi & Smith, 2024), or participation patterns and physical engagement (Edris et al., 2025). While these studies provide valuable insights, they often do not account for the combined influence of institutional support systems, environmental resources, and psychological determinants on athlete engagement. This fragmented approach highlights a gap in the literature, as understanding athlete motivation and sustained participation

requires a more holistic framework that captures the interaction of these multiple factors within collegiate sports settings. Furthermore, there is a lack of empirical evidence focusing on collegiate sports programs in developing contexts, where structural and resource-related challenges may significantly affect athlete experiences.

Athlete engagement has emerged as a practical construct that reflects sustained motivation and commitment. It encompasses active participation, emotional investment, and behavioral involvement in training and competition (Zhang et al., 2025). High levels of engagement indicate that athletes are motivated and likely to continue participating, while low engagement may signal burnout, dissatisfaction, or disengagement (Graña et al., 2021). Thus, engagement serves as a meaningful proxy for understanding retention-related behaviors in sports programs.

In this context, the present study aims to examine the determinants of athlete motivation and engagement in collegiate team sports programs using a Self-Determination Theory perspective. Specifically, it investigates how program components (organizational commitment, incentives, facilities, and equipment) influence athlete engagement. Moreover, the study seeks to develop and validate a structural model to explain these relationships and to explore athletes' lived experiences regarding intrinsic motivation, extrinsic factors, and barriers to sustained participation. The novelty of this study lies in its integrative approach, which simultaneously examines institutional (organizational commitment), environmental (facilities and equipment), and psychological (intrinsic and extrinsic motivation) factors within a single analytical and structural modeling framework. Unlike previous studies that focus on isolated variables, this research combines quantitative modeling and qualitative insights to provide a comprehensive understanding of athlete engagement as a multidimensional construct in collegiate sports settings.

By integrating quantitative and qualitative approaches, this study contributes to the growing body of literature on athlete motivation by providing a comprehensive, context-specific understanding of engagement as a key retention mechanism in collegiate sports programs.

## METHODS

### Study Design and Participants

This study employed a mixed-methods research design integrating both quantitative and qualitative approaches to examine the determinants of athlete motivation and engagement in collegiate team sports programs. The quantitative component used a descriptive-correlational design to examine the relationships and predictive influence of program components namely, organizational commitment, incentives, facilities, and equipment on athlete engagement. Meanwhile, the qualitative component adopted a phenomenological approach to explore the lived experiences of student-athletes regarding motivation, engagement, and challenges related to retention.

The participants in the study were collegiate student-athletes enrolled in team sports programs at selected higher education institutions. A total of 75 student-athletes (45 male, 30 female) participated in the quantitative phase of the study, distributed across basketball, volleyball, baseball, and softball teams. Participants

were selected using purposive sampling, with inclusion criteria requiring that they: (1) are currently active members of a collegiate team sport, (2) have participated in organized training and competition for at least one academic year, and (3) are officially recognized members of their respective university sports programs.

For the qualitative phase, a subset of participants was selected through criterion-based sampling to provide in-depth insights into their motivational experiences. These participants were chosen based on their willingness to participate and their ability to articulate experiences related to motivation, engagement, and challenges encountered in the sports program.

All participants voluntarily took part in the study and were informed of its purpose prior to data collection. Ethical considerations were strictly observed, including obtaining informed consent, maintaining confidentiality of responses, and ensuring that participation was entirely voluntary. The study adhered to established ethical standards for research involving human participants, ensuring that all data were collected, analyzed, and reported with integrity and respect for participant rights.

### **Ethical approval statement**

This study was approved by the Institutional Ethics Review Board of the University of Perpetual Help System DALTA (Approval Code: UPHS-IERB 2026-001 SP). All participants provided informed consent prior to participation, and the study was conducted in accordance with established ethical standards, including the Declaration of Helsinki. Participant confidentiality and anonymity were strictly maintained throughout the research.

### **Research Instruments**

The study utilized a researcher-developed questionnaire and a semi-structured interview guide to collect quantitative and qualitative data on athlete motivation and engagement. The questionnaire was based on Self-Determination Theory and designed to measure the following variables: organizational commitment (recruitment and retention), extrinsic motivation (incentives), perceived support (facilities), environmental support (equipment), and athlete engagement (participation and involvement).

The quantitative instrument consisted of a structured Likert-scale questionnaire using a four-point scale (1 = low to 4 = very high). Each variable was measured through multiple items representing its respective indicators. Organizational commitment assessed recruitment and retention practices; extrinsic motivation measured incentives and benefits; perceived support evaluated facility adequacy; environmental support focused on equipment availability; and athlete engagement captured active participation and involvement in team activities.

Content validity was established through expert evaluation by three specialists in physical education, sports science, and research methodology. Reliability testing using Cronbach's alpha yielded acceptable internal consistency ( $\alpha \geq 0.70$ ) across all variables, indicating that the instrument was reliable for measuring the constructs.

For the qualitative component, a semi-structured interview guide was used to explore athletes' lived experiences related to intrinsic motivation, extrinsic influences, and barriers to sustained engagement. The open-ended format allowed for in-depth responses that complemented the quantitative findings.

## Data Analysis

Data were analyzed using an explanatory sequential mixed-methods approach, integrating quantitative and qualitative techniques. Quantitative data were processed using IBM SPSS and AMOS. Descriptive statistics (mean and standard deviation) were used to assess the levels of organizational commitment, extrinsic motivation, perceived support, environmental support, and athlete engagement. Pearson product-moment correlation analysis was conducted to examine relationships among variables. In contrast, multiple regression analysis was used to identify significant predictors of athlete engagement, with the coefficient of determination ( $R^2$ ) and standardized beta coefficients ( $\beta$ ) reported.

Structural Equation Modeling (SEM) was performed to validate the proposed framework and examine structural relationships among variables. Model fit was evaluated using standard indices, including the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR), and was evaluated against established threshold criteria.

Qualitative data were analyzed using thematic analysis, involving coding, categorization, and theme development to identify patterns related to motivation, engagement, and retention challenges. The qualitative findings were used to explain and enrich the quantitative results, providing a more comprehensive understanding of athlete engagement.

## RESULTS

This study aimed to examine the determinants of athlete motivation and engagement in collegiate team sports programs by analyzing the influence of program components, including organizational commitment, extrinsic motivation, perceived support, and environmental support. Both quantitative and qualitative data were utilized to assess the level of program support, determine relationships among variables, identify significant predictors of athlete engagement, and validate the proposed structural model. The results are presented through descriptive statistics, correlation analysis, multiple regression, Structural Equation Modeling (SEM), and thematic analysis to provide a comprehensive understanding of athlete engagement.

**Table 1.** Descriptive Indicators of Program Support and Athlete Engagement

| Variable  | Mean | SD   | Interpretation |
|---|------|------|----------------|
| Organizational Commitment (Recruitment & Retention) | 3.42 | 0.48 | Very High      |
| Extrinsic Motivation (Incentives)                   | 3.18 | 0.52 | High           |
| Perceived Support (Facilities)                      | 3.11 | 0.55 | High           |
| Environmental Support (Equipment)                   | 3.47 | 0.45 | Very High      |
| Athlete Engagement (Participation)                  | 3.42 | 0.45 | Very High      |

Table 1 indicates that student-athletes generally perceive the sports development program as highly supportive of their motivation and engagement. Among the program components, environmental support and organizational commitment emerged as the most prominent strengths, suggesting that access to adequate equipment and effective recruitment and retention practices are critical to fostering athlete engagement. In contrast, incentives and facilities, while still positively perceived, were relatively less pronounced, indicating potential areas for program

enhancement. Overall, the findings highlight that a competence-supportive environment, particularly through well-maintained resources and structured organizational support, is essential in sustaining active participation and engagement among collegiate athletes.

**Table 2.** Correlation Matrix Between Program Support and Athlete Engagement

| Variables                 | 1     | 2     | 3     | 4     | 5 |
|---------------------------|-------|-------|-------|-------|---|
| Organizational Commitment | 1     |       |       |       |   |
| Extrinsic Motivation      | 0.61* | 1     |       |       |   |
| Perceived Support         | 0.58* | 0.64* | 1     |       |   |
| Environmental Support     | 0.66* | 0.62* | 0.59* | 1     |   |
| Athlete Engagement        | 0.49* | 0.57* | 0.60* | 0.63* | 1 |

Table 2 presents the correlation matrix between program support variables and athlete engagement. Pearson correlation analysis revealed that all program components are positively and significantly associated with athlete engagement ( $p < 0.05$ ), indicating that institutional support contributes to sustained motivation and continued participation. Specifically, environmental support in terms of equipment showed the strongest relationship with athlete engagement ( $r = 0.63$ ), followed by perceived support in terms of facilities ( $r = 0.60$ ), extrinsic motivation through incentives ( $r = 0.57$ ), and organizational commitment ( $r = 0.49$ ). Additionally, strong positive relationships were observed among the independent variables, particularly between extrinsic motivation and perceived support ( $r = 0.64$ ), and between organizational commitment and environmental support ( $r = 0.66$ ). These findings suggest that competence-supportive environments, particularly those providing adequate facilities and equipment, play a crucial role in enhancing athlete motivation and sustained involvement in collegiate team sports programs.

**Table 3.** Multiple Regression Predicting Athlete Engagement

| Predictor Variables       | B    | SE   | $\beta$ | t    | p-value |
|---------------------------|------|------|---------|------|---------|
| Organizational Commitment | 0.18 | 0.09 | 0.19    | 2.01 | 0.048   |
| Extrinsic Motivation      | 0.24 | 0.08 | 0.27    | 2.98 | 0.004   |
| Perceived Support         | 0.29 | 0.10 | 0.31    | 3.10 | 0.003   |
| Environmental Support     | 0.34 | 0.09 | 0.36    | 3.78 | 0.001   |

**Table 4.** Model Summary

| Statistic      | Value   |
|----------------|---------|
| $R^2$          | 0.68    |
| Adjusted $R^2$ | 0.66    |
| F              | 37.42   |
| p              | < 0.001 |

Tables 3 and 4 present the results of the multiple regression analysis examining the predictive role of program-related variables in athlete engagement. The overall model was statistically significant,  $F(4, 70) = 37.42$ ,  $p < .001$ . The model explained 68% of the variance in athlete engagement ( $R^2 = 0.68$ ), with an adjusted  $R^2$  of 0.66.

All predictor variables in the model showed positive, statistically significant coefficients. Environmental support (equipment) had the highest standardized coefficient ( $\beta = 0.36$ ,  $p = 0.001$ ), followed by perceived support (facilities) ( $\beta = 0.31$ ,  $p = 0.003$ ), extrinsic motivation (incentives) ( $\beta = 0.27$ ,  $p = 0.004$ ), and organizational commitment ( $\beta = 0.19$ ,  $p = 0.048$ ).

These results indicate that each predictor variable contributes significantly to the model's explanation of athlete engagement, as reflected in its respective regression coefficient and significance value.

**Table 5.** Structural Equation Model (SEM) Fit Indices

| Fit Index | Obtained Value | Interpretation |
|-----------|----------------|----------------|
| CFI       | 0.95           | Excellent Fit  |
| TLI       | 0.93           | Good Fit       |
| RMSEA     | 0.061          | Acceptable Fit |
| SRMR      | 0.052          | Good Fit       |

Table 5 presents the fit indices of the Structural Equation Modeling (SEM) conducted to validate the proposed motivation–engagement model. The results indicate that the model demonstrates a good fit to the data. Specifically, the Comparative Fit Index (CFI = 0.95) indicates an excellent fit, while the Tucker–Lewis Index (TLI = 0.93) reflects a good fit. The Root Mean Square Error of Approximation (RMSEA = 0.061) falls within the acceptable range, and the Standardized Root Mean Square Residual (SRMR = 0.052) also indicates a good fit.

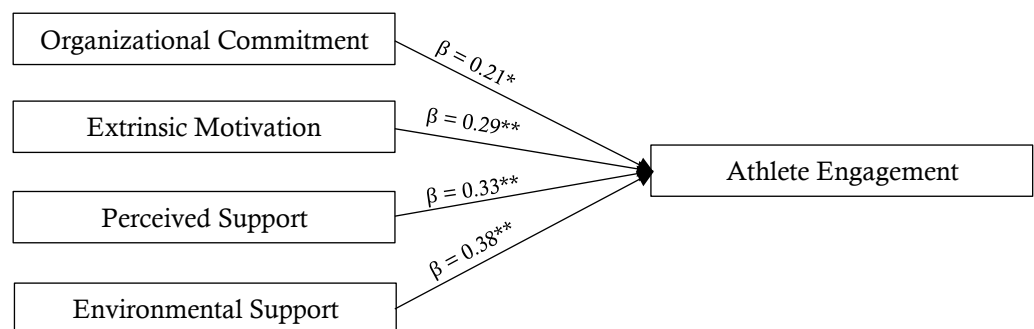
These results confirm that all fit indices met the recommended thresholds, suggesting that the proposed structural model adequately explains the relationships between program support and athlete engagement.

**Table 6.** Structural Path Analysis

| Path                    | $\beta$ | p-value |
|-------------------------|---------|---------|
| Commitment → Engagement | 0.21    | 0.014   |
| Incentives → Engagement | 0.29    | 0.002   |
| Facilities → Engagement | 0.33    | 0.001   |
| Equipment → Engagement  | 0.38    | 0.000   |

Table 6 presents the structural path analysis of the relationships between program components and athlete engagement. The results indicate that all structural paths were statistically significant, confirming that each program component contributes to athlete engagement. Specifically, environmental support in terms of equipment showed the strongest direct effect on athlete engagement ( $\beta = 0.38$ ,  $p < 0.001$ ), followed by perceived support in terms of facilities ( $\beta = 0.33$ ,  $p = .001$ ), extrinsic motivation through incentives ( $\beta = 0.29$ ,  $p = 0.002$ ), and organizational commitment ( $\beta = 0.21$ ,  $p = 0.014$ ).

These findings confirm that both extrinsic factors (incentives) and intrinsic-supportive components (facilities, equipment, and organizational commitment) significantly influence athlete engagement, highlighting the importance of a supportive environment in sustaining motivation and participation in collegiate team sports programs.



**Figure 1.** Structural Model of Athlete Motivation and Engagement

Figure 1 presents the structural model of athlete motivation and engagement. The model illustrates the direct effects of organizational commitment, extrinsic motivation, perceived support, and environmental support on athlete engagement.

Among the predictors, environmental support demonstrates the strongest effect, followed by perceived support, extrinsic motivation, and organizational commitment. These results are consistent with the findings of the regression and structural path analyses, confirming the importance of both environmental and institutional factors in sustaining athlete engagement.

**Table 7.** Thematic Analysis of Athlete Motivation, Engagement, and Retention Risks

| Major Themes                             | Sub-Themes  |
|--|---|
| Intrinsic Motivation Drivers             | Passion for sport; Sense of belonging within the team; Personal growth and discipline         |
| Extrinsic Motivation Factors             | Scholarships and financial incentives; Recognition and rewards; Opportunities for competition |
| Barriers to Engagement (Retention Risks) | Delayed financial support; Academic–athletic conflicts; Limited or inadequate facilities      |
| Burnout and Disengagement Indicators     | Physical and mental fatigue; Time constraints and pressure; Administrative inefficiencies     |

Table 7 presents the thematic categories identified from the analysis, organized into four major themes: intrinsic motivation drivers, extrinsic motivation factors, barriers to engagement (retention risks), and burnout and disengagement indicators. Intrinsic motivation themes include passion for sport, sense of belonging, and personal growth, while extrinsic factors encompass scholarships, recognition, and competitive opportunities. The analysis also identifies several barriers to engagement, such as delayed financial support, academic–athletic conflicts, and limited facilities. In addition, indicators of burnout and disengagement include physical and mental fatigue, time-related pressures, and administrative inefficiencies. These themes and sub-themes summarize the range of factors associated with athlete motivation, engagement, and retention risks within collegiate sports contexts.

## DISCUSSION

This study examined the determinants of athlete motivation and engagement in collegiate team sports programs using a Self-Determination Theory perspective. The findings revealed that student-athletes generally perceive their sports programs as supportive, with high to very high levels of organizational commitment, environmental support, and athlete engagement. These results indicate that a well-structured sports development program plays a critical role in fostering both intrinsic and extrinsic motivation, which are essential for sustained participation. From a Self-Determination Theory perspective, these program components influence athlete engagement by satisfying key psychological needs. Organizational commitment, reflected in effective recruitment, retention, and program management strategies, enhances athletes' sense of relatedness by fostering belonging and connection within the team, while also supporting autonomy through structured yet empowering environments that allow athletes to feel valued and involved in decision-making.

On the other hand, environmental support—particularly the availability of adequate facilities and equipment—directly contributes to the need for competence by enabling athletes to perform effectively, develop skills, and experience mastery in their sport. When these psychological needs for autonomy, competence, and relatedness are satisfied, athletes are more likely to develop self-determined forms of motivation, leading to higher levels of engagement, persistence, and long-term

participation in collegiate team sports programs. This supports the assertion that environments that satisfy athletes' psychological needs for competence, autonomy, and relatedness foster higher levels of engagement and persistence (Van Yperen, 2025; Alkawasbeh & Akroush, 2025).

The significant positive relationships observed between program components and athlete engagement further reinforce the importance of institutional support systems. In particular, environmental support (equipment) and perceived support (facilities) demonstrated the strongest associations with engagement. These findings are consistent with previous studies indicating that competence-supportive environments enhance athletes' motivation and performance outcomes (Askilashvili, 2025; Akines & Akines, 2024). When athletes are provided with adequate resources, they are more likely to feel competent, which strengthens their commitment to training and competition. Similarly, organizational commitment and incentives were also found to be significantly related to engagement, highlighting the role of both intrinsic-supportive and extrinsic motivational factors in sustaining athlete participation (Eys et al., 2020).

The results of the multiple regression analysis provide further evidence that environmental support is the strongest predictor of athlete engagement, followed by perceived support, extrinsic motivation, and organizational commitment. This indicates that tangible aspects of the sports environment, such as access to quality equipment and facilities, play a critical role in influencing athletes' continued involvement. These findings align with the principles of Self-Determination Theory, which emphasize the importance of competence in fostering self-determined motivation (Dénarié, 2023; Batucan et al., 2025). While extrinsic motivators such as incentives also contribute to engagement, their effectiveness appears to be enhanced when combined with supportive environmental conditions, rather than functioning independently.

The structural equation modeling results further validated the proposed motivation–engagement framework, demonstrating a good model fit and confirming the significant influence of all program components on athlete engagement. The structural path analysis revealed that both intrinsic-supportive factors (facilities, equipment, and organizational commitment) and extrinsic motivators (incentives) significantly predict engagement. This supports the notion that athlete motivation is multidimensional and influenced by the interaction of internal and external factors (Sutriawan et al., 2025; Batucan et al., 2025). The findings suggest that a holistic approach to sports program development—one that integrates psychological, environmental, and organizational elements—is necessary to effectively sustain athlete motivation and retention.

The qualitative findings provide deeper insights into the mechanisms underlying athlete motivation and engagement. Intrinsic factors such as passion for sport, sense of belonging, and personal growth were identified as key drivers of sustained participation. These findings are consistent with literature emphasizing the importance of relatedness and intrinsic enjoyment in promoting long-term engagement in sports (Bergström et al., 2021; Longakit et al., 2025). At the same time, extrinsic factors such as scholarships, recognition, and competitive opportunities were found to reinforce motivation, particularly when aligned with athletes' personal goals.

However, the study also identified several barriers that may hinder sustained engagement, including delayed financial support, academic–athletic conflicts, and inadequate facilities. These challenges highlight a potential mismatch between athletes' needs and institutional support, which may lead to decreased motivation and an increased risk of disengagement or dropout. Additionally, indicators of burnout, such as physical fatigue and time-related pressures, suggest that excessive demands and insufficient recovery opportunities may negatively impact athlete well-being (De Francisco et al., 2020; Panganiban, 2025). These findings underscore the importance of addressing both structural and psychosocial factors in designing effective sports development programs.

Overall, this study's findings emphasize that athlete engagement is a critical mechanism linking program support to retention outcomes. When sports programs effectively provide competence-supportive environments, meaningful incentives, and opportunities for social connection, athletes are more likely to remain engaged and committed. Conversely, systemic challenges and inadequate support structures may undermine motivation and increase the likelihood of disengagement. Therefore, higher education institutions must adopt comprehensive and athlete-centered strategies to enhance motivation, sustain engagement, and promote long-term participation in collegiate team sports.

### **Limitations of the study**

Despite the significant findings of this study, several limitations should be acknowledged. First, the study was limited to a specific group of collegiate student-athletes from selected higher education institutions, which may restrict the generalizability of the results to other contexts, such as different regions, sports disciplines, or competitive levels. Future studies may include a larger and more diverse sample to enhance external validity.

Second, the study relied on self-reported data, which may be subject to response bias, including social desirability and subjective interpretation of survey items. Although measures were taken to ensure the validity and reliability of the instruments, bias in participants' responses cannot be eliminated.

Third, while the study employed a mixed-methods approach, the qualitative component was limited to selected participants and may not fully capture the breadth of experiences among all student-athletes. Expanding qualitative data collection through in-depth interviews or longitudinal designs could provide a more comprehensive understanding of athlete motivation and engagement over time.

Finally, the cross-sectional nature of the quantitative data limits the ability to establish causal relationships among variables. Although regression and structural modeling provided insights into predictive relationships, future research may consider longitudinal or experimental designs to examine further causal mechanisms underlying athlete motivation, engagement, and retention.

## **CONCLUSION**

This study provides empirical evidence that athlete engagement in collegiate team sports is a multidimensional outcome shaped by the interaction of institutional, environmental, and motivational factors. Grounded in Self-Determination Theory,

the findings indicate that engagement is higher when sports programs support athletes' needs for competence, autonomy, and relatedness.

The results show that all program components significantly contribute to athlete engagement, with environmental support—particularly access to equipment—and facility-related support emerging as the strongest predictors. Both intrinsic-supportive factors (e.g., organizational commitment and supportive environments) and extrinsic motivators (e.g., incentives and rewards) jointly influence engagement, suggesting the importance of an integrated support system.

Qualitative findings further indicate that intrinsic motivation, reflected in passion, belonging, and personal growth, underpins sustained participation, while extrinsic incentives act as reinforcing factors. However, barriers such as financial constraints, academic–athletic conflicts, and limited resources continue to pose significant risks to long-term engagement and retention.

Overall, athlete engagement serves as a key mechanism linking program support to retention outcomes, underscoring the need for a holistic, well-aligned approach in collegiate sports programs.

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## **AI DISCLOSURE STATEMENT**

During the preparation of this manuscript, the authors utilized DeepL Translate and Grammarly to assist with translation, grammar checking, and language refinement. All outputs were thoroughly reviewed and revised by the authors to ensure accuracy, clarity, and compliance with academic standards. The authors assume full responsibility for the content of this manuscript.

## **DATA AVAILABILITY**

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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This research does not receive external funding.

## **CONFLICT OF INTEREST**

The authors hereby declares that this research is free from conflicts of interest with any party.

## **PUBLISHER'S NOTE**

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