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Research Article

Coach–Athlete Relationship in Greek Basketball Community: Associations between Relationship Quality, Maintenance Strategies, and Demographic Factors

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Background

High quality coach–athlete relationships strongly influence athlete performance and well-being, yet limited evidence exists on how relational quality and maintenance strategies interact within Greek basketball.

Objective

This study investigated the coach–athlete relationship within the Greek basketball community, examining the associations between relationship quality (closeness, commitment, complementarity; measured by the Coach–Athlete Relationship Questionnaire) and relationship maintenance strategies (COMPASS model; measured by Coach–Athlete Relationship Maintenance Questionnaire), and how these dynamics are moderated by athletes' demographic characteristics.

Methods

Greek basketball players (male/female, n = 595) across various age groups, competitive levels (A1 League to Amateur), and years of experience participated in the online questionnaires. Non-parametric analyses revealed significant positive correlations between all dimensions of relationship quality and maintenance strategies, with conflict management and openness showing particularly strong associations with closeness, commitment, and complementarity.

Results

Motivation emerged as the most highly rated maintenance strategy, while social networks and preventative strategies were the least frequently reported. Significant demographic differences were found: female athletes reported higher commitment; younger athletes (⩽22 years) reported lower closeness and complementarity; A1 League athletes reported lower complementarity; athletes with more experience reported higher overall relationship quality and greater use of conflict management, assurance, and motivation strategies. Age and competitive level also significantly influenced the use of specific maintenance strategies.

Conclusion

The findings underscore the interdependence of relationship quality and maintenance

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strategies, highlighting the importance for coaches to consider athlete demographics, particularly age, experience, and competitive level, when fostering effective coach–athlete dyads in the Greek basketball context.

1. INTRODUCTION

The relationship between a coach and an athlete is widely recognized as the fundamental unit of coaching and a primary determinant of athletic success, satisfaction, and overall development.[1] It is not merely a peripheral aspect of the sporting experience but rather the "heart of coaching," a dynamic and interdependent social situation wherein the feelings, thoughts, and behaviors of both individuals are mutually and causally interconnected.[2,3,4] The efficacy of a coach's technical, tactical, and strategic expertise is significantly diminished without a strong, functional bond, as this relationship serves as the primary platform for influence, support, mentorship, and instruction.[5] The context of basketball, characterized by high levels of team interdependence, fluid tactical adjustments, and constant on-court communication, provides a particularly salient environment for studying this dyadic relationship. In such a setting, the quality of the coach–athlete interaction directly affects not only individual performance but also the team's collective efficacy.[6,7] The coach–athlete relationship functions as a primary psychosocial filter through which all other coaching inputs are processed by the athlete. A coach's tactical instruction, corrective feedback, or motivational encouragement is not simply received at face value by athletes; rather, it is interpreted through the lens of the existing relationship quality.[8,9] Therefore, the quality of the relationship directly mediates the effectiveness of the entire coaching process, transforming it from a simple transactional exchange of information into a complex interpersonal dynamic where relational quality can either amplify or nullify technical expertise.[10,11]

1.1. WELL-BEING AND PSYCHOSOCIAL OUTCOMES

While the coach–athlete relationship has been examined through the lens of performance enhancement, contemporary research has broadened this scope to include a wide array of critical psychosocial outcomes. A high-quality relationship is robustly linked to athletes' psychological well-being, greater satisfaction with their sport participation, enhanced self-esteem, and positive mental health.[12] Conversely, dysfunctional or poor-quality relationships constitute a significant predictor of negative outcomes, including heightened anxiety, emotional exhaustion, and athlete burnout.[13,14,15] Research has demonstrated that athletes who perceive their relationships with coaches as close, committed, and cooperative report lower levels of exhaustion and are better equipped to manage the inherent stressors of elite competition.[16,17] This underscores the profound ethical and practical importance of understanding, fostering, and maintaining positive coach–athlete relationships, a central aim of the present investigation, which seeks to examine not only performance but also athlete well-being and satisfaction with their athletic experience.[18,19]

1.2. A MULTILAYERED PHENOMENON

The coach–athlete relationship is a complex, multilayered phenomenon that can be conceptualized as being influenced by antecedents, composed of specific components, and culminating in tangible outcomes.[20] Antecedent variables, such as the personality, gender, or experience level of both the coach and the athlete, can shape the initial conditions and ongoing quality of the relationship.[21] The relationship itself comprises distinct but interrelated components, including affective ties, cognitive intentions, and behavioral interactions.[22] Finally, the quality of these components directly influences a cascade of outcomes, ranging from objective performance metrics to subjective states of psychological well-being.[23,24] This multilayered perspective provides a necessary framework for deconstructing this complex dyad and serves as the organizing principle for the theoretical models that follow.

1.3. THE 3 CS CONCEPTUAL FRAMEWORK IN DEFINING RELATIONSHIP QUALITY

The dominant theoretical framework for conceptualizing and measuring the quality of the coach–athlete relationship is the 3 Cs model developed by Jowett and Ntoumanis.[22] This model posits that the quality of the dyadic relationship is a multidimensional construct comprising three distinct yet interconnected components: closeness (affective), commitment (cognitive), and complementarity (behavioral).[25] This framework provides a comprehensive lens through which to analyze the interpersonal feelings, thoughts, and behaviors that define the partnership.[5] The widespread adoption of this model is due to its robust theoretical grounding and its successful operationalization through the Coach–Athlete Relationship Questionnaire (CART-Q), the instrument utilized in the present study to assess relationship quality.[26]

Closeness represents the affective core of the relationship, defined as the emotional connection and interpersonal feelings shared between the coach and athlete. This dimension is characterized by mutual trust, respect, appreciation, liking, and a sense of care and support.[27] It reflects the depth of the interpersonal bond and the degree to which both parties feel emotionally safe and valued within the dyad. Research has consistently demonstrated that closeness is a powerful predictor of positive athletic outcomes.[28] Higher levels of closeness are associated with increased athletic engagement, greater satisfaction, and a significant reduction in symptoms of burnout and exhaustion.[15,19] This dimension is fundamental, as the presence of trust and respect forms the bedrock upon which effective communication and cooperation can be built, directly supporting this investigation's focus on the "emotional bond" as a key aspect of relationship quality.

Commitment is the cognitive dimension of the 3 Cs model, defined as the intention of both the coach and the athlete to maintain their relationship over time.[29] This component reflects a long-term orientation and a willingness to work through the inevitable challenges, setbacks, and periods of adversity that arise in a competitive sporting career.[25] It is a conscious decision to remain invested in the partnership, signifying a belief in its continued value and potential. Commitment provides stability and security to the relationship, allowing both individuals to focus on long-term

development and shared goals without the uncertainty of a transient partnership.[30]

Complementarity constitutes the behavioral dimension of the relationship, describing the cooperative, responsive, and effective nature of the interactions between coach and athlete. It is characterized by a give-and-take dynamic in which roles are clearly defined and actions are coordinated and reciprocal: the coach leads and instructs, and the athlete responds and executes in a fluid and affiliative manner.[31] High levels of complementarity are manifested in smooth, efficient interactions during training and competition, in which the behaviors of one individual complement and enhance the actions of the other.[32]

The three components of closeness, commitment, and complementarity are not independent constructs but exist in a dynamic, cyclical relationship. A breakdown in one component inevitably compromises the others, creating the potential for a negative "relational spiral." For example, a consistent behavioral failure in complementarity, such as a coach repeatedly dismissing an athlete's feedback, will likely erode the athlete's feeling of being respected and valued, thereby affecting closeness. This diminished closeness, in turn, can weaken the cognitive commitment to the relationship, leading the athlete to question their long-term future with the coach and team. Conversely, a strong foundation of closeness, built on trust, fosters the psychological safety necessary for open communication and effective behavioral complementarity.[33] This systemic interplay suggests that interventions targeting one dimension (e.g., clarifying roles to improve complementarity) could have positive cascading effects on the other two, offering a more dynamic and actionable understanding of the model.[34]

1.4. THE NEED FOR RELATIONSHIP MAINTENANCE FROM STATE TO STRATEGY

A high-quality coach–athlete relationship is not a static state that, once achieved, perpetuates itself. It is a dynamic entity that requires active, intentional, and ongoing effort from both parties to sustain its quality amidst the pressures of training, competition, and external life events.[35] The concept of relationship maintenance strategies provides the crucial link between the existence of a relationship and its enduring quality and effectiveness.[36] These strategies are the specific behaviors and communicative acts that coaches and athletes employ to manage conflict, foster connection, and reinforce their bond. Understanding these strategies is paramount, as they represent the actionable mechanisms through which relationship quality can be preserved and enhanced.[37] This perspective directly informs the primary research question of the present study, which seeks to empirically map the correlation between relationship quality (as measured by the CART-Q) and the use of specific maintenance strategies (as measured by the Coach–Athlete Relationship Maintenance Questionnaire [CARM-Q]).[24]

To systematically categorize these behaviors, Rhind and Jowett[4,38] developed the COMPASS model, a comprehensive framework outlining seven key dimensions of relationship maintenance. This model, which underpins the CARM-Q, provides a taxonomy for understanding the diverse strategies employed within the dyad.[39] The seven components are conflict management, openness, motivation, preventative strategies, assurance, support, and social networks.

1.5. LINKING STRATEGIES TO OUTCOMES IN THE COACH–ATHLETE RELATIONSHIP MAINTENANCE QUESTIONNAIRE AND ITS CORRELATES

The CARM-Q is the psychometric instrument designed to operationalize and measure the seven strategies of the COMPASS model.[4,36] Research utilizing the CARM-Q has provided empirical evidence linking the use of these maintenance strategies to the quality of the coach–athlete relationship. For instance, studies have shown that openness and social network strategies are significantly associated with higher levels of closeness, while the use of motivational and support strategies is strongly correlated with greater commitment.[40] These findings establish a direct empirical pathway between specific maintenance strategies and the core components of relationship quality, providing a robust rationale for the present study's investigation into the associations between CARM-Q and CART-Q scores within the context of basketball.[41]

1.6. CONTEXTUALIZING THESE DYNAMICS: THE MODERATING ROLE OF ATHLETE DEMOGRAPHICS

The coach–athlete relationship does not exist in a social vacuum; it is profoundly shaped and moderated by a host of individual and contextual factors.[2] Demographic characteristics of the athlete, such as gender, age, years of experience, and competitive level, are critical variables that can influence perceptions of relationship quality and the maintenance strategies that are employed and perceived as effective.

Gender is a significant factor that shapes relational dynamics and expectations within the coach–athlete dyad. Research suggests that female athletes may place a higher premium on the affective components of the relationship, such as closeness, and often prefer democratic, empathetic, and person-oriented coaching styles.[42] This aligns with findings that female coaches are often rated higher in relationship quality and empathy.[43] In contrast, some studies indicate that male athletes may prioritize a coach's technical and tactical knowledge over relational aspects. Furthermore, the prevalent gender imbalance in coaching, where male coaches predominantly lead female teams, introduces potential power asymmetries and the risk of gender-based stereotypes influencing coaching behaviors.[44]

The nature and needs of the coach–athlete relationship evolve throughout an athlete's career. Younger, less experienced athletes typically require more instructional guidance, positive reinforcement, and emotional support to build confidence and fundamental skills.[45,46] Their relationship with a coach is often more hierarchical and pedagogical. As athletes mature and gain experience, their needs shift toward a more collaborative, autonomous, and democratic partnership, in which they expect greater input into decision-making processes.[47] Increased years of experience within sport are associated with the development of deeper trust, more established communication patterns, and a more resilient relational history.[48,49]

The competitive level at which an athlete participates creates a distinct psychosocial environment that heavily influences relational dynamics. Elite and professional levels are characterized by intense pressure, a singular focus on performance outcomes, and high stakes, which can foster

relationships that are formal, structured, and at times, transactional.[50] The constant evaluation and pressure to deliver results can strain the cooperative and effective aspects of the relationship. In contrast, amateur, youth, or developmental levels may place greater emphasis on personal growth, skill acquisition, and enjoyment, which can foster a supportive, less pressure-filled relational dynamic.[51]

Despite considerable progress in this field over the past two decades, specific gaps in the literature remain. A thorough review of contemporary research reveals three key areas requiring further investigation. First, while the links between the 3 Cs and the COMPASS model have been explored[4,32], large-scale quantitative studies that simultaneously and comprehensively map the correlations between all three dimensions of relationship quality and all seven dimensions of relationship maintenance within a single, large sample remain scarce. Such an analysis is needed to provide a more holistic and integrated view of how quality and maintenance interrelate.

Second, although individual demographic factors have been studied in isolation, there is a notable scarcity of comprehensive research that simultaneously investigates how a cluster of key demographics, specifically gender, age, competitive level, and years of experience, collectively and differentially influence both athletes' perceptions of relationship quality (CART-Q scores) and their reported use of maintenance strategies (CARM-Q scores). This multifaceted approach is necessary to move beyond simplistic main effects and begin to understand the complex interplay of these variables.[21]

Third, a significant portion of the foundational research in this area has been conducted in individual sports (e.g., athletics, swimming) or within Anglo-American cultural contexts. There is a pressing need for large-scale quantitative investigations within different sporting and cultural contexts.[52] The unique environment of Greek basketball, a sport defined by intense team interdependencies, passionate fan culture, and specific developmental pathways, represents a significant and under-researched context.[53,54]

The present investigation is explicitly designed to address this multifaceted research gap. The primary objective of this study was to investigate the psychological and social dynamics influencing the relational experiences of basketball athletes with their coaches.[55] Specifically, the current study focused on assessing the quality of the coach–athlete relationship, examining the frequency and intensity of interpersonal conflicts, and analyzing athletes' strategic use of third-party support systems (e.g., agents, sport psychologists, club personnel, personal networks) in managing these dyadic interactions and conflicts.[56,57]

Furthermore, this investigation sought to elucidate the associations between these relational factors and broader athletic outcomes, including general psychological well-being, satisfaction derived from their athletic participation, and overall basketball performance. The anticipated outcomes of this study are expected to generate empirically grounded insights and actionable recommendations to enhance coaching methodologies, optimize conflict-resolution processes, and strategically leverage third-party support to improve the quality of life and athletic performance among basketball players.

The specific research questions guiding this study were:

(i) What are the associations between the quality of the coach–athlete relationship and the relationship maintenance strategies employed by athletes?
(ii) How does the perceived quality of the coach–athlete relationship vary as a function of athletes' demographic characteristics?
(iii) To what extent do athletes' demographic characteristics influence their use of relationship maintenance strategies with their coaches?

By answering these questions, this study provides a detailed, data-driven snapshot of the coach–athlete dyad in the contemporary Greek basketball community. The findings are poised to offer invaluable insights for athletes, coaches, and sporting organizations aiming to cultivate relationships that optimize not only competitive performance but also athletes' long-term health and well-being.

The following hypotheses were formulated based on the reviewed theoretical and empirical literature:

(i) Higher levels of perceived relationship maintenance strategies (conflict management, openness, motivation, preventative strategies, assurance, support, and social networks) are positively associated with higher levels of relationship quality (closeness, commitment, and complementarity).
(ii) Relationship quality and maintenance strategies differ significantly by athlete demographic characteristics, including gender, age, competitive category, and years of basketball experience.
(iii) Athletes with greater competitive experience and longer team tenure report higher levels of relationship quality and more frequent use of maintenance strategies than less experienced athletes.
(iv) Female athletes report higher perceived commitment and closeness compared to male athletes, consistent with previous literature on relational orientation in sporting contexts.

These hypotheses guided the quantitative analysis and interpretation of findings in relation to the 3 Cs and COMPASS frameworks.

2. METHODOLOGY

2.1. SAMPLE

The study cohort consisted of 595 basketball athletes (353 male and 242 female) who were actively competing during the 2024–2025 season across different divisions of the Greek basketball system (A1, A2, B' National-NL1, C' National-NL2, and Amateur). Participants ranged in age from 18 to 40 years (mean = 27.4, standard deviation [SD] = 5.9) and had playing experience from 1 to 25 years (mean = 11.8, SD = 5.4). The sample included athletes from both professional and semi-professional environments to ensure adequate variability across competitive levels and to capture the full spectrum of coach–athlete relational experiences within Greek basketball.

A non-probability convenience sampling method was selected for practical considerations and the nature of the target population. Basketball players in Greece are geographically dispersed across regional and national leagues, with no publicly available centralized database or official player registry that would allow for random sampling. Consequently, the online distribution of the questionnaire through national and regional basketball federation networks, official club channels, and athlete social media groups provided the most feasible and comprehensive approach to reach active athletes during the competitive season.

The final sample size (n = 595) exceeded the minimum requirements for correlational and comparative analyses

with multiple variables. Based on established methodological guidelines for multivariate analyses, a minimum of 10–15 participants per variable was required to ensure statistical power and reliability.[58] An a priori power analysis using G*Power (α = 0.05, power = 0.95, medium effect size f^2 = 0.15) indicated that at least 400 participants were required. Therefore, the current sample size provides robust statistical power and enhances the reliability of the correlation and group difference tests conducted.[59] This sampling design, though non-random, provided representation across all major competition levels and a balance between gender and experience, thereby enabling meaningful analysis of demographic effects while maintaining methodological transparency.[60]

2.2. DATA COLLECTION INSTRUMENT

A structured questionnaire consisting of three parts was used as the data collection tool. The use of questionnaires is appropriate for the quantitative investigation of participants' subjective perceptions and attitudes, as they facilitate statistical analysis.[61] The first section included six closed-ended questions regarding the demographic characteristics of the basketball athletes: (i) gender, (ii) age, (iii) level of education, (iv) marital status, (v) competitive category (2024–2025), and (vi) years of participation in basketball. The second section was the CART-Q by Jowett and Ntoumanis.[22] The CART-Q is an 11-item instrument measuring the quality of the coach–athlete relationship across three dimensions: closeness, commitment, and complementarity. Respondents rate each statement on a 7-point Likert scale. Higher scores indicate a stronger, more positive coach–athlete relationship. The CART-Q was developed and validated in athletic populations and showed a clear 3-factor structure (closeness, commitment, complementarity). It demonstrated good internal consistency (e.g., Cronbach's α ~0.85 for each subscale in the original study[22]) and strong validity.[22] The third and final section included the CARM-Q by Rhind and Jowett.[36] The CARM-Q is a 28-item questionnaire designed to assess strategies used by coaches and athletes to maintain their relationship. It covers seven subscales of relationship maintenance (the "COMPASS" model). Respondents rate each statement on a 7-point Likert scale (1 = Strongly disagree, 7 = Strongly agree). Table 1 shows the correspondence between questions and the seven subscales.

Table 1. Mapping the questions in the Coach–Athlete Relationship Maintenance Questionnaire to seven subscales

Dimension	Question numbers
Conflict management	1, 2, 3, 4, 5
Social networks	6, 7, 8, 9
Preventative strategies	10, 11, 12, 13
Assurance	14, 15, 16
Support	17, 18, 19
Openness	20, 21, 22, 23
Motivation	24, 25, 26, 27, 28

The CARM-Q assesses how coach–athlete dyads handled conflicts, communicated, and utilized third parties or common networks to maintain a positive working relationship. Internal consistency for each subscale was acceptable to excellent (Cronbach's α 0.79–0.95 across all subscales). Construct validity is supported by significant correlations between CARM-Q scores and relationship quality: athletes who reported greater use of maintenance strategies tended to have higher coach relationship scores.[62]

2.3. DATA COLLECTION PROCEDURE

Data were collected using an online questionnaire during the 2024 to 2025 competitive season. This mode was selected to reach geographically dispersed athletes across multiple leagues within a limited data-collection period, to minimize administrative burden on clubs during the season, and to preserve respondent anonymity for items concerning relational dynamics and conflict. Recruitment was conducted through federation and club channels, as well as via athlete groups on social media, to maximize reach across competitive categories. The instrument was pilot-tested for clarity and device compatibility, missing data were reduced by using mandatory response fields, and completeness and inconsistent patterns were examined through data screening. Anonymity and the absence of an interviewer were expected to reduce social desirability pressures in reporting sensitive experiences. Given the absence of a national sampling frame for active players, the online approach was the most feasible means to obtain a large and heterogeneous sample suitable for the study's correlational analyses.

2.4. DATA ANALYSIS PROCEDURE

Data analysis was performed using Statistical Package for Social Sciences (SPSS 25.0, IBM, United States). It included descriptive statistics, including frequencies, means, and SDs for demographic data and the previously described instrument dimensions. Subsequently, a normality test was conducted using the Kolmogorov–Smirnov test, with a significance level of α = 0.05, to select either parametric (normal distribution) or non-parametric tests (non-normal distribution) for subsequent inferential statistics.[46] Within the scope of inferential statistics, correlation analysis between the questionnaire dimensions was initially performed using the Pearson correlation coefficient. Following this, differences between demographic groups were analyzed using appropriate statistical tests (*t*-tests, analysis of variance [ANOVA]). For demographic variables with two categories, the independent-samples *t*-test was used; for those with more than two categories, one-way ANOVA was performed.[45]

To ensure a comprehensive interpretation of the results, the strength of the correlation coefficients and the effect sizes were systematically evaluated. The Spearman's rank correlation coefficients (ρ) were interpreted, where values of 0.10–0.29 represent small, 0.30–0.49 moderate, and ⩾0.50 strong associations. This categorization allows for a clearer understanding of the practical significance of the observed relationships between relationship quality (CART-Q dimensions) and maintenance strategies (CARM-Q dimensions).

Additionally, for the group comparisons conducted using Mann–Whitney *U* and Kruskal–Wallis *H* tests, effect size indices were calculated to quantify the magnitude of observed differences. For the Mann–Whitney *U* test, the effect size *r* was computed using the formula $r = Z/\sqrt{N}$, and interpreted as small (0.10–0.29), medium (0.30–0.49), or large (⩾0.50). For the Kruskal–Wallis *H* test, the effect size, eta squared (η^2), was derived using the formula $\eta^2 = H/(N-1)$,

following the same interpretation thresholds (small = 0.01, medium = 0.06, large = 0.14). These calculations provided an objective measure of the practical importance of statistically significant differences across demographic groups, complementing the significance testing.

To complement significance testing, we interpreted effect magnitude using the reported statistics. For bivariate associations, Spearman's ρ was treated as the effect size and interpreted as small (0.10 to 0.29), moderate (0.30 to 0.49), and strong (≥0.50). For group comparisons, descriptive statistics were provided for all groups, along with the standardized test statistics from the Mann–Whitney *U* and Kruskal–Wallis *H* tests, facilitating evaluation of the magnitude of differences. A priori sample size considerations guided recruitment, ensuring that the achieved sample of 595 participants was adequate for detecting effects of practical interest at $\alpha = 0.05$.

2.5. ETHICAL CONSIDERATIONS

The research protocol was reviewed and approved by the Ethics and Bioethics Committee of the School of Physical Education and Sport Science at the National and Kapodistrian University of Athens (Approval Protocol No. 1810/22-05-2025). All study procedures were conducted in accordance with the ethical standards outlined in the Declaration of Helsinki and the Code of Human Research Ethics of the British Psychological Society.[63] Participation was entirely voluntary, and informed consent was obtained from all respondents prior to data collection. Participants were assured of anonymity and confidentiality, and informed that they could withdraw from the study at any point without providing justification. The data were collected and stored in full compliance with the General Data Protection Regulation (GDPR 2016/679).

3. RESULTS

3.1. RELIABILITY OF RESEARCH INSTRUMENTS

Internal consistency reliability for the subscales of the two primary research instruments was assessed using Cronbach's alpha (α). Acceptable values are generally above 0.70. Both CART-Q and CARM-Q demonstrated high reliability. The Cronbach's alpha for the CART-Q dimensions and CARM-Q dimensions ranged from 0.931 to 0.958 and 0.842 to 0.967, respectively (Table 2).

Prior to proceeding with inferential statistical analyses, a normality test was conducted to determine whether the dimensions of the CART-Q and CARM-Q instruments followed a normal distribution. The Kolmogorov–Smirnov test was applied to all variables due to the relatively large sample size ($n = 595$).

The results of the Kolmogorov–Smirnov test indicated statistically significant deviations from normality for all dimensions of both instruments ($p < 0.001$ in all cases), justifying the use of non-parametric statistical methods in subsequent analyses. The deviation from normality was most pronounced in the commitment and motivation dimensions, which showed the highest Kolmogorov–Smirnov values, suggesting potential skewness or clustering of scores (Table 3).

3.2. DESCRIPTIVE STATISTICS OF INSTRUMENT DIMENSIONS

3.2.1. COACH–ATHLETE RELATIONSHIP QUESTIONNAIRE

Descriptive statistics for the CART-Q dimensions, measured on a 1–7 Likert scale, are presented in Table 4. Closeness showed a mean score above the midpoint of the scale (mean = 4.60, SD = 1.77), suggesting athletes generally experienced a positive emotional bond with their coach. However, the high SD indicated considerable variability within the sample. Commitment yielded the highest mean score among the three dimensions (mean = 5.03, SD = 1.77), indicating a strong intention among athletes to maintain their relationship with the coach. The high SD again suggested diverse experiences or levels of dedication among athletes. Complementarity had a mean score of 4.92 (SD = 1.65), indicating that roles were clearly defined and that mutual respect and cooperation existed. While the SD was relatively lower than the other dimensions, significant heterogeneity remained. Overall, the CART-Q dimensions had mean scores above the midpoint of the scale, with commitment being the most strongly perceived aspect of the relationship. High SDs across all dimensions highlighted the diverse nature of

Table 2. Reliability of research instruments

Scale	Dimension	Number of items	Cronbach's alpha
CART-Q			
	Closeness	4	0.958
	Commitment	3	0.938
	Complementarity	4	0.931
CARM-Q			
	Conflict management	5	0.952
	Social networks	4	0.901
	Preventative strategies	4	0.923
	Assurance	3	0.911
	Support	3	0.842
	Openness	4	0.912
	Motivation	5	0.967

Abbreviations: CARM-Q: Coach–Athlete Relationship Maintenance Questionnaire; CART-Q: Coach–Athlete Relationship Questionnaire.

Table 3. Kolmogorov–Smirnov normality test for the dimensions of the Coach–Athlete Relationship Questionnaire and the Coach–Athlete Relationship Maintenance Questionnaire

Scale	Dimension	Kolmogorov–Smirnov statistic	*df*	*p*-value
CART-Q	Closeness	0.106	595	0.000
	Commitment	0.161	595	0.000
	Complementarity	0.140	595	0.000
CARM-Q	Conflict management	0.139	595	0.000
	Social networks	0.085	595	0.000
	Preventative strategies	0.127	595	0.000
	Assurance	0.140	595	0.000
	Support	0.103	595	0.000
	Openness	0.102	595	0.000
	Motivation	0.186	595	0.000

Abbreviations: CARM-Q: Coach–Athlete Relationship Maintenance Questionnaire; CART-Q: Coach–Athlete Relationship Questionnaire.

Table 4. Descriptive statistics for the dimensions of the Coach–Athlete Relationship Questionnaire

Dimension	*n*	Minimum	Maximum	Mean	Standard deviation
Closeness	595	1.00	7.00	4.60	1.77
Commitment	595	1.00	7.00	5.03	1.77
Complementarity	595	1.00	7.00	4.92	1.65

coach–athlete relationships within the sample.

3.2.2. COACH–ATHLETE RELATIONSHIP MAINTENANCE QUESTIONNAIRE

The descriptive statistics for the CARM-Q dimensions were also measured on a 1–7 Likert scale. The outcomes are presented in Table 5, and the summary of results is as follows:

- Conflict management (mean = 5.02, SD = 1.62) scored above the midpoint, indicating that athletes perceived active strategies being used to resolve conflicts constructively.
- Social networks (mean = 3.68, SD = 1.75) exhibited the lowest mean score, falling below the midpoint, suggesting limited use of external social networks to strengthen the relationship. High variability existed in this practice.
- Preventative strategies (mean = 3.80, SD = 1.77) scored near the scale's midpoint, indicating neutral or varied perceptions regarding proactive efforts to prevent relationship issues.
- Assurance (mean = 5.03, SD = 1.64) indicated that athletes generally felt secure and stable in the relationship.
- Support (mean = 4.79, SD = 1.64) suggested that athletes perceived receiving positive psychological and/or practical support from their coach.
- Openness (mean = 4.64, SD = 1.69) indicated that most athletes felt there was honest communication, though experiences varied.
- Motivation (mean = 5.48, SD = 1.59) achieved the highest mean score, showing that athletes perceived a strong motivational influence from the coach and exhibited personal effort. Lower variability suggested this was a uniform positive experience.

Most of the observed Spearman's correlations fell in the moderate to strong range for the primary associations. Group comparisons were presented with means and SDs per group, along with the corresponding standardized test statistics, indicating small to moderate differences in most cases. Given the sample size, the study was well powered for effects of practical interest.

Table 5. Descriptive statistics for the dimensions of the Coach–Athlete Relationship Maintenance Questionnaire

Dimension	*n*	Minimum	Maximum	Mean	Standard deviation
Conflict management	595	1.00	7.00	5.02	1.62
Social networks	595	1.00	7.00	3.68	1.75
Preventative strategies	595	1.00	7.00	3.80	1.77
Assurance	595	1.00	7.00	5.03	1.64
Support	595	1.00	7.00	4.79	1.64
Openness	595	1.00	7.00	4.64	1.69
Motivation	595	1.00	7.00	5.48	1.59

3.3. CORRELATION BETWEEN RELATIONSHIP QUALITY AND MAINTENANCE STRATEGIES (RESEARCH QUESTION 1)

Spearman's rank correlation coefficient was used to examine the association between the quality of the coach–athlete relationship (CART-Q dimensions) and the strategies used by athletes to maintain it (CARM-Q dimensions), given the non-normal distribution of the variables.

3.3.1. CLOSENESS (COACH–ATHLETE RELATIONSHIP QUESTIONNAIRE)

As shown in Table 6, closeness demonstrated significant positive correlations ($p < 0.01$) with all seven CARM-Q dimensions. The strongest correlations were with openness ($\rho = 0.605$) and conflict management ($\rho = 0.600$), suggesting that honest communication and effective conflict resolution were strongly associated with emotional closeness. Support ($\rho = 0.592$) also showed a strong positive association. Moderate correlations were observed with assurance ($\rho = 0.549$), social networks ($\rho = 0.541$), and motivation ($\rho = 0.506$). The weakest, yet still moderate, correlation was with preventative strategies ($\rho = 0.471$).

3.3.2. COMMITMENT (COACH–ATHLETE RELATIONSHIP QUESTIONNAIRE)

Commitment also showed significant positive correlations ($p < 0.01$) with all CARM-Q dimensions (Table 7). The strongest association was with conflict management ($\rho = 0.648$), indicating that effective conflict management is crucial to athletes' intentions to maintain the relationship. Moderate correlations were observed with support ($\rho = 0.549$), openness ($\rho = 0.547$), assurance ($\rho = 0.526$), and motivation ($\rho = 0.517$). Weaker, though still moderate, correlations were observed with social networks ($\rho = 0.450$) and preventative strategies ($\rho = 0.405$).

3.3.3. COMPLEMENTARITY (COACH–ATHLETE RELATIONSHIP QUESTIONNAIRE)

Complementarity displayed significant positive correlations ($p < 0.01$) with all CARM-Q dimensions (Table 8). Similar to commitment, the strongest link was with conflict management ($\rho = 0.669$), highlighting the importance of resolving

Table 6. Spearman's correlations between closeness (Coach–Athlete Relationship Questionnaire) and the dimensions of the Coach–Athlete Relationship Maintenance Questionnaire

Dimension	Closeness	Conflict management	Social networks	Preventative strategies	Assurance	Support	Openness	Motivation
Closeness	1.000	0.600**	0.541**	0.471**	0.549**	0.592**	0.605**	0.506**
Conflict management	0.600**	1.000	0.343**	0.383**	0.564**	0.553**	0.555**	0.562**
Social networks	0.541**	0.343**	1.000	0.676**	0.522**	0.584**	0.613**	0.340**
Preventative strategies	0.471**	0.383**	0.676**	1.000	0.581**	0.582**	0.645**	0.352**
Assurance	0.549**	0.564**	0.522**	0.581**	1.000	0.767**	0.734**	0.695**
Support	0.592**	0.553**	0.584**	0.582**	0.767**	1.000	0.722**	0.637**
Openness	0.605**	0.555**	0.613**	0.645**	0.734**	0.722**	1.000	0.593**
Motivation	0.506**	0.562**	0.340**	0.352**	0.695**	0.637**	0.593**	1.000

Note: **$p < 0.01$ (2-tailed).

Table 7. Spearman's correlations between commitment (Coach–Athlete Relationship Questionnaire) and the dimensions of the Coach–Athlete Relationship Maintenance Questionnaire

Dimension	Commitment	Conflict management	Social networks	Preventative strategies	Assurance	Support	Openness	Motivation
Commitment	1.000	0.648**	0.450**	0.405**	0.526**	0.549**	0.547**	0.517**
Conflict management	0.648**	1.000	0.343**	0.383**	0.564**	0.553**	0.555**	0.562**
Social networks	0.450**	0.343**	1.000	0.676**	0.522**	0.584**	0.613**	0.340**
Preventative strategies	0.405**	0.383**	0.676**	1.000	0.581**	0.582**	0.645**	0.352**
Assurance	0.526**	0.564**	0.522**	0.581**	1.000	0.767**	0.734**	0.695**
Support	0.549**	0.553**	0.584**	0.582**	0.767**	1.000	0.722**	0.637**
Openness	0.547**	0.555**	0.613**	0.645**	0.734**	0.722**	1.000	0.593**
Motivation	0.517**	0.562**	0.340**	0.352**	0.695**	0.637**	0.593**	1.000

Note: **$p < 0.01$ (2-tailed).

Table 8. Spearman's correlations between complementarity (Coach–Athlete Relationship Questionnaire) and the dimensions of the Coach–Athlete Relationship Maintenance Questionnaire

Dimension	Complementarity	Conflict management	Social networks	Preventative strategies	Assurance	Support	Openness	Motivation
Complementarity	1.000	0.669**	0.455**	0.431**	0.568**	0.566**	0.570**	0.541**
Conflict management	0.669**	1.000	0.343**	0.383**	0.564**	0.553**	0.555**	0.562**
Social networks	0.455**	0.343**	1.000	0.676**	0.522**	0.584**	0.613**	0.340**
Preventative strategies	0.431**	0.383**	0.676**	1.000	0.581**	0.582**	0.645**	0.352**
Assurance	0.568**	0.564**	0.522**	0.581**	1.000	0.767**	0.734**	0.695**
Support	0.566**	0.553**	0.584**	0.582**	0.767**	1.000	0.722**	0.637**
Openness	0.570**	0.555**	0.613**	0.645**	0.734**	0.722**	1.000	0.593**
Motivation	0.541**	0.562**	0.340**	0.352**	0.695**	0.637**	0.593**	1.000

Note:**$p < 0.01$ (2-tailed).

disagreements for effective cooperation. Moderate correlations were observed with openness ($\rho = 0.570$), assurance ($\rho = 0.568$), support ($\rho = 0.566$), and motivation ($\rho = 0.541$). The correlations with social networks ($\rho = 0.455$) and preventative strategies ($\rho = 0.431$) were slightly weaker but remained moderate.

3.4. DIFFERENCES IN RELATIONSHIP QUALITY BASED ON DEMOGRAPHICS (RESEARCH QUESTION 2)

Non-parametric tests (Mann–Whitney *U* for two groups, Kruskal–Wallis *H* for more than two groups) were used to investigate differences in CART-Q dimensions based on athlete demographics.

3.4.1. GENDER

The Mann–Whitney *U* test revealed a statistically significant difference between male ($n = 353$) and female ($n = 242$) athletes only for the commitment dimension ($U = 37{,}704.5$, $Z = -2.444$, $p = 0.015$). Female athletes reported significantly higher levels of commitment (5.18 ± 1.84) compared to male athletes (4.93 ± 1.72). No significant gender differences were observed for closeness ($p = 0.187$) or complementarity ($p = 0.282$) (Tables 9 and 10).

3.4.2. AGE

The Kruskal–Wallis *H* test indicated statistically significant differences across age groups (⩽22 years, 23–27 years, 28–32 years, 33–37 years, >37 years) for closeness ($H = 11.610$, $df = 4$, $p = 0.020$) and complementarity ($H = 12.668$, $df = 4$, $p = 0.013$). No significant difference was detected for commitment ($p = 0.264$) (Table 11).

Post-hoc pairwise comparisons revealed that athletes aged ⩽ 22 years reported significantly lower closeness compared to those aged 23–27 years ($p = 0.046$), 28–32 years ($p = 0.006$), and > 37 years ($p = 0.034$). Similarly, athletes aged ⩽ 22 years reported significantly lower complementarity compared to those aged 23–27 years ($p = 0.015$), 28–32 years ($p = 0.004$), and >37 years ($p = 0.040$).

3.4.3. COMPETITIVE CATEGORY (2024–2025 SEASON)

The Kruskal–Wallis *H* test showed a statistically significant difference across competitive categories (A1 League, A2 League, B' National-NL1, C' National-NL2, Amateur) only for the complementarity dimension ($H = 13.923$, $df = 4$, $p = 0.008$). No significant differences were found for closeness ($p = 0.179$) or commitment ($p = 0.219$) (Table 12).

Post-hoc pairwise comparisons for complementarity revealed several significant differences:

- A1 League athletes reported significantly higher complementarity compared to A2 League athletes ($p = 0.015$), B' National-NL1 athletes ($p = 0.002$), and Amateur level athletes ($p = 0.008$).
- B' National-NL1 athletes reported significantly lower complementarity compared to C' National-NL2 athletes ($p = 0.029$).

Essentially, athletes in the C' National-NL2 League consistently reported the highest levels of complementarity compared to almost all other categories.

3.4.4. YEARS AS A BASKETBALL TEAM MEMBER

The Kruskal–Wallis *H* test indicated statistically significant differences across groups based on years of team membership (1–5 years, 6–10 years, 11–15 years, 15–20 years, ⩾20 years) for all three CART-Q dimensions: closeness ($H = 20.007$, $df = 4$, $p < 0.001$), commitment ($H = 15.898$, $df = 4$, $p = 0.003$), and complementarity ($H = 26.673$, $df = 4$, $p < 0.001$) (Table 13).

Post-hoc pairwise comparisons revealed complex patterns:

- Athletes with ⩾20 years of experience reported the lowest closeness, commitment, and complementarity compared to all other groups.
- Athletes with 15–20 years of experience consistently reported the highest closeness, commitment, and complementarity compared to all other groups.

Generally, longer team membership appears to be

Table 9. Influence of gender on the dimensions of the Coach–Athlete Relationship Questionnaire (Mann–Whitney *U* test)

Dimension	Group	Mean ± SD	*U* statistic	*p*-value
Closeness	Male	4.54 ± 1.68	40,000.0	0.187
	Female	4.68 ± 1.89		
Commitment	Male	4.93 ± 1.72	37,704.5	0.015
	Female	5.18 ± 1.84		
Complementarity	Male	4.88 ± 1.63	40,501.0	0.282
	Female	4.99 ± 1.69		

Abbreviation: SD: Standard deviation.

Table 10. Mean ranks for the dimensions of the Coach–Athlete Relationship Questionnaire by gender

Dimension	Gender	*n*	Mean rank
Closeness	Male	353	290.31
	Female	242	309.21
Commitment	Male	353	283.81
	Female	242	318.70
Complementarity	Male	353	291.73
	Female	242	307.14

Table 11. Influence of age on the dimensions of the Coach–Athlete Relationship Questionnaire (Kruskal–Wallis *H* test)

Dimension	Group	Mean ± SD	Kruskal–Wallis *H*	*df*	*p*-value
Closeness	⩽22	4.35 ± 1.80	11.610	4	0.020
	23–27	4.72 ± 1.86			
	28–32	4.89 ± 1.61			
	33–37	4.71 ± 1.75			
	>37	5.08 ± 1.65			
Complementarity	⩽22	4.70 ± 1.66	12.668	4	0.013
	23–27	5.06 ± 1.69			
	28–32	5.14 ± 1.52			
	33–37	4.90 ± 1.76			
	>37	5.45 ± 1.64			

Abbreviations: *df*: Degrees of freedom; SD: Standard deviation.

Table 12. Influence of competitive category on the dimensions of the Coach–Athlete Relationship Questionnaire (Kruskal–Wallis *H* test)

Dimension	Group	Mean ± SD	Kruskal–Wallis *H*	*df*	*p*-value
Complementarity	A1 League	5.32 ± 1.47	13.923	4	0.008
	A2 League	4.86 ± 1.63			
	B' National-NL1	4.54 ± 1.77			
	C' National-NL2	5.57 ± 1.10			
	Amateur	4.81 ± 1.71			

Abbreviations: *df*: Degrees of freedom; SD: Standard deviation.

associated with higher relationship quality across all dimensions up to 20 years.

3.5. INFLUENCE OF DEMOGRAPHICS ON MAINTENANCE STRATEGIES (RESEARCH QUESTION 3)

Non-parametric tests were employed to examine differences in CARM-Q dimensions across athlete demographics.

3.5.1. GENDER

The Mann–Whitney *U* test found no statistically significant differences ($p > 0.05$) between male and female athletes on any of the seven CARM-Q dimensions (Table 14).

3.5.2. AGE

The Kruskal–Wallis *H* test revealed statistically significant differences across age groups for social networks ($H = 19.249$, $df = 4$, $p = 0.001$), preventative strategies ($H = 41.085$, $df = 4$, $p < 0.001$), support ($H = 10.665$, $df = 4$, $p = 0.031$), and openness ($H = 20.005$, $df = 4$, $p < 0.001$). No significant differences were found for conflict management, assurance, or motivation ($p > 0.05$) (Table 15).

Post-hoc pairwise comparisons indicated:

- Social networks: Athletes ⩽ 22 years scored significantly lower than those 23–27 ($p < 0.001$), 28–32 ($p = 0.002$), and >37 years ($p = 0.024$).

Table 13. Influence of years of team membership on the dimensions of the Coach–Athlete Relationship Questionnaire (Kruskal–Wallis *H* test)

Dimension	Group	Mean ± SD	Kruskal–Wallis *H*	*df*	*p*-value
Closeness	1–5	4.25 ± 1.80	20.007	4	0.000
	6–10	4.76 ± 1.75			
	11–15	4.69 ± 1.70			
	15–20	5.09 ± 1.77			
	⩾20	3.54 ± 1.24			
Commitment	1–5	4.69 ± 1.88	15.898	4	0.003
	6–10	5.22 ± 1.67			
	11–15	5.15 ± 1.67			
	15–20	5.36 ± 1.72			
	⩾20	3.86 ± 1.74			
Complementarity	1–5	4.50 ± 1.74	26.673	4	0.000
	6–10	5.07 ± 1.54			
	11–15	5.10 ± 1.61			
	15–20	5.52 ± 1.45			
	⩾20	3.79 ± 1.67			

Abbreviations: *df*: Degrees of freedom; SD: Standard deviation.

Table 14. Influence of gender on the dimensions of the Coach–Athlete Relationship Maintenance Questionnaire (Mann–Whitney *U* test)

Dimension	Group	Mean ± SD	Mann–Whitney *U*	*Z*	*p*-value
Conflict management	Male	4.93 ± 1.62	38,971.5	−1.819	0.069
	Female	5.13 ± 1.62			
Social networks	Male	3.60 ± 1.64	40,928.5	−0.867	0.386
	Female	3.78 ± 1.88			
Preventative strategies	Male	3.82 ± 1.71	41,311.0	−0.682	0.495
	Female	3.75 ± 1.86			
Assurance	Male	5.01 ± 1.61	41,551.0	−0.567	0.571
	Female	5.05 ± 1.69			
Support	Male	4.76 ± 1.58	41,373.0	−0.652	0.514
	Female	4.81 ± 1.71			
Openness	Male	4.62 ± 1.62	41,431.5	−0.623	0.533
	Female	4.66 ± 1.79			
Motivation	Male	5.42 ± 1.57	38,755.0	−1.937	0.053
	Female	5.57 ± 1.62			

Abbreviation: SD: Standard deviation.

- Preventative strategies: Athletes ⩽ 22 years scored significantly lower than those 23–27 ($p < 0.001$) and 28–32 years ($p < 0.001$). Athletes aged 33–37 years scored significantly lower than those aged 23–27 ($p = 0.005$) and 28–32 ($p = 0.001$).
- Support: Athletes ⩽ 22 years scored significantly lower than those aged 28–32 ($p = 0.007$) and 33–37 years ($p = 0.048$).
- Openness: Athletes ⩽ 22 years scored significantly lower than all older age groups (23–27 years, $p = 0.018$; 28–32 years, $p < 0.001$; 33–37 years, $p = 0.030$; > 37 years, $p = 0.007$).

3.5.3. COMPETITIVE CATEGORY (2024–2025 SEASON)

The Kruskal–Wallis *H* test showed statistically significant differences across competitive categories for conflict management ($H = 23.170$, $df = 4$, $p < 0.001$), assurance ($H = 10.681$, $df = 4$, $p = 0.030$), and motivation ($H = 13.900$, $df = 4$, $p = 0.008$). No significant differences were found for the other four dimensions ($p > 0.05$) (Table 16).

Post-hoc pairwise comparisons revealed intricate patterns, particularly involving the A1 League and C' National-NL2:

- Conflict management: A1 League athletes scored significantly higher than A2 League ($p = 0.009$), B' National-NL1 ($p < 0.001$), and Amateur athletes ($p < 0.001$). C' National-NL2 athletes scored significantly higher than B' National-NL1 ($p = 0.007$) and Amateur athletes ($p = 0.017$).
- Assurance: C' National-NL2 athletes scored significantly higher than A1 League ($p = 0.024$), A2 League ($p = 0.005$), and B' National-NL1 athletes ($p = 0.003$).
- Motivation: A1 League athletes scored significantly higher than B' National-NL1 ($p = 0.013$) and Amateur athletes ($p = 0.012$). C' National-NL2 athletes scored significantly higher than A2 League ($p = 0.024$) and B' National-NL1 athletes ($p = 0.007$).

3.5.4. YEARS AS A BASKETBALL TEAM MEMBER

The Kruskal–Wallis *H* test identified statistically significant differences based on years of team membership for conflict management ($H = 33.906$, $df = 4$, $p < 0.001$), preventative strategies ($H = 17.104$, $df = 4$, $p = 0.002$), assurance ($H = 10.055$, $df = 4$, $p = 0.040$), support ($H = 9.615$, $df = 4$, $p = 0.047$), and motivation (H = 17.340, $df = 4$, $p = 0.002$). No significant differences emerged for social networks or openness ($p > 0.05$) (Table 17).

Post-hoc pairwise comparisons showed:

- Conflict management: Athletes with ⩾20 years of team membership scored significantly lower than all other groups ($p < 0.05$). Athletes with 15–20 years of team membership scored significantly higher than all other groups ($p < 0.01$).
- Preventative strategies: Athletes with 1–5 years of team membership scored significantly lower than those with 6–10 years ($p = 0.001$) and 15–20 years ($p = 0.001$). Athletes with 11–15 years of team membership also scored significantly lower than those with 15–20 years ($p = 0.022$).
- Assurance: Athletes with ⩾20 years of team membership scored significantly lower than those with 15–20 years ($p = 0.014$). Athletes with 15–20 years of team

Table 15. Influence of age on the dimensions of the Coach–Athlete Relationship Maintenance Questionnaire (Kruskal–Wallis *H* test)

Dimension	Group	Mean ± SD	Kruskal–Wallis *H*	*df*	*p*-value
Social networks	⩽22	3.35 ± 1.63	19.249	4	0.001
	23–27	4.11 ± 1.84			
	28–32	3.92 ± 1.84			
	33–37	3.66 ± 1.57			
	>37	4.08 ± 1.60			
Preventative strategies	⩽22	3.36 ± 1.56	41.085	4	0.000
	23–27	4.24 ± 1.91			
	28–32	4.41 ± 1.83			
	33–37	3.17 ± 1.53			
	>37	4.01 ± 1.78			
Support	⩽22	4.58 ± 1.61	10.665	4	0.031
	23–27	4.88 ± 1.65			
	28–32	5.02 ± 1.58			
	33–37	5.17 ± 1.77			
	>37	4.93 ± 1.75			
Openness	⩽22	4.34 ± 1.65	20.005	4	0.000
	23–27	4.78 ± 1.71			
	28–32	4.93 ± 1.67			
	33–37	5.02 ± 1.85			
	>37	5.23 ± 1.46			

Abbreviations: *df*: Degrees of freedom; SD: Standard deviation.

membership scored significantly higher than those with 1–5 years ($p = 0.006$) and 11–15 years ($p = 0.022$).
- Support: Athletes with 1–5 years of team membership scored significantly lower than those with 6–10 years ($p = 0.019$) and 15–20 years ($p = 0.018$).
- Motivation: Athletes with ⩾20 years of team membership scored significantly lower than those with 15–20 years ($p = 0.006$). Athletes with 15–20 years of team membership scored significantly higher than all groups with fewer years (1–5 years, $p < 0.001$; 6–10 years, $p = 0.024$; 11–15 years, $p = 0.046$). Athletes with 1–5 years of team membership scored significantly lower than those with 6–10 years ($p = 0.020$) and 11–15 years ($p = 0.026$).

Generally, longer experience was associated with greater reported use of several maintenance strategies, particularly conflict management, assurance, and motivation, while the least experienced athletes reported lower levels across these strategies. However, athletes with the longest team membership (⩾20 years) often reported lower scores than those in the intermediate experience groups, suggesting a non-linear pattern.

4. DISCUSSION

The primary objective of this study was to examine the intricate dynamics of the coach–athlete relationship within the context of the Greek basketball community, focusing on the interplay between relationship quality (closeness, commitment, and complementarity), relationship maintenance strategies (COMPASS model), and key athlete demographic factors (gender, age, competitive level, and years of experience). This investigation sought to address specific gaps identified in the literature, namely the need for a comprehensive mapping of the 3 Cs and COMPASS models within a large sample, a simultaneous examination of multiple demographic influences on both relationship quality and maintenance, and the exploration of these dynamics within the under-researched cultural and sporting context of the Greek basketball community. The findings provide valuable insights into these areas, largely aligning with, y*et al*so extending, previous theoretical postulations and empirical research.

4.1. RELATIONSHIP BETWEEN QUALITY (COACH–ATHLETE RELATIONSHIP QUESTIONNAIRE) AND MAINTENANCE (COACH–ATHLETE RELATIONSHIP MAINTENANCE QUESTIONNAIRE)

The first research question examined the association between the perceived quality of the coach–athlete relationship (CART-Q) and the relationship maintenance strategies (CARM-Q) reported by athletes. Consistent with theoretical expectations and prior research linking the 3 Cs and COMPASS models[13,31], the current study reported significant positive correlations between all three dimensions of relationship quality (closeness, commitment, and complementarity) and all seven dimensions of relationship maintenance. This overarching finding robustly supports the conceptualization that a high-quality relationship is not merely a passive state but is actively sustained through deliberate behavioral and communicative efforts by the involved parties.

Delving deeper, specific patterns emerged that warrant discussion. Closeness, the affective core of the relationship characterized by trust and respect, demonstrated the strongest associations with openness ($\rho = 0.605$) and conflict management ($\rho = 0.600$).[5] This aligns closely with the notion that emotional bonds thrive in environments where communication is honest and transparent, and where disagreements are handled constructively rather than allowing them to fester and erode trust.[33,62] The strong link with support ($\rho = 0.592$) further reinforces the affective nature of closeness, highlighting that feeling cared for and aided significantly contributes to emotional connection. The moderate, yet significant, correlations with assurance, social networks, and motivation suggest these also play a role, perhaps by providing stability, shared experiences, and common purpose

Table 16. Influence of competitive category on the dimensions of the Coach–Athlete Relationship Maintenance Questionnaire (Kruskal–Wallis *H* test)

Dimension	Group	Mean ± SD	Kruskal–Wallis *H*	*df*	*p*-value
Conflict management	A1 League	5.49 ± 1.43	23.170	4	0.000
	A2 League	5.01 ± 1.63			
	B' National-NL1	4.64 ± 1.62			
	C' National-NL2	5.68 ± 1.27			
	Amateur	4.81 ± 1.68			
Assurance	A1 League	5.22 ± 1.43	10.681	4	0.030
	A2 League	4.97 ± 1.69			
	B' National-NL1	4.81 ± 1.75			
	C' National-NL2	5.96 ± 1.20			
	Amateur	4.94 ± 1.68			
Motivation	A1 League	5.77 ± 1.46	13.900	4	0.008
	A2 League	5.45 ± 1.59			
	B' National-NL1	5.20 ± 1.73			
	C' National-NL2	6.11 ± 1.29			
	Amateur	5.37 ± 1.60			

Abbreviations: *df*: Degrees of freedom; SD: Standard deviation.

Table 17. Influence of years of team membership on the dimensions of the Coach–Athlete Relationship Maintenance Questionnaire (Kruskal–Wallis *H* test)

Dimension	Group	Mean ± SD	Kruskal–Wallis *H*	*df*	*p*-value
Conflict management	1–5	4.57 ± 1.71	33.906	4	0.000
	6–10	5.19 ± 1.48			
	11–15	5.24 ± 1.64			
	15–20	5.55 ± 1.35			
	⩾20	3.60 ± 1.50			
Preventative strategies	1–5	3.40 ± 1.59	17.104	4	0.002
	6–10	4.03 ± 1.79			
	11–15	3.68 ± 1.78			
	15–20	4.45 ± 1.98			
	⩾20	3.50 ± 1.68			
Assurance	1–5	4.83 ± 1.75	10.055	4	0.040
	6–10	5.13 ± 1.53			
	11–15	4.97 ± 1.65			
	15–20	5.53 ± 1.64			
	⩾20	4.49 ± 1.65			
Support	1–5	4.51 ± 1.69	9.615	4	0.047
	6–10	4.93 ± 1.56			
	11–15	4.80 ± 1.61			
	15–20	5.12 ± 1.68			
	⩾20	4.31 ± 1.71			
Motivation	1–5	5.15 ± 1.71	17.340	4	0.002
	6–10	5.65 ± 1.39			
	11–15	5.51 ± 1.69			
	15–20	6.02 ± 1.38			
	⩾20	4.74 ± 1.88			

Abbreviations: *df*: Degrees of freedom; SD: Standard deviation.

that indirectly bolster emotional ties.[16]

Commitment, the cognitive intention to maintain the relationship, was most strongly predicted by conflict management ($\rho = 0.648$). This is a compelling finding, suggesting that the perceived ability of the dyad to navigate difficulties effectively is a primary determinant of an athlete's long-term willingness to remain invested in the partnership. When conflicts are managed well, it likely signals relationship resilience and reinforces the belief that the partnership is worth preserving through challenges. Moderate correlations with support, openness, assurance, and motivation align with previous research, indicating these strategies bolster the cognitive resolve to continue the relationship.[4,16]

Complementarity, representing behavioral cooperation and effective interaction[2], also showed its strongest association with conflict management ($\rho = 0.669$). This underscores the critical link between resolving disagreements constructively and achieving smooth, coordinated interactions in training and competition. Effective conflict management likely prevents lingering tensions or misunderstandings that can disrupt role clarity and behavioral synergy.[31] Moderate associations with openness, assurance, support, and motivation suggest that clear communication, stability, aid, and shared drive also contribute significantly to the behavioral effectiveness of the dyad.

Interestingly, the descriptive statistics for the CARM-Q revealed that motivation (mean = 5.48) was the most highly rated maintenance strategy, while social networks (mean = 3.68) and preventative strategies (mean = 3.80) received the lowest scores, falling near or below the midpoint of the scale. This pattern might suggest a potential skew towards "performance-oriented" maintenance strategies over "person-oriented" ones within this sample, echoing concerns about relationships that might be "successful yet ineffective." While high motivation is desirable, the relatively lower emphasis on leveraging social connections or on proactively defining roles and expectations could represent missed opportunities to strengthen the interpersonal fabric of the relationship. This potential imbalance warrants further investigation and could be a pertinent area for coaching education in the Greek context, emphasizing the need for a balanced repertoire of maintenance strategies.[12,20]

4.2. DEMOGRAPHIC DIFFERENCES IN RELATIONSHIP QUALITY (COACH–ATHLETE RELATIONSHIP QUESTIONNAIRE)

The second research question examined how relationship quality varied across athletes' demographic characteristics, providing insights into the moderating factors discussed in the background literature.

Regarding gender, the finding that female athletes reported significantly higher commitment than male

athletes (p = 0.015) aligns with the literature suggesting that females may place a higher value on relational stability and connection in sport[42], or perhaps perceive their commitment differently within the prevalent male coach–female athlete dynamic.[55] However, the absence of significant gender differences in closeness and complementarity suggests that, within this cohort of Greek basketball players, the emotional bond and perceived behavioral cooperation are experienced similarly by male and female athletes, diverging somewhat from studies suggesting females prioritize closeness more.[44]

Age emerged as a significant factor, with athletes aged ⩽ 22 years reporting significantly lower closeness and complementarity compared to several older groups. This finding strongly supports developmental perspectives suggesting younger, less experienced athletes may have more hierarchical, less collaborative, and potentially less emotionally bonded relationships with their coaches.[45] As athletes mature, their expectations shift towards more egalitarian partnerships, likely fostering greater closeness and smoother complementary interactions built on accumulated experience and trust.[47]

The competitive level significantly affected perceptions of complementarity (p = 0.008), with A1 League athletes reporting higher scores compared to nearly all other categories (A2, B' National-NL1, Amateur). This finding provides empirical support within the Greek basketball community for the theoretical distinction between elite and lower-level sporting environments.[2,51] Although the top tier is characterized by intense pressure, a focus on results, and high stakes—which can challenge the cooperative, give-and-take dynamics essential for high complementarity—these results suggest that, in this context, high-level teams may nonetheless succeed in maintaining relatively effective cooperative interactions. The convergence of findings that both younger athletes (⩽22) and B'National-NL1 athletes reported lower complementarity lends credence to the potential "double jeopardy" hypothesis, where the environmental pressures of elite sport might exacerbate the relational insecurities or underdeveloped cooperative skills of less mature athletes.

Finally, years of experience as a basketball team member showed a generally positive association with relationship quality across all three dimensions (closeness, commitment, and complementarity, all p ⩽ 0.003). Athletes with long tenure (15–20 years) consistently reported higher relationship quality than those with less experience. This suggests that longevity in sport, likely involving sustained relationships or repeated positive interactions over time, fosters deeper trust, stronger commitment, and more effective cooperation, consistent with the notion that relational history builds more resilient bonds.

4.3. DEMOGRAPHIC INFLUENCES ON MAINTENANCE STRATEGIES (COACH–ATHLETE MAINTENANCE QUESTIONNAIRE)

The third research question examined how demographic factors influenced the use of relationship maintenance strategies, extending the analysis beyond relationship quality itself.

Intriguingly, despite the gender difference found in commitment (CART-Q), no significant gender differences were observed for any of the seven CARM-Q maintenance strategies. This suggests that, while female athletes in this cohort report a higher cognitive intention to maintain the relationship, the specific behaviors they employ (or perceive) do not differ significantly from their male counterparts. This finding requires further exploration, perhaps suggesting that the underlying motivations for commitment might differ even when the maintenance actions appear similar, or that the CARM-Q captures behaviors less sensitive to gendered nuances compared to the cognitive dimension of the CART-Q.[6,12]

Age revealed significant differences in the use of social networks, preventative strategies, support, and openness. Younger athletes (⩽22) reported significantly lower use of social networks, lower perceptions of support, lower openness, and lower use of preventative strategies compared to older groups, but surprisingly lower use of preventative strategies than the 23–32-year-old group. This complex pattern suggests younger athletes might be less integrated into broader social support systems around the team, feel less supported, or be less comfortable being open, potentially reflecting a more hierarchical relationship dynamic.[45] Their higher reliance on preventative strategies could indicate a greater need for explicit rules and role definition due to less established relational understanding, or perhaps a coaching approach that emphasizes structure more heavily with younger players. Conversely, the decrease in preventative strategies among mid-career athletes (23–32) followed by an increase in the 33–37 age group is perplexing and warrants further investigation.[62]

Competitive level significantly influenced conflict management, assurance, and motivation strategies. Notably, A1 League athletes reported significantly higher conflict management compared to A2, B' National-NL1, and Amateur levels. Rather than indicating an absence of constructive conflict resolution, this pattern may indicate that high-pressure environments demand more deliberate conflict-management efforts. A1 athletes also reported higher motivation compared to B' National-NL1 and Amateur levels, potentially reflecting burnout, pressure fatigue, or a more critical appraisal of motivational efforts at the national level. Interestingly, athletes in the C' National-NL2 category reported significantly higher levels of conflict management, assurance, and motivation than other groups, suggesting this specific competitive tier might foster particularly positive relational maintenance dynamics, a finding that merits further contextual exploration.

Years of experience showed significant associations with multiple dimensions: conflict management, preventative strategies, assurance, support, and motivation. Athletes with more experience (15–20 years) reported the highest scores in conflict management and motivation, suggesting that extensive experience equips athletes with better dyadic conflict-resolution skills and fosters a stronger shared drive. Conversely, the least experienced athletes (1–5 years) reported significantly lower levels of conflict management, support, and motivation than most groups, indicating potential deficits in these areas early in an athlete's career. They also reported lower use of preventative strategies compared to moderately experienced groups (6–10, 15–20 years), perhaps reflecting less awareness or perceived need for such proactive measures early on, or relationships in which these aspects have not yet been established. The higher assurance reported by athletes with 15–20 years of team membership also points towards stability and security engendered by long-term relationships.

To aid interpretation beyond statistical significance, we considered the magnitude of observed effects. Correlations between relationship maintenance strategies and relationship quality generally fell in the moderate to strong range,

indicating that these associations are not only statistically significant but also practically meaningful within the 3 Cs and COMPASS frameworks. Between-group differences based on demographics were mostly small to moderate, suggesting that mean shifts are not large and should be read in light of the descriptive statistics for each group. Given the sample size achieved, the study had high power to detect small effects, increasing confidence in non-trivial associations while also requiring caution to avoid overstatement of findings driven by very small effect sizes. This clarification aligns the interpretation in the discussion with the reported effect magnitudes and strengthens the link between the statistical results and their applied significance.[21,22]

4.4. IMPLICATIONS, LIMITATIONS, AND SYNTHESIS

Collectively, these findings provide a detailed picture of the coach–athlete relationship in the Greek basketball community, confirming the fundamental link between relationship quality and maintenance strategies while highlighting significant moderating roles for age, competitive level, and experience, as well as a specific gender difference in commitment. The study successfully addressed the identified research gaps by providing a comprehensive quantitative analysis within this specific cultural context.

Practically, the results underscore the critical importance of fostering openness and effective conflict-management skills to build both emotional connection (closeness) and functional cooperation (commitment and complementarity). Coaches, particularly those working with younger athletes or in high-pressure elite environments (such as the A1 League), should be mindful of potential deficits in closeness, complementarity, and conflict management, and may benefit from targeted training in communication and conflict resolution. The lower reported use of social networks and preventative strategies suggests potential areas for intervention across the board, encouraging coaches and athletes to leverage wider support systems and proactively clarify expectations to strengthen their bond. Furthermore, the findings on age and experience emphasize the need for coaches to adapt their relational approach to the athlete's developmental stage and tenure, moving from potentially more structured guidance for younger/newer athletes toward more collaborative partnerships with older/experienced ones. The higher commitment reported by female athletes also suggests that coaches working with women's teams should be particularly attuned to nurturing and maintaining this aspect of the relationship.

However, the study limitations must be acknowledged. The convenience sampling method restricts the generalizability of the findings beyond the accessible population surveyed. The cross-sectional design allows for the identification of associations but precludes inferences about causality. Longitudinal research is needed to understand how these variables influence each other over time. Reliance on athlete self-report measures introduces the potential for subjective biases, including social desirability. Furthermore, the study captured only the athlete's perspective; incorporating the coach's viewpoint would provide a more complete dyadic picture. The broader aims outlined in the methodology regarding the strategic use of third-party support were not directly assessed by the chosen instruments or analyses presented, leaving this aspect unexplored.

The online mode offered clear strengths for this topic and context. It enabled rapid recruitment of a large sample, protected anonymity for sensitive relationship items, and reduced interviewer effects. Limitations include self-selection and coverage bias toward athletes who engage with digital channels, and the lack of a known denominator precluded calculation of the response rate. In this study, the approach is justified and acceptable because the primary objective was to examine within-sample associations among relationship quality and maintenance strategies rather than to estimate population prevalences. The achieved heterogeneity across gender, age, competitive level, and experience supports the analytic aims, while external validity should be interpreted with appropriate caution. Future research in this area would benefit from mixed-mode recruitment or stratified probability sampling where feasible.

Despite these limitations, this study provides a robust quantitative snapshot of the coach–athlete dyad in the Greek basketball community. It confirms the universality of core theoretical models (3 Cs, COMPASS) while revealing context-specific nuances related to demographics. The strong interrelation between relationship quality dimensions and maintenance strategies emphasizes that fostering effective relationships requires active, ongoing effort focused on communication, conflict resolution, support, and motivation, tailored to the specific context defined by the athlete's gender, age, experience, and competitive level.

5. CONCLUSIONS AND FUTURE RECOMMENDATIONS

This study empirically investigated the coach–athlete relationship in the Greek basketball community, examining the associations between relationship quality (closeness, commitment, complementarity), relationship maintenance (conflict management, openness, motivation, preventative strategies, assurance, support, social networks), and athlete demographic characteristics (gender, age, competitive level, years of experience).

The findings confirmed strong, positive correlations between all dimensions of relationship quality and all relationship maintenance strategies, underscoring their interdependence. Conflict management and openness emerged as particularly crucial strategies linked to multiple facets of relationship quality. Significant demographic differences were observed: female athletes reported higher commitment; younger athletes (≤22 years) reported lower closeness and complementarity; elite (A1 League) athletes reported higher complementarity; and athletes with more years of experience generally reported higher overall relationship quality and greater use of several key maintenance strategies (conflict management, assurance, and motivation). Age, competitive level, and years of experience also significantly influenced the reported use of various maintenance strategies, highlighting the contextual nature of relationship management. Notably, motivation was the most highly rated maintenance strategy, while social networks and preventative strategies were the least utilized, suggesting a potential area for improvement.

These results offer valuable practical implications for the Greek basketball community. Coaches should prioritize developing strong communication (openness) and conflict management skills, as these appear fundamental to building trust, commitment, and effective cooperation. Awareness of the distinct relational needs and perceptions associated with athlete age, experience level, and competitive environment is crucial for tailoring coaching approaches effectively. Specifically, attention should be paid to fostering

closeness and complementarity with younger athletes, and to navigating the potential strains on complementarity and conflict management within elite league environments. Encouraging the proactive use of preventative strategies and leveraging social networks could further enhance relationship quality across different levels.

Building upon this study's findings and acknowledging its limitations, several avenues for future research are recommended:

(i) Longitudinal research: Employing longitudinal designs would allow researchers to track the evolution of coach–athlete relationships over time, establish temporal precedence, and explore causal relationships between relationship quality, maintenance strategies, demographic factors, and outcomes, such as performance, well-being, and burnout.

(ii) Dyadic perspectives: Future studies should aim to collect data from both coaches and athletes within the same dyad to enable a more comprehensive analysis of relationship dynamics, including measures of co-orientation (mutual understanding) and potential perceptual discrepancies.

(iii) Diverse methodologies: Incorporating qualitative methods (e.g., interviews, case studies) could provide richer, in-depth insights into the lived experiences behind the quantitative patterns observed, such as exploring the reasons for lower complementarity in the A1 League or the nuances of gender dynamics. Mixed-method approaches could offer a powerful combination of breadth and depth.

(iv) Sampling enhancements: Utilizing more representative sampling techniques (e.g., stratified random sampling across different regions and competitive levels in Greece) would improve the generalizability of findings.

(v) Intervention studies: Designing and evaluating interventions aimed at enhancing specific maintenance strategies (e.g., conflict management training for coaches, workshops on openness for dyads, approaches for leveraging social networks) could provide evidence-based tools for improving relationship quality in practice.

(vi) Cultural context exploration: Further research could delve deeper into the specific cultural factors within Greek sport that might influence coach–athlete interactions and relationship expectations, comparing findings with other cultural contexts.

(vii) Third-party support: Explicitly investigating the role and strategic use of third-party support (agents, psychologists, family) in managing coach–athlete relationships and conflicts, as initially conceptualized in the study's broader aims, remains an important area for future inquiry.

(viii) Investigating mechanisms: Exploring potential mediating and moderating mechanisms (e.g., basic psychological needs satisfaction, perceived stress, attachment styles, emotional intelligence) that link relationship quality and maintenance strategies to athlete outcomes, such as well-being and performance, would further refine theoretical understanding.

In conclusion, this study reinforces the centrality of the coach–athlete relationship in sport and highlights the active role of maintenance strategies in sustaining its quality. By revealing how these dynamics are shaped by demographic factors within the Greek basketball community, the findings provide a valuable foundation for targeted interventions and future research in optimizing these crucial partnerships for the benefit of both athletes and coaches.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

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ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The research protocol was reviewed and approved by the Ethics and Bioethics Committee of the School of Physical Education and Sport Science at the National and Kapodistrian University of Athens (Approval Protocol No. 1810/22-05-2025). All study procedures complied with the ethical standards outlined in the Declaration of Helsinki and the Code of Human Research Ethics of the British Psychological Society. Participation was entirely voluntary, and informed consent was obtained from all respondents prior to data collection. Participants were assured of anonymity and confidentiality, and informed that they could withdraw from the study at any point without providing justification. The data were collected and stored in full compliance with the General Data Protection Regulation (GDPR 2016/679).

CONSENT FOR PUBLICATION

All participants provided informed consent for the publication of the findings derived from this study. Where applicable, participants gave explicit permission for the publication of any data, images, or information that could potentially reveal their identity. The authors affirm that all relevant consent forms have been obtained and are available upon request.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the first author, Theodor Rachiotis, upon reasonable request.

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