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# Modelling the coach-athlete relationship (CAR) on specific motor tasks and team performance

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## ABSTRACT



**Background:** Motor tasks (MT) and team performance (TP) are important aspects for young basketball athletes. However, empirical evidence examining the mediating role of specific motor tasks in the relationship between coach-athlete relationships and team performance among youth basketball athletes remains limited. **Objectives:** Thus, our current study aims to investigate how CAR is related to MT and TP and how MT mediates TP. **Methods:** Our current study employed a cross-sectional design. We also recruited 180 young basketball players. The Coach-Athlete Relationship Questionnaire (CAR) was used to measure performance. This study employed Structural Equation Modelling (SEM) analysis. **Results:** We observed that CAR was significantly related to MT ( $\beta = 0.68, p < 0.001$ ) and TP ( $\beta = 0.45, p < 0.001$ ). In addition, we observed that MT mediated the effect directly with TP ( $\beta = 0.52, p < 0.001$ ). **Conclusion:** We conclude in our findings that the quality of MT and TP is greatly influenced by CAR. Therefore, it is important for coaches to start focusing on the development of CAR in young basketball athletes. Therefore, this study contributes to the literature on how TP is significantly related to CAR and MT. Furthermore, the findings of this study provides valuable information for basketball coaches about the importance of CAR and MT for future athlete performance.

**Keywords:** Coach-athlete interaction; competition performance; young basketball athletes

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**Authors' Contribution:** a – Study Design; b – Data Collection; c – Statistical Analysis; d – Manuscript Preparation; e – Funds Collection

## INTRODUCTION

In the modern era of basketball training, coaches use a variety of strategies, including analysing factors that can significantly affect athletes' performance. Currently, sports psychology is an important factor and is claimed to contribute to the development of young basketball players. Of the many psychological aspects, the coach-athlete relationship (CAR) has received more attention among coaches for research in the context of sports (Zang et al., 2025), including basketball. CAR is an aspect that shows the extent of the relationship or interaction between the two parties, namely the coach and the young athletes (Muthuswamy & Chitraman,

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2023; Srinivasa Gopalan et al., 2024), In the context of sports, a harmonious relationship or interaction between coaches and athletes is fundamental to achieving training goals and ultimately achieving high performance (Freire et al., 2022). Conceptually, the CAR can be interpreted as a social situation that describes the closeness felt by both of them (e.g., mutual care and support) (Coussens et al., 2022). In the context of modern basketball, the achievement of competitive advantage depends not only on individual technical ability, but also on quality CAR that is built between the coach and the athlete (Ntalachani et al., 2025). Contemporary research shows that high-quality CAR predicts levels of psychological quality among athletes (Jowett et al., 2023). Furthermore, a good or quality relationship between coach and athlete plays an important role for athletes during the training process or during competitions (Simons & Bird, 2024), and evidence from previous research shows that a harmonious CAR can have a positive impact, for example athletes appear more confident, can survive difficulties, feel happy or satisfied and ultimately can achieve high performance goals (Jowett, 2024).

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In the modern era of basketball, an understanding of specific MT is becoming increasingly important motor skills, game-related abilities, and functional capacity are comprehensive domains in assessing the performance of young basketball athletes. Specific MT in basketball include various aspects such as sprinting, agility, jump height, endurance, as well as technical skills such as jump shot, free throws and dribbling, which is vital in the context of a dynamic basketball game (Roberto de Andrade do Nascimento et al., 2024). Essentially, CAR can be a way to ensure that the long-term training climate runs smoothly and harmoniously, because positive interactions between coaches and athletes will produce positive results, including the potential to improve overall team performance (TP) (Freire et al., 2023).

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Although research on coach-athlete relationships has progressed rapidly, there is still a gap in understanding how these CAR specifically affect specific MT and TP in the context of young athlete basketball (Morais et al., 2021). Previous research has tended to examine these aspects separately, whereas in the reality of the game of basketball, the three components interact with each other and influence each other dynamically (Zhao & Jowett, 2023). Therefore, an approach is needed modelling comprehensive to uncover the relationship between CAR variables, specific MT, and TP (Phillips et al., 2023). After reviewing the explanations and literature from the previous studies above, we conclude that the main objective of our current research is to investigate the relationship between CAR and MT or TP and how MT can be a mediating variable for TP.

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## METHOD

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### Study Design and Ethics Approval

This research uses a cross-sectional study design with a quantitative approach to analyse the relationships between variables (CAR, specific MT, and TP) in the context of young athlete basketball. The research protocol was approved by the Local Ethics Committee of Universitas Jambi (Registration No. 1716/UN21/PT/2025, 25 June 2025). The study was conducted in compliance with the ethical principles outlined in the 2013 Declaration of Helsinki.

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### Participants

This study involved 180 young basketball athletes from various sports clubs and schools in Jambi (see **Table 1**). They were first contacted via email, and the sports clubs and schools that responded were then followed up by adding them to a WhatsApp group (participants' identities were kept private by providing initials). After that, young basketball athletes were required to meet certain inclusion criteria to be eligible to participate. These criteria included (i) being between 15 and 18 years of age, (ii) having no history of fatal injuries, and (iii) having no history of chronic illness.

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The demographic characteristics of the participants show a representative distribution for the population of young basketball athletes. The majority of participants were male ( $n = 112$ , 62.2%) with gaming experience ranging from 2 to 6 years. The distribution of competition levels shows that 45% of participants play at the regional level, 35% at the provincial level, and 20% at the national level.

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**Table 1. Demographic Characteristics of Participants**

Characteristic	Category	n	%
Age	15-16	78	43.3
	17-18	102	56.7
Gender	Man	112	62.2
	Woman	68	37.8
Basketball Experience	2-3 years	65	36.1
	4-5 years	89	49.4
	6+ years	26	14.4
Competition Level	Regional	81	45.0
	Province	63	35.0
	National	36	20.0

## Measurements

### CAR

In our current research, we adopted the Coach-Athlete Relationship Questionnaire (CAR-Q) to measure the extent of the relationship between coaches and athletes in the sports context. The CAR-Q in our research has been changed into Indonesian so that the questions are easier for the participants to understand. The CAR-Q consists of 11 items from 3 dimensions, for example, "I have a close relationship with my coach" (closeness), "I always practice diligently to achieve goals" (commitment), and "My coach makes me feel responsive to practice" (complementarity), and each item will be rated using a Likert scale from 1 (It really didn't suit my situation with the coach.) to 7 (It really suits my situation with the coach.). A previous study has reported that the CAR-Q has a Cronbach's alpha of closeness (0.95), commitment (0.95), and complementarity (0.96), respectively (Longakit et al., 2025).

### Specific MT

Based on several previous studies, tests to measure motor performance among athletes include the following:

Agility T-test: first the participant stands upright at cone A (start line); after the whistle sounds, the participant runs as fast as possible towards cone B; after that, the participant runs sideways towards cone C and runs back past cone B to go to cone D and runs back to cone B and ends by running towards cone A. The test is carried out twice, and the best result in seconds is recorded as the final result (Chuang et al., 2021).

For the sprint 25-m test, participants stood at the finish line after the whistle sounded, then they had to run quickly towards the finish line. Participants were instructed to take two attempts at this test, and the best time was recorded in seconds (Arede et al., 2021).

Vertical Jump test: participants stand with their backs against the wall with the available meter. After the signal "Yo", the participant jumps vertically as high as possible, and the best result of two jumps is recorded in centimetres (Huang et al., 2024).

Yo-Yo IR1: Participants stand at cone A; after the audio bleep sounds, participants run quickly towards cone B to cone C (rest interval) and get ready to run back to cone A. This activity is carried out continuously until the participant is unable to run anymore (González-Fernández et al., 2021).

### TP

TP data was collected based on last season's competition results, including performance analysis of win-loss percentage, score per match, field goal percentage, three-point, and free throw percentage (Alves & Barbosa, 2025; Espasa-Labrador et al., 2025). This instrument is used to analyse the level of team ability in cooperating in basketball matches.

## Procedure

Our study was conducted in July 2025, precisely in the field of Jambi University (Indonesia). We obtained the club permit (Registration Number: 20/June/2025). and the school permit (Registration Number: 21/June/2025). The research implementation time started from 07:00 to 11:00 a.m. The The test sequence

includes the following: first, we conducted a 1-hour CART-Q questionnaire test. After completion, participants were given a 5-minute break. The second activity continued with a 2-hour MT test (Agility T-Test, 25-metre Sprint, Vertical, and Yo-Yo IR1). Before the test began, participants were instructed to warm up (5 min) and take a 5-minute rest interval between tests. The activity concluded with a 5-minute cooldown. Meanwhile, TP data was collected based on last season’s competition results.

### Statistical Analysis

This research involves the use of statistical software in the form of Smart PLS. We will analyse the mean and standard deviation (SD) of CAR, MT, and TP variables. Statistical analysis in this study uses Structural Equation Modelling (SEM) (Longakit et al., 2025). The analysis process will involve evaluating the goodness-of-fit model using various indices such as the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA) to ensure the model’s fit with empirical data. SEM analysis will also identify the effect size and statistical significance of each pathway in the model, thus providing an in-depth understanding of the relative contribution of each variable to the research outcome.

## RESULTS AND DISCUSSION

### Results

#### Descriptive Analysis

Descriptive analysis showed that the overall quality of CAR was in the good category with an average score of 4.12 (SD = 0.68) on a scale of 1-5. The closeness dimension obtained the highest score (mean = 4.25, SD = 0.72), followed by commitment (mean = 4.18, SD = 0.65) and complementarity (mean = 3.93, SD = 0.78) (see Table 2).

Table 2. Descriptive Statistics of CAR

CAR Dimensions	Unit	Mean ± SD
Closeness	Likert scale 1-7	4.25 ± 0.72
Commitment	Likert scale 1-7	4.18 ± 0.65
Complementarity	Likert scale 1-7	3.93 ± 0.78

Note: SD = Standard Deviation; CAR = Coach-Athlete Relationship.

Based on Table 3, the results of the study show significant variations in the motor tasks of the participants. The agility test has a mean of 9.85 and SD of 0.94, while the speed test has a mean of 3.42 and SD of 0.31. The vertical jump test has a mean of 48.7 and SD of 6.8, while the endurance test has a mean of 1.285 and SD of 245.

Table 3. Descriptive Statistics of MT

Components	Unit	Mean ± SD
Agility	T-Test (second)	9.85 ± 0.94
Speed	Sprint 25-m (second)	3.42 ± 0.31
Power	Vertical Jump (cm)	48.7 ± 6.8
Endurance	Yo-Yo IR1 (meter)	1.285 ± 245

Note: SD = Standard Deviation; MT = Motor Task.

Table 4. Descriptive Statistics of TP

Team Performance Analysis	Unit	Mean ± SD
Win-loss	Frequency	0.64 ± 0.18
Score per match	Frequency	72.8 ± 12.4
Field goal	Frequency	89.3 ± 10.2
Three-point	Percentage	47.2% ± 245
Throw percentage	Percentage	71.6%

Note: SD = Standard Deviation; TP = Team Performance.

TP analysis showed an average win-loss ratio of 0.64 (SD = 0.18), with an average score per match of 72.8 points (SD = 12.4). The effectiveness of the game was assessed based on field goal percentage (47.2%), three-point percentage (34.8%), and free throw percentage (71.6%) (see **Table 4**).

**Evaluation of Measurement Models**

Evaluation of the goodness-of-fit SEM model shows that the research model has a good fit with the empirical data. The value of Chi-square ( $\chi^2$ ) = 234.29 to 256.78, and  $\chi^2/df$  = 1.32 to 1.97. Other fit indices also showed satisfactory results: CFI = 0.90 to 0.95, TLI = 0.92 to 0.94. The CAR instrument had Cronbach's alpha value of CAR (0.89), MT (0.90) and TP (0.87). The validity of the construct was confirmed through factor loading values ranging from 0.71 to 0.94 and RMSEA = 0.040 to 0.043 (see **Table 5**).

**Table 5. Results of Measurement Model Evaluation**

Instruments	$\chi^2$	$\chi^2/df$	Comparative Fit Index	Tucker-Lewis Index	Root Mean Square Error of Approximation	Cronbach's $\alpha$	Average Variance Extracted	Factor Loading Range
CAR	245.67 ***	1.32	0.95	0.94	0.043	0.89	0.62	0.81-0.87
MT	256.78***	1.97	0.92	0.93	0.040	0.90	0.78	0.72-0.94
TP	234.29***	1.83	0.90	0.92	0.041	0.87	0.81	0.71-0.88

Note: \*\*\*  $p < 0.001$ . CAR = Coach-Athlete Relationships; MT = Motor Tasks; TP = Team Performance.

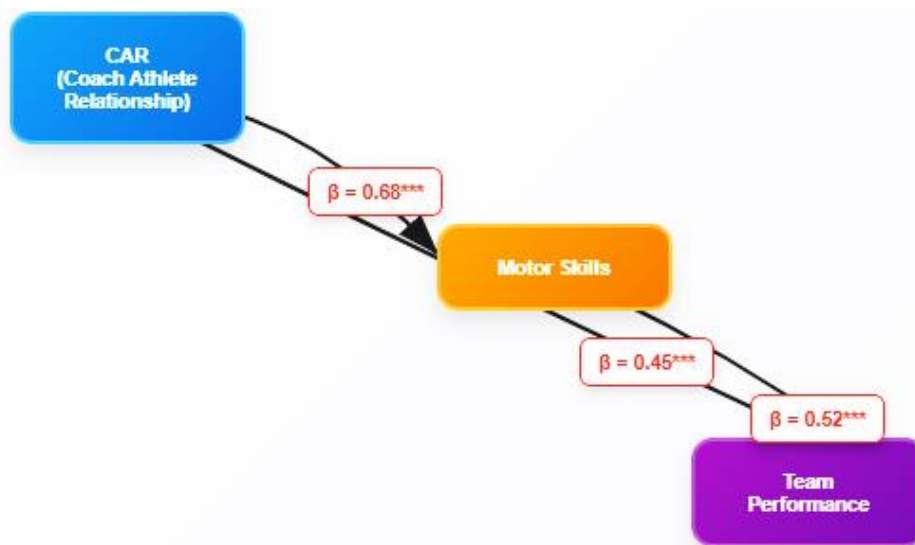
**Structural Model Analysis**

Path analysis using SEM revealed a significant relationship between all research variables. The direct effect of CAR on specific MT showed a pathway coefficient of  $\beta = 0.68$  ( $p < 0.001$ ), indicating that the quality of the CAR has a strong impact on the MT of athletes. The direct influence of CAR on TP showed a coefficient of  $\beta = 0.45$  ( $p < 0.001$ ), suggesting that the quality of the CAR directly contributed to TP. Meanwhile, the effect of specific MT on TP had a coefficient of  $\beta = 0.52$  ( $p < 0.001$ ) (**Table 6** and **Fig. 1**).

**Table 6. Path Coefficients and Effect Size Analysis Results**

Influence Path	Coefficient $\beta$	t-value	p-value	f <sup>2</sup>	Interpretation
CAR → Motor Tasks	0.68	10.15	< 0.001	0.86	Large effect
CAR → Team Performance	0.45	5.77	< 0.001	0.25	Medium effect
Motor Task → Team Performance	0.52	7.32	< 0.001	0.37	Large effect

Note: CAR = Coach-Athlete Relationships; MT = Motor tasks; TP = Team Performance.



**Figure 1. Structural Model with Path Coefficients between Variables**

## Discussion

The research aims to investigate the relationship between each dimension of the CAR, MT and TP among young basketball athletes.

### The Variable CAR affects on Specific MT

The findings of this study show that the quality of the CAR has a significant direct influence on the specific MT of young basketball athletes. This can be explained because a high-quality coach-athlete relationship has the potential to trigger positive things; for example, when the relationship between coach and athlete is harmonious, the athlete will have a strong motivation to achieve in their performance (Setiawan et al., 2023). Basically, CAR is a positive social condition created between coaches and athletes, and several previous studies are in line with current findings which report that CAR has been associated with various important aspects such as athlete performance and well-being, such as affect, coping, and sports satisfaction (Zhang & Rhim, 2024; Simons et al., 2023). Meanwhile, several recent studies have shown that the quality of athletes' well-being, performance and motivation is influenced by the quality of the coach-athlete relationship (Davis et al., 2018; Nascimento Junoret al., 2024; Vieira et al., 2018). We found that CAT essentially results from the reciprocal interactions and causal interdependence between the thoughts, roles and behaviours of coaches and athletes. Furthermore, Gu et al. (2023) explained that CAR is a very effective stimulus for increasing training engagement among athletes.

### The Variable CAR affects on TP

Path analysis showed that the quality of the CAR had a significant direct influence on TP. These findings indicate that the quality of interpersonal relationships between coaches and athletes not only affects individual performance but also contributes to overall TP effectiveness. Basically, CAR can create a harmonious situation between coaches and athletes during training sessions, with such conditions becoming opportunities and triggering athletes to have high competitive performance. This finding has also been reported by previous studies, where CAR can significantly and effectively influence athlete performance and athlete fatigue (Gu et al., 2021; Fan et al., 2023). Some reports suggest that high CAR plays a crucial role in shaping and developing positive aspects such as emotional well-being and enjoyment of sport, leading to improved TP (Wekesser et al., 2021; Elicot et al., 2025). Conversely, a poor relationship between coaches and athletes can have negative consequences, such as lack of motivation to train, low participation rates, and poor performance (Martin, 2020; Elicot et al., 2025). These previous studies consistently align with these findings, underscoring the importance of a harmonious relationship between both parties, namely coaches and athletes, for optimal athletic performance.

### The Mediating Role of Specific MT

Mediation analysis revealed that specific MTs play a role as partial mediators in the relationship between the quality of the CAR and TP. The findings of this study align with those of previous studies, such as Kokstejn et al. (2019), who reported that physical fitness among athletes is a key determinant of dribbling speed performance. Furthermore, a previous study also explained that high physical endurance of athletes is correlated with total distance, number of high-intensity actions, and sprints during the match (Redkva et al., 2018). Meanwhile, Zhou et al. (2025) highlighted their findings, which showed that every referee needs and is required to have high physical fitness, because this will support the referee's performance (e.g., running back and forth for a long time) when leading a match. Similarly to our current findings, high physical fitness can display high quality in terms of dribbling, passing, shooting and the ability to play for long periods without experiencing excessive fatigue.

### Strength, Limitation and Future Research

The main strength of our current study is analysing the direct relationship between CAR and TP, mediated by MT variables. Our findings demonstrate that both CAR and MT variables significantly influence TP. However, our study is limited by its limited participation of basketball athletes, making it difficult to generalise

the results to other populations. In addition, another limitation is in the cultural context. Therefore, future research should include athletes from other sports, such as handball, soccer, futsal, volleyball, sepak takraw, or tennis.

## CONCLUSION

Our current research concludes and highlights that high TP is significantly influenced by CAR variables, mediated by MT, in young basketball athletes. Therefore, this study will contribute to the literature on how TP is significantly related to CAR and MT. Furthermore, the findings of this study will provide valuable information for basketball coaches about the importance of CAR and MT for future athlete performance.

## ACKNOWLEDGEMENTS

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## CONFLICT OF INTEREST

We did not identify any conflicts of interest in this study.

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