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Heymans' cube model of temperament in the case of basketball coaches

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Abstract

Aim. This study examined whether temperament characteristics differ among basketball coaches according to coaching performance level and gender.
Material and method. A total of 54 basketball coaches participated in the study, including 28 medal-winning coaches at National Championships (9 at U14 level and below; 19 at U16 and senior level) and 26 coaches without medals. The sample also included 24 female and 30 male coaches. Temperament was assessed using a 21-item online questionnaire based on the Heymans' Cube model.
Results. Data were analyzed using the Kruskal-Wallis test and independent samples t-test. No statistically significant differences were identified between coaching performance groups regarding emotionality, non-emotionality, activity, non-activity, or primary-secondary functioning ($p > .05$). However, descriptive trends suggested that coaches with higher competitive achievements tended to show lower emotionality, higher activity, and slightly stronger secondary tendencies, reflecting a potentially more reflective and action-oriented temperament profile. Significant gender differences were found for emotionality and non-emotionality. Female coaches scored significantly higher in emotionality ($p < .001$), indicating greater emotional responsiveness, whereas male coaches scored significantly higher in non-emotionality. No statistically significant gender differences were found for activity, non-activity, or primary-secondary functioning, although male coaches showed slightly higher descriptive activity scores.
Conclusions. These findings suggest that gender may represent a more relevant differentiating factor than coaching performance regarding temperament characteristics, particularly emotional responsiveness, with potential implications for coaching behavior, emotional regulation, and decision-making in competitive sport contexts.

Key words: *temperament; basketball; coaches' performance; emotionality; activity.*

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Introduction

Temperament, as a personality trait, plays a crucial role in one' cognitive, emotional, and performance capacities (Van der Werff, 1985). One classical model for understanding temperament is Heymans' Cube, developed by Gerard Heymans in the early 20th century.

Heymans' extensive research into the comprehensive characterization of individual personality differences led to the conceptualization that variations in human temperament can be systematically classified (Vermeij & Vroomen, 2023). The exploration of personality and its intricate relationship with athletic performance has been a subject of enduring interest within the realm of sports science, engaging researchers, coaches, and athletes alike (Wunder et al., 2024a; Shuai et al., 2023). One classical model for understanding temperament is Heymans' Cube, developed by Gerard Heymans in the early 20th century. Although originally rooted in classical differential psychology, temperament-based approaches continue to offer useful conceptual perspectives for understanding psychological functioning in sport settings (Piepiora, 2020; Budnik-Przybylska et al., 2022). This model posits that temperament can be understood through three orthogonal dimensions: activity, emotionality, and susceptibility to primary versus secondary functions, offering a nuanced perspective beyond simpler trait-based approaches. Positive emotions, for instance, have been shown to enhance self-efficacy, motivation, attention, and problem-solving skills, all of which are critical for success in sports like basketball (McCarthy, 2011). The cube model's emphasis on these dimensions allows for a more holistic understanding of how athletes respond to the multifaceted challenges presented by their sport.

Drawing on Hippocratic temperament theory, Heyman proposed a three-dimensional model - Emotion, Activity, and Primary-Secondary Functioning - forming a "cube". Each axis represents a bipolar quality: *Emotion* from stable to volatile, *Activity* from passive to active, and *Primary-Secondary Functioning* referring to primary (persons who live more in the present moment) and secondary (holding onto past experiences/long-lasting after-effects). Combining these yields eight temperament types (Vermeij & Vroomen, 2023, see Figure 1).

Emotionality	Activity	Dominance of P or S	Type of temperament
−	−	P	Amorphous
−	−	S	Apathetic
+	−	P	Nervous
+	−	S	Sentimental
−	+	P	Sanguine
−	+	S	Phlegmatic
+	+	P	Choleric
+	+	S	Passionate

Note: P = primary function; S = secondary function; "+" = high level of the given trait; "-" = low level of the given trait.

Fig. I. *Heyman's Cube - eight temperament types*

Among the various models proposed to understand individual differences in behavior, the Heymans' cube model of temperament presents a unique framework for analyzing and predicting athletic performance, particularly within the demanding context of basketball (Singh & Singh, 2025). This framework conceptualizes the coach's professional profile by intersecting the dimensions of activity, emotionality, and primary/ secondary function to categorize distinct behavioral dispositions. By mapping these psychological parameters onto the specific demands of court-side decision-making, this model illuminates how coaches balance high-pressure tactical adjustments with the necessity for consistent player management (Shi & Chang, 2024; Wunder et al., 2024a). The interplay between these temperamental dimensions directly influences how leaders navigate the cognitive load associated with in-game adaptability and tactical shifts (Ding et al., 2026). Consequently, coaches with varying temperaments may leverage these psychological predispositions to manipulate game momentum, such as through the strategic deployment of technical fouls to recalibrate team arousal levels (Tenenbaum et al., 2023). Moreover, this assessment of emotional regulation and decision-making competence allows for a more granular understanding of how coaches transition between strategic, tactical, and operational frameworks during high-stakes competition (Kolar et al., 2025). By integrating this multidimensional approach, researchers can discern how a coach's innate disposition, whether categorized by high emotionality or decisive activity, modulates their

influence on team dynamics and player development (Tamás-Szora & Béki, 2026). Furthermore, this psychometric classification enables a more nuanced evaluation of how coaches align their inherent temperament with the specialized mental requirements, such as resilience, composure, or adaptive leadership, that are necessitated by the unique pressures of the modern basketball environment (Singh & Singh, 2025). This taxonomy also provides a vital lens for analyzing risk propensity, as demonstrated by the correlations found between coaching certification levels and varied risk-taking behaviors (Wunder et al., 2024b).

The capacity of basketball coaches to effectively navigate the multifaceted demands of their roles is significantly shaped by their temperament, which encompasses persistent, biologically rooted personality traits influencing cognitive, emotional, and performance capacities (Martín-Rodríguez et al., 2024). Temperament, as a foundational aspect of personality, dictates an individual's characteristic emotional and behavioral responses, impacting how coaches perceive, process, and react to the myriad stimuli inherent in the high-pressure environment of competitive basketball (Rudasill & Rimm-Kaufman, 2009). These inherent temperamental differences influence a coach's emotional competence, which dictates their capability to understand and manage their own emotions, as well as perceive and influence the emotions of their athletes (Allen & Laborde, 2014).

These perspectives converge in the context of basketball – an elite, fast-paced, cognitively demanding sport that challenges both athletes and coaches to sustain attention, regulate emotions, and make split-second decisions (Singh & Singh, 2025; Gou & Li, 2025). Temperament dimensions, as conceptualized by Heymans (e.g., primary vs. secondary functioning), may influence a coach's tendency toward intuitive or deliberative decision-making, emotional expressiveness, and leadership style (Van der Werff, 1985; Van der Werff & Verster, 1987).

Coaches are figures of great influence in the lives of their athletes, and can greatly affect their performance and psychological well-being (Kavussanu & Boardley, 2009). The motivational styles and approaches employed by coaches have been extensively examined through the lens of self-determination and achievement goals (Kiamouri et al., 2024). The creation of training environments attuned to athletes' underlying motives requires coaches to possess a profound understanding of motivation (Chan & Mallett, 2011). A coach's leadership style, specifically the degree to which they are perceived as autonomy-supportive, plays a crucial role in shaping athletes' intrinsic motivation, with a democratic decision-making style fostering higher levels of autonomy and intrinsic motivation (Amorose & Anderson-Butcher, 2007). Recognizing the dominant temperament traits of basketball coaches is essential for both personal and professional development (Castillo et al., 2018; Jahansa & Nickbakhsh, 2014). Coaches with predominantly choleric or sanguine tendencies, for instance, may demonstrate high levels of energy, assertiveness, and enthusiasm, which can foster motivation and engagement among players (Kao et al., 2023). However, excessive impulsivity or emotional reactivity associated with such profiles may also require conscious regulation to prevent conflicts or ineffective communication (Duque et al., 2022). Conversely, phlegmatic or melancholic traits may support calm decision-making, reflective analysis, and consistent organization, yet these profiles may sometimes be less adaptive in situations requiring rapid adjustments or strong motivational drive (Jowett et al., 2024; Braun & Tamminen, 2019). Coaches that exhibit effective leadership skills can positively influence athletes' behaviors, motivating them to adjust physically and mentally, fully engage in competition, and achieve their peak performance (Liu et al., 2025). Further research into the practical applications of the Heymans' cube model in basketball is warranted, as it could lead to more informed athlete development strategies and improved team performance.

In the highly dynamic and competitive environment of basketball, the role of the coach extends beyond technical and tactical expertise. Personality and temperament features shape the manner in which coaches interact with athletes, manage stress, make decisions under pressure, and establish a motivational climate within the team (Saginbayevna, 2025). Temperament, understood as the relatively stable set of innate emotional and behavioral tendencies, influences a coach's communication style, leadership strategies, and capacity for self-regulation during critical moments of competition (Kim & Park, 2020).

Coaches' motivational approaches can be evaluated not just by the athletes' perceptions but also by looking at the coaches themselves, giving insight into their experiences (Kiamouri et al., 2024). Furthermore, coaches who demonstrate mental toughness, characterized by their ability to overcome adversity, control emotions, communicate effectively, and maintain high standards, tend to foster holistic development in their athletes, extending beyond mere athletic performance (Raabe et al., 2022). It has been found that athletes who perceived their coach to possess servant leader qualities also displayed higher intrinsic motivation, were more task oriented, were more satisfied, were "mentally tougher," and performed better than were athletes coached by non-servant leaders (Rieke et al., 2008). Effective leadership in sports necessitates the provision of direction, encouragement, and constructive feedback (Li et al., 2025). Athletes' dedication to their coach-athlete connection is seen as a component of the process of trusting in fulfilling their obligations to the relationship, especially in the context of direct and frequent interactions (Jowett, 2024). Coaches' temperamental dispositions shape their athletes

behaviors, which in basketball translate into a more need-supportive climate that enhances players' motivation, well-being, and performance (Stebbings et al., 2011).

The current study

This study explores the types of temperament among basketball coaches through the lens of Heymans' Cube Model - a classical typology that categorizes human temperament based on three axes: emotionality (emotional vs. non-emotional), activity (active vs. non-active), and primary vs. secondary function. The main focus was to investigate potential gender-based or performance-based temperament tendencies in the case of basketball coaches (having different coaching performance levels).

Hypotheses

H1: Investigating basketball coaches' temperament dimensions, significant differences were highlighted according to coaches' performance levels.

H2: There are significant differences between female basketball coaches and male coaches regarding the temperament characteristics.

Materials and method

Participants

A total of 54 participants, basketball coaches, aged between 26 and 67 years (M = 41.3, SD = 9.2) have participated in the study. The specialists were distributed as follows:

- According to coaching performance levels: 28 medal-winning coaches at National Championships (9 coaches with medals at U14 category and below and 19 with medals at U16 and senior level) and 26 coaches without medals;
- Related to gender - 24 female basketball coaches and 30 male coaches.

Instruments

To assess the coaches's temperament a questionnaire of 21 items was used. The questionnaire explores the Heyman's Cube model of temperament, assessing primary vs. secondary function, emotionality and activity dimensions (7 items for each dimension), and can be found at: https://tinyurl.com/HeymansCube. The participants need to mark their option by choosing A or B, in the case of each item. The first 7 items refer to emotionality (A option reflecting an emotive person), the next 7 items regard activity (A option determining a non-active profile), while the last 7 items address the primary vs. secondary function (A option referring to primary function). The conceptual relevance of temperament-based approaches remains evident in contemporary sport psychology, where temperament traits continue to be examined in relation to self-confidence, self-regulation, and sport performance (Budnik-Przybylska et al., 2022). The model conceptualizes temperament along three bipolar axes, whose combinations generate eight distinct temperament types (Strelau, 2020; Piepiora, 2020).

Procedure

The questionnaire was distributed online, in 2024-2025, through *Google Forms* application. Ethical guidelines were followed throughout the research process: written informed consent was obtained for all participants before the actual study started; participants were informed that they could decide to withdraw from the study at any time and for any reason, without any negative consequences; the anonymity was ensured and data were treated confidentially.

Results

We have investigated whether there are significant differences between basketball coaches (according to coaching performance level and gender) in terms of the distinct temperament dimensions as defined by Heymans' model.

Table I presents the descriptive statistics for the analyzed temperament dimensions, comparatively examined between basketball coaches without medals and coaches who obtained medals at national competitions (NC).

Table I. Descriptive statistics for temperament dimensions according to coaching performance

Descriptives	coaching performance	emotional	non-emotional	non-active	active	primary	secundary
N	Without medals	26	26	26	26	26	26

	With medals at NC	28	28	28	28	28	28
Mean	Without medals	2.42	4.58	1.96	5.04	3.81	3.19
	With medals at NC	2.14	4.86	1.50	5.50	3.86	3.14
Median	Without medals	3.00	4.00	2.00	5.00	4.00	3.00
	With medals at NC	2.00	5.00	1.00	6.00	3.00	4.00
Minimum	Without medals	0	1	0	2	2	1
	With medals at NC	0	1	0	1	1	0
Maximum	Without medals	6	7	5	7	6	5
	With medals at NC	6	7	6	7	7	6
Skewness	Without medals	0.209	-0.209	0.548	-0.548	0.172	-0.172
	With medals at NC	0.885	-0.885	1.55	-1.55	0.434	-0.434
Kurtosis	Without medals	-0.36	-0.366	0.023	0.023	-0.56	-0.563
	With medals at NC	0.379	0.379	2.13	2.13	-0.87	-0.870

Note. NC: National competitions.

The descriptive results indicate several differences between coaches who obtained medals at NC and those without such performances. Coaches with medals at NC presented lower levels of emotionality (M = 2.14), compared to coaches without medals (M = 2.42), suggesting a greater degree of emotional stability and a lower tendency to react intensely to emotionally charged situations. At the same time, medal-winning coaches recorded higher scores for activity (M = 5.50), compared to coaches without medals (M = 5.04), reflecting a more active, energetic, and action-oriented behavioral profile.

In relation to the emotional echo dimensions, the differences between the two groups were minimal. For the primary function, which reflects a reduced internal resonance of events, the mean values were almost identical between coaches with medals (M = 3.86) and those without medals (M = 3.81). Similarly, for the secondary function, characterized by a stronger and more prolonged psychological resonance even in relation to less significant events, the differences were negligible (M = 3.14 for coaches with medals vs. M = 3.19 for coaches without medals). These findings suggest that, although successful coaches tend to be less emotional and more active, the way in which events produce an internal psychological echo appears relatively similar across the two groups.

Table II. *Levene's test for the analyzed temperament variables according to coaching performance levels*

Homogeneity of Variances Test (Levene's)				
	F	**df**	**df2**	**p**
emotional	0.0314	1	52	0.860
non-emotional	0.0314	1	52	0.860
non-active	0.5570	1	52	0.459
active	0.5570	1	52	0.459
primary	6.9374	1	52	0.011
secondary	6.9374	1	52	0.011

The results of Levene's test (Table II) indicated that the assumption of homogeneity of variances was met for the variables *emotional* (F = 0.031, p = 0.860), *non-emotional* (F = 0.031, p = 0.860), *non-active* (F = 0.557, p = 0.459), and *active* (F = 0.557, p = 0.459), as the significance values exceeded the threshold of p > .05. However, for the variables *primary* and *secundary*, the homogeneity assumption was violated (F = 6.937, p = 0.011), indicating unequal variances between groups. Although the assumption of homogeneity of variances was not fully met across all analyzed variables, the data distribution satisfied the assumption of normality, as indicated by skewness and kurtosis values (presented in Table 1) within the acceptable range of ±1.96 (Field, 2018).

The Kruskal-Wallis test was used to compare the three coaching performance groups: coaches without medals (N = 26), coaches with medals at U14 level and below (N = 9), and coaches with medals at U16 and senior level, N = 19 (Table III).

Table III. Comparison between coaches by performance level across three groups – Kruskal-Wallis test

	χ^2	**df**	**p**	ε^2
emotional	0.877	2	0.645	0.0166
non-emotional	0.877	2	0.645	0.0166
non-active	2.772	2	0.250	0.0523
active	2.772	2	0.250	0.0523
primary	1.671	2	0.434	0.0315
secondary	1.671	2	0.434	0.0315

Note. ε^2: effect size index for Kruskal-Wallis test.

The results showed no statistically significant differences between the three groups for emotional, non-emotional, non-active, active, primary, or secondary dimensions (p > .05). Therefore, coaching performance level, as reflected by medal achievement, was not associated with significant differences in these psychological characteristics.

Although the Kruskal-Wallis test did not indicate statistically significant differences between the three coaching performance groups, the descriptive statistics suggest several nuanced tendencies in the analyzed temperament variables (Table IV).

Table IV. Descriptive statistics for the analyzed temperament variables across coaching performance group

	coaching performance	**emotional**	**non-emotional**	**non-active**	**active**	**primary**	**secundary**
N	without medals	26	26	26	26	26	26
	medals U14 and below	9	9	9	9	9	9

	medals U16 and seniors	19	19	19	19	19	19
Mean	without medals	2.42	4.58	1.96	5.04	3.81	3.19
	medals U14 and below	2.22	4.78	1.56	5.44	4.22	2.78
	medals U16 and seniors	2.11	4.89	1.47	5.53	3.68	3.32
Standard deviation	without medals	1.63	1.63	1.40	1.40	1.02	1.02
	medals U14 and below	1.92	1.92	2.07	2.07	1.86	1.86
	medals U16 and seniors	1.59	1.59	1.50	1.50	1.45	1.45

Coaches with medals at U16 and senior level recorded the lowest mean score for emotionality (M = 2.11), compared with coaches with medals at U14 level and below (M = 2.22) and coaches without medals (M = 2.42). This may suggest a slightly lower emotional reactivity among coaches with higher-level competitive results.

At the same time, coaches with medals at U16 and senior level obtained the highest mean score for activity (M = 5.53), followed by coaches with medals at U14 level and below (M = 5.44) and coaches without medals (M = 5.04). Thus, higher coaching performance appears to be descriptively associated with a more active temperament profile.

Regarding the primary-secondary function, the differences are small. However, coaches with medals at U16 and senior level showed a slightly higher mean for secondary tendencies (M = 3.32) than the other groups, while also presenting the lowest mean for primary tendencies (M = 3.68). This may indicate that more successful coaches tend, to a small extent, to process competitive events more deeply, reflect more on the causes of success or failure, and seek solutions to avoid repeating mistakes.

Overall, these descriptive tendencies suggest that coaches with higher competitive achievements may be characterized by slightly lower emotionality, higher activity, and a more reflective temperament profile (see Fig. II).

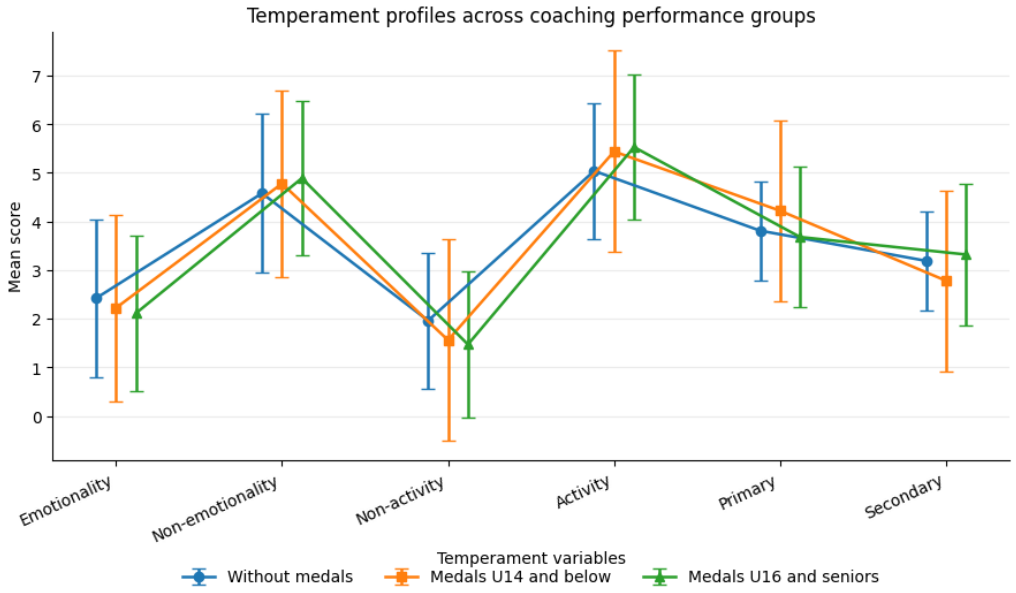

Fig. II. Mean scores and standard deviations of temperament variables across coaching performance groups

Next, an independent samples t-test was conducted to compare male and female coaches in terms of the analyzed temperament variables (Table V).

Table V. Gender differences in temperament variables

Independent samples t-test Temperament variables		Statistic	df	p
emotional	Student's t	4.563	52.0	< .001
non-emotional	Student's t	-4.563	52.0	< .001
non-active	Student's t	1.185	52.0	0.242
active	Student's t	-1.185	52.0	0.242
primary	Student's t	-0.204	52.0	0.839
secondary	Student's t	0.204	52.0	0.839

The results indicated statistically significant gender differences only for emotionality and non-emotionality.

Female coaches obtained significantly higher scores for emotionality compared with male coaches, $t(52) = 4.563$, $p < .001$. The effect size (Hedges' $g = 1.25$) shows strong differences between the compared groups (Predoiu, 2020). Conversely, male coaches scored significantly higher on the opposite dimension, non-emotionality, $t(52) = -4.563$, $p < .001$, also reflecting a large effect size (Hedges' $g = 1.25$), suggesting a markedly less emotionally reactive temperament profile among male coaches. These findings suggest that female coaches tend to display higher emotional reactivity, whereas male coaches appear to be characterized by a more non-emotional temperament profile.

No statistically significant gender differences were found for non-activity, activity, primary, or secondary temperament dimensions ($p > .05$). Therefore, gender seems to differentiate coaches mainly in relation to emotional responsiveness, but not in relation to activity level or the primary-secondary processing style.

Table VI. Descriptive statistics of temperament variables by gender

	Group	N	Mean	Median	SD	SE
emotional	Female	24	3.25	3.00	1.51	0.308
	Male	30	1.50	1.00	1.31	0.239
non-emotional	Female	24	3.75	4.00	1.51	0.308
	Male	30	5.50	6.00	1.31	0.239
non-active	Female	24	2.00	2.00	1.72	0.351
	Male	30	1.50	1.00	1.38	0.253
active	Female	24	5.00	5.00	1.72	0.351
	Male	30	5.50	6.00	1.38	0.253
primary	Female	24	3.79	4.00	1.32	0.269
	Male	30	3.87	3.00	1.36	0.248
secondary	Female	24	3.21	3.00	1.32	0.269
	Male	30	3.13	4.00	1.36	0.248

The descriptive statistics (presented in Table VI) show several relevant tendencies regarding gender differences in temperament variables. Female coaches obtained a higher mean score for emotionality ($M = 3.25$) compared with male coaches ($M = 1.50$), suggesting a stronger emotional responsiveness in the female group. In contrast, male coaches recorded a higher mean score for non-emotionality ($M = 5.50$) than female coaches ($M = 3.75$), indicating a more emotionally detached or less emotionally reactive profile.

Smaller descriptive differences were observed for activity-related variables. Male coaches had slightly higher mean scores for activity (*M* = 5.50) compared with female coaches (*M* = 5.00), while female coaches scored slightly higher for non-activity (*M* = 2.00) than male coaches (*M* = 1.50). This may suggest a tendency for male coaches to present a somewhat more active temperament profile.

For the primary-secondary function, the mean differences were minimal. Female coaches had a slightly higher mean score for secondary tendencies (*M* = 3.21) than male coaches (*M* = 3.13), which may indicate a marginally stronger internal processing of events. However, the values are very close, so this tendency should be interpreted cautiously.

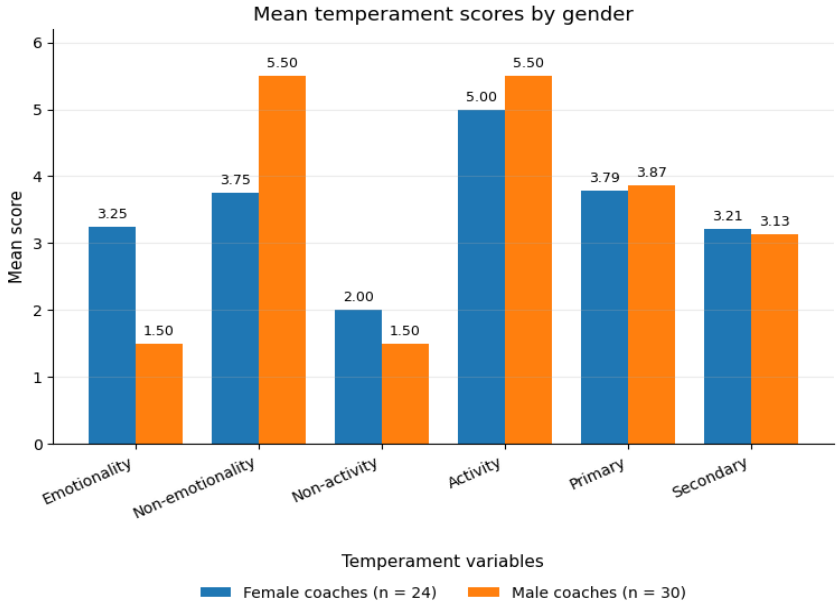

Fig III. Temperament profiles by gender

Overall, as shown in Figure III, the descriptive profile suggests that gender differences are most visible in the emotional dimension, with female coaches showing higher emotionality and male coaches showing higher non-emotionality. Differences in activity and primary-secondary tendencies appear to be much smaller.

Discussions

The present study examined temperament characteristics in basketball coaches using the Heymans' Cube Model, focusing on differences according to coaching performance level and gender. Overall, the findings suggest that temperament-related differences linked to coaching performance were not statistically significant, whereas gender emerged as a more relevant differentiating factor, particularly in relation to emotionality.

Regarding coaching performance, the absence of statistically significant differences between coaches without medals, coaches with medals at U14 level and below, and coaches with medals at U16 and senior level suggests that temperament, as conceptualized through the Heymans framework, may not directly determine competitive coaching success. Coaching effectiveness is widely recognized as a multidimensional construct influenced by technical expertise, tactical knowledge, communication abilities, leadership style, emotional regulation, decision-making under pressure, and contextual variables, rather than by isolated temperament traits alone (Côté & Gilbert, 2009). Therefore, medal achievement may reflect a broader interaction between personal, interpersonal, and environmental determinants rather than stable temperament dispositions.

However, descriptive tendencies provide potentially meaningful practical insights. Coaches with higher competitive achievements showed lower emotionality, higher activity, and slightly stronger secondary functioning. Although these differences were not statistically significant, they align conceptually with literature suggesting that effective coaches in high-performance settings benefit from emotional stability, behavioral activation, and reflective decision-making. Emotional regulation has been identified as a critical component of coaching effectiveness, particularly in high-pressure competitive environments where coaches must manage both their own emotional responses and those of their athletes (Thelwell et al., 2008). Lower emotional reactivity may support clearer decision-making, improved communication, and greater behavioral consistency during stressful competition contexts.

Similarly, the higher activity levels observed among more successful coaches may reflect a stronger action orientation, persistence, and proactive engagement with coaching demands. Leadership research in sport suggests that highly effective coaches tend to demonstrate greater initiative, behavioral consistency, and active problem-solving strategies (Fletcher & Scott, 2010). The slightly elevated secondary functioning in higher-performing coaches may indicate greater reflective processing, suggesting a tendency to analyze experiences more deeply and learn from competitive outcomes. Reflective practice has consistently been associated with coaching expertise and professional development (Nash et al., 2012).

Gender comparisons revealed clearer findings. Female coaches demonstrated significantly higher emotionality, whereas male coaches scored significantly higher on non-emotionality. These findings are generally consistent with broader psychological literature reporting gender differences in emotional expressiveness, emotional responsiveness, and emotion regulation tendencies (Else-Quest et al., 2012). Women often report greater emotional awareness and emotional expressiveness, whereas men may be socialized toward emotional restraint and lower overt emotional reactivity. In coaching contexts, these differences should not be interpreted hierarchically, but rather as reflecting distinct interpersonal and leadership approaches.

Indeed, emotional responsiveness may offer important coaching advantages, particularly in athlete-centered environments requiring empathy, interpersonal sensitivity, and emotionally attuned communication. Previous research has emphasized that emotional intelligence and emotional competence are valuable coaching characteristics, supporting athlete motivation, relational quality, and communication effectiveness (Chan & Mallett, 2011). Thus, higher emotionality among female coaches should not necessarily be interpreted as a vulnerability, but may represent a relational strength depending on the coaching context.

Male coaches also showed descriptively higher activity levels, although this difference was not statistically significant. This tendency may reflect slightly greater behavioral activation or action orientation, but the absence of inferential significance suggests caution in interpretation. Similarly, the near-identical primary-secondary scores indicate that deeper psychological processing of competitive events may not differ meaningfully according to gender in this sample.

The assessment of temperament in coaching practice may provide several practical advantages. Greater awareness of individual temperament characteristics can support coaches in developing enhanced self-awareness, which may facilitate the adaptation of leadership behaviors to different team contexts and athlete personalities (Chan & Mallett, 2011; Côté & Gilbert, 2009). In addition, understanding temperament-related behavioral tendencies may contribute to more effective interpersonal relationships, as knowledge of individual psychological characteristics can improve empathy, individualized communication, and the quality of the coach–athlete relationship (Jowett & Cockerill, 2003; Jowett & Ntoumanis, 2004). From a managerial perspective, awareness of temperament profiles may also support the design of targeted professional development programs, contribute to stronger team cohesion, and improve the alignment between coaching approaches and the specific demands of basketball performance environments (Carron et al., 2002; Nash et al., 2012). Ultimately, acknowledging the role of temperament in basketball coaching underscores the importance of integrating psychological and behavioral dimensions into coach education, training, and evaluation processes. Such an approach does not diminish the importance of technical and tactical competence; rather, it complements these essential domains by promoting a more holistic understanding of coaching effectiveness and leadership in competitive sport contexts (Côté & Gilbert, 2009).

Limitations and future directions

The present findings should be interpreted in light of several limitations. The relatively small sample size (N = 54), together with the unequal distribution across coaching performance categories, should be acknowledged as limitations of the present study. In addition, the exclusive focus on basketball coaches restricts the generalizability of the findings to other sports, where coaching demands may differ substantially in terms of tactical complexity, emotional pressure, and organizational context. Temperament was assessed through a self-report questionnaire, which inherently carries the risk of social desirability bias, subjective interpretation, and response tendencies, particularly given the professional context in which coaches may consciously or unconsciously present themselves in ways aligned with perceived role expectations. The use of online data collection, although practical and efficient, also reduced experimental control over the assessment conditions. Furthermore, coaching performance was operationalized through medal achievement, an objective and easily quantifiable indicator, yet one that captures only a limited dimension of coaching effectiveness. Successful coaching extends beyond competitive outcomes and may also encompass athlete development, interpersonal relationships, psychosocial support, team cohesion, and the long-term sustainability of performance.

Future research should examine temperament characteristics in larger and more diverse coaching populations, including multiple sports and competitive levels. Longitudinal designs would help clarify whether temperament influences coaching development over time or interacts with professional experience. Future

studies should also integrate complementary constructs such as emotional intelligence, coping strategies, stress tolerance, leadership style, and decision-making under competitive pressure.

Conclusions

Anchored in Heymans' Cube Model to map emotionality, activity, and primary–secondary function, our findings indicate that while temperament differences by performance were not statistically significant, descriptive patterns point toward a high-performance coaching profile that is more emotionally stable, energetic, and reflective, with gender-based contrasts in emotional responsiveness also emerging as a meaningful dimension of leadership in competitive basketball.

Medalist coaches displayed higher activity levels and lower passivity, reinforcing the idea that being energetic, proactive, and engaged is an asset in competitive sports settings. There were no significant differences in how reflective (secondary function) or reactive (primary function) the coaches were. However, coaches with U16 and senior-level medals showed a slightly more reflective thinking style.

Gender differences were more pronounced, with female coaches displaying higher emotionality and male coaches higher non-emotionality. These findings suggest that emotional responsiveness represents an important dimension in coaching psychology and may contribute to distinct leadership approaches in competitive sport.

By narrowing its focus to basketball coaches, this study contributes to a deeper understanding of the psychological traits associated with effective sports leadership, potentially guiding future coach recruitment, development programs, and performance enhancement initiatives.

Declaration of conflicting interests

The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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