Preparation of sports activities with cultural perspective for Thailand's Green Marathon athletes

Preparación de actividades deportivas con una perspectiva cultural para los atletas del Maratón Verde de Tailandia

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Abstract

Introduction: This study examines how sports and physical preparation influence athletes' readiness, motivation, and eco-friendly behaviors in Thailand's green marathon. it aims to investigate how consistent training, guided by self-determination theory, shapes environmental awareness and participation within the cultural context.
Objective: to analyze the relationships among preparation, motivation, perceived event quality, and eco-conscious behaviors of marathon runners, emphasizing cultural and sustainability aspects.
Methodology: A quantitative design was employed, surveying 400 runners through structured questionnaires and testing relationships using confirmatory factor analysis and structural equation modeling.
Results: Systematic training enhances motivation, confidence, perceived quality, and environmentally responsible actions. significant positive links among preparation, intrinsic motivation, perceived quality, and eco-conscious practices were confirmed.
Discussion: These outcomes support prior literature highlighting holistic preparationphysical, mental, and environmental in promoting sustainable participation and awareness. integrating cultural values and sustainability fosters community involvement and ecological responsibility.
Conclusions: Effective preparation strengthens motivation and eco-friendly practices, encouraging sustainable marathon participation. promoting integrated training that embeds ecological education and cultural principles can advance Thailand's goals for sustainable sports tourism and responsible event management.

Keywords

Sports preparation; physical activity preparation: Green Marathon; marathon training; cultural perspective; Thailand.

Resumen

Introducción: este estudio examina cómo la preparación física y deportiva influye en la disposición, la motivación y los comportamientos ecológicos de los atletas en el maratón verde de Tailandia. El objetivo es investigar cómo el entrenamiento constante, guiado por la teoría de la autodeterminación, moldea la conciencia ambiental y la participación en el contexto cultural.
Objetivo: analizar las relaciones entre la preparación, la motivación, la percepción de la calidad del evento y las conductas ecológicas de los corredores, destacando los aspectos culturales y de sostenibilidad.
Metodología: se empleó un diseño cuantitativo, encuestando a 400 corredores mediante cuestionarios estructurados y evaluando las relaciones mediante análisis factorial confirmatorio y modelos de ecuaciones estructurales.
Resultados: el entrenamiento sistemático mejora la motivación, la confianza, la percepción de la calidad y las acciones responsables con el medio ambiente. Se confirmaron vínculos positivos significativos entre la preparación, la motivación intrínseca, la percepción de la calidad y las prácticas eco-conscientes.
Discusión: estos resultados respaldan la literatura previa que subraya la preparación integral física, mental y Ambiental para fomentar la participación sostenible y la conciencia ecológica. La integración de valores culturales y sostenibilidad fortalece la implicación comunitaria y la responsabilidad ambiental.
Conclusiones: una preparación eficaz potencia la motivación y las prácticas ecológicas, promoviendo la participación sostenible en maratones. La promoción de entrenamientos integrados que incluyan educación ambiental y principios culturales puede avanzar los objetivos de Tailandia en turismo deportivo sostenible y gestión responsable de eventos

Palabras clave

Preparación deportiva; preparación de actividad física: Maratón Verde; entrenamiento de maratón; perspectiva cultural; Tailandia.

Introduction

In the present era, the popularity of sports events at both international and regional levels continues to expand steadily (Fithroni et al., 2024). These activities encompass diverse sports that offer opportunities for participants of all genders, ages, and skill levels to engage actively. Running, cycling, and swimming are among the most popular sports attracting broad audiences and generating substantial enjoyment (Di Gioia et al., 2024). As the global sports market is projected to grow from $267.47 billion in 2024 to approximately $525.83 billion by 2033, with an annual growth rate of 7.8% (Kudinska et al., 2025), the emphasis on preparing athletes for these events becomes increasingly important. This growth is driven by heightened audience engagement, technological advances, and the recognition of sports as key components of health and economic development (Dhiman, 2023; Fong, 2025). The economic impact of sports tourism, in particular, highlights the dual role of sports in promoting public health and driving regional economies (Fong, 2025).

In Thailand, this global trend manifests vividly through the exponential rise of marathon running and other endurance sports. These events have become an integral part of the local sports culture, serving as health promotion activities and economic catalysts for communities. Notable marathons such as the Buriram Marathon, Laguna Phuket Marathon, and Khon Kaen Marathon continue to see increasing participation. The country's infrastructure, governmental support, and enthusiasm for sports enhance its capacity to host major events (Lubina, 2025). However, the rapid growth of these mass participation events has also presented significant environmental challenges, including substantial waste generation and resource consumption (Su, X. et al., 2025). These issues threaten the long-term sustainability of the very events that contribute to the economy and well-being.

In response to these challenges, the "Green Marathon" concept has emerged as a crucial approach to mitigate environmental impact while sustaining event growth. A Green Marathon is defined as an environmentally sustainable sports event that emphasizes eco-conscious practices in both event organization and athlete preparation (Green et al., 2025). For athletes, this preparation extends beyond physical and mental training to include integrating environmentally friendly practices, such as conserving resources and adopting sustainable habits that reflect ecological awareness (Zafari et al., 2025). This holistic approach supports the broader environmental goals of reducing waste, minimizing energy use, and promoting community engagement. Moreover, culturally, the Green Marathon offers a platform to reinforce traditional Thai values emphasizing harmony with nature and community solidarity, fostering a deeper connection between athletes' physical preparation and environmental consciousness (Mattayakorn & Boonchom, 2025). The integration of sustainability into athletic preparation aligns with the principles of Self-Determination Theory, which posits that individuals are more likely to engage in behaviors (like eco-friendly practices) when they feel a sense of autonomy, competence, and relatedness (Valero-Valenzuela, et al., 2024).

Ultimately, while the importance of sustainable sports events is widely recognized, the existing literature lacks a clear understanding of the specific psychological and cultural factors that drive this behavior. There is a critical gap in the research regarding how specific preparation efforts particularly those influenced by Thai cultural values and guided by the principles of Self-Determination Theory impact athletes' motivation and eco-friendly behaviors in the context of Thailand's Green Marathon. Existing studies tend to focus on event management rather than the personal, behavioral aspects of the athletes themselves (Hussain et al., 2024; Rahman, 2023). This study aims to address this research gap by exploring the direct relationships among sports preparation, physical activity, athlete motivation (guided by Self-Determination Theory), and eco-friendly behaviors within Thailand's sports event landscape. The findings will provide valuable insights for organizers and policymakers to promote more effective, environmentally responsible sports practices, ensuring a resilient and culturally resonant legacy for future generations.

Related work

Recent global trends highlight marathons as vital platforms for promoting environmental awareness and sustainable practices (Stapleton, et al., 2022). "Green Marathons" integrate ecological principles to

reduce waste, conserve resources, and foster eco-friendly behaviors among participants and organizers especially when aligned with local cultural values that enhance environmental stewardship (Huang & Chiu, 2024; Triantafyllidis & Kaplanidou, 2022). These events serve not only as sporting spectacles but also as catalysts for ecological consciousness, particularly when culturally contextualized (Zhou et al., 2023). In Thailand, the resurgence of marathon running and endurance sports is strongly linked to traditional cultural values emphasizing harmony with nature and community cohesion (Srichan et al., 2024). The Thai worldview, rooted in respect for natural resources and collective participation, provides a strategic foundation for embedding ecological initiatives within sporting events (Rahayu et al., 2024). These cultural attitudes are vital in transforming marathons into environmentally responsible festivals that resonate with local identity and foster shared responsibility for sustainability.

The international literature underscores marathons' role as platforms for ecological education and sustainable development (Stapleton, et al., 2022). "Green Marathons" focusing on waste minimization, resource conservation, and eco-friendly behaviors gain momentum worldwide when integrated with local cultural principles supporting environmental stewardship (Huang & Chiu, 2024; Triantafyllidis & Kaplanidou, 2022). Such events serve as effective means to foster ecological consciousness, especially when tailored to specific cultural contexts (Zhou et al., 2023). In Thailand, the integration of Buddhist principles like mindfulness and compassion influences public attitudes towards sustainability, reinforcing behaviors such as waste reduction, water conservation, and ecological education during marathon training and races *(*Valenzuela-Jurado et al., 2023*)*. Studies indicate that athlete preparation for Green Marathons extends beyond physical training to include ecological literacy and cultural values that resonate with local beliefs (Adefila et al., 2024; Tandamrong, & Laphet, 2025).). Training in natural settings such as parks and forests not only reduces energy consumption but also deepens participants' connection to their environment, supporting sustainable development goals (Kizanlikli, et al., 2023). Community involvement through eco-friendly materials, waste management, and renewable energy use further amplifies local support and ensures the success of these events (Fuchs, 2025). Despite these insights, there is limited research on how Thai cultural perspectives specifically influence athlete preparation and eco-conscious behaviors in Green Marathons, a gap this study aims to address.

This study explores how athletes' preparation physically, mentally, and environmentally affects participation in Thailand's Green Marathon. Findings demonstrate that athletes engaging in consistent, dedicated training routines, including regular running and endurance exercises, exhibit higher motivation and confidence vital for completing the marathon (Paprancová, et al., 2025). The relationship between sport preparation and self-determination suggests that intrinsic motivation significantly enhances perceptions of readiness and event quality (Braunstein-Minkove et al., 2023; Valero-Valenzuela et al., 2024). Proper preparation fosters confidence, resilience, and commitment, while disciplined routines in long-distance running support optimal performance. The perceived quality of the marathon which encompasses organizational management, environmental practices, and participant support substantially influences athletes' eco-friendly behaviors and attitudes (Channa, et al., 2022). A high-quality event experience encourages participants to adopt sustainable practices such as waste reduction and resource conservation, with routines rooted in Thai cultural values like mindfulness and compassion (Bodhisatirawaranggoora, et al., 2025*)* The positive correlation between self-determination and eco-friendly routines underscores the importance of motivation for maintaining sustainable behaviors during training and race day. The validation of the measurement model through multiple fit indices and validity tests confirms the robustness of these relationships (Hösl, et al., 2024). High reliability and discriminant validity scores indicate that constructs such as motivation, preparation, perceived quality, and cultural values are both interconnected and distinct. Ultimately, these insights suggest that sustainable marathon participation depends on continuous athlete motivation, cultural awareness, and comprehensive preparation physical, mental, and environmental to foster long-term ecological responsibility and community engagement)Zhang, et al., 2024(.

Conceptual research framework and hypotheses

This study conceptualizes the relationship between sport preparation, psychological motivation, perception of event quality, and participation behavior in Thailand's Green Marathons, emphasizing cultural influences and environmentally responsible behaviors. The framework integrates two key dimensions sport performance and environmental engagement into a holistic behavioral model, thereby addressing the perceived gap between self-determination and pro-environmental behavior.

Sport Performance Dimension

This dimension examines how athletes' physical and mental preparation (Sport Preparation: SP) enhances Physical Activity Self-Determination (PSD), which reflects autonomy, competence, and goal-directed behavior. While the model does not directly measure objective performance (e.g., marathon finish time), it focuses on motivational indicators such as intrinsic goals, perseverance, and psychological readiness, which contribute to athletes' self-efficacy and commitment (Clutterbuck et al., 2024). These internal drivers align with the broader concept of self-determination theory, which has been shown to enhance adherence and performance in endurance sports contexts.

Environmental Engagement Dimension

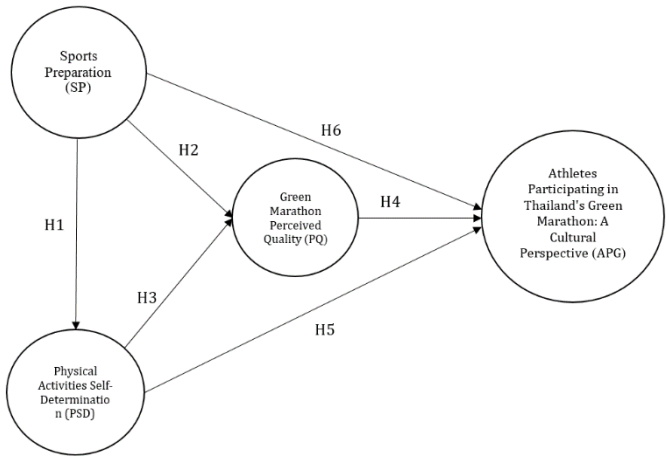
Simultaneously, the model investigates how Green Marathon Perceived Quality (PQ) including event organization, eco-management practices, and cultural integration affects athletes' participation behavior (APG), particularly in promoting environmentally responsible actions (e.g., waste sorting, reusable materials, respect for local culture). Research suggests that positive perceptions of event quality can foster psychological identification with sustainability goals, leading to more conscious behavior during and beyond the event (Huang & Chiu, 2024; De Clercq et al., 2025).

Integration and Rationale

Although the connection between self-determination and green behavior may not be immediately apparent, emerging studies in sport management and sustainability indicate that autonomy-supportive environments can foster not only greater sport engagement but also environmental awareness when green practices are emphasized in the sporting context (Meerits et al., 2025) Therefore, this integrated framework proposes that motivational states (e.g., self-determination) and perceived event quality work synergistically to shape athletes' sustained behavioral alignment with environmental values, particularly within the culturally rich setting of Thailand's Green Marathons.

The conceptual model is presented in Figure 1, highlighting the dual influence of psychological and ecological determinants on participation behavior.

Figure 1. Conceptual research framework



H1. Sport Preparation (SP) is positively associated with Physical Activity Self-Determination (PSD).

H2. Sport Preparation (SP) is positively associated with Green Marathon Perceived Quality (PQ).

H3. Physical Activity Self-Determination (PSD) is positively associated with Participation Behavior (APG) in Thailand's Green Marathons.

H4. Green Marathon Perceived Quality (PQ) is positively associated with culturally contextualized participation behavior (APG) in Thailand's Green Marathons.

H5. Physical Activity Self-Determination (PSD) is positively associated with culturally sustainable behaviors of athletes in Thailand's Green Marathons (APG).

H6. Sport Preparation (SP) is positively associated with Participation Behavior (APG) in Thailand's Green Marathons.

Method

This research employed a quantitative, descriptive, and correlational design to examine how the preparation of sports and physical activities influences athletes' readiness and behavior in Thailand's Green Marathon. Data were collected through structured questionnaires distributed to a sample of marathon runners in Khon Kaen, Thailand. The scope of the study was both exploratory, aiming to understand the relationship between athletes' training and preparation practices and their environmental consciousness, and explanatory, to identify how these preparation strategies impact their decision-making, engagement, and expenditure during Green Marathons. The findings highlight that effective preparation of sports and physical activities can enhance athletes' environmental attitudes, improve their performance, and foster sustainable participation in eco-friendly marathon events.

Participants

Participants consisted of 9,000 registered marathon runners who completed the event in Khon Kaen during the data collection period. The target population included adults aged 20 to 60 years who participated in the full marathon (42.195 km) category. A stratified convenience sampling method was used to select participants. All participants voluntarily agreed to participate after being informed of the study's purpose and providing informed consent.

A total of 414 responses were initially collected, but incomplete questionnaires were excluded, resulting in 400 valid cases for analysis. Participants were stratified into four groups: gender, age category, running experience, and region. Demographic information such as age distribution, gender balance, education level, and running experience is reported to enhance transparency. The study received ethical approval from the Sripatum University Khon Kaen Campus, review board.

Procedure

The data collection process involved distributing online questionnaires immediately after the race. The questionnaires were created using Google Forms and shared via a QR code and direct links distributed at the race site and through social media channels. The data collection period lasted four weeks, during which participants completed the forms at their convenience. Researchers ensured the confidentiality and anonymity of respondents to promote honest and accurate responses.

Instrument

The instrument used for data collection was a structured questionnaire divided into four parts. Part 1 collected demographic information, including gender, age, education level, occupation, and income. Part 2 assessed athletes' preparation of sports and physical activities for participating in Thailand's Green Marathon, focusing on training routines, environmental practices integrated into preparation, and mental readiness, measured on a 5-point Likert scale ranging from 'least prepared' (1) to 'most prepared' (5). Part 3 examined athletes' self-determination in relation to their engagement in physical activities, based on the Self-Determination Theory (SDT), covering aspects such as intrinsic motivation, perceived competence, autonomy, and relatedness, measured using a Likert scale from 'strongly disagree' (1) to 'strongly agree' (5). Part 4 evaluated athletes' perceptions of the perceived quality of the Green Marathon, including components such as organizational management, environmental sustainability practices, participant support, and overall event experience, also measured on a Likert scale from 'poor' (1) to 'excellent' (5).

The questionnaire was pilot tested with 30 runners to evaluate clarity, reliability, and validity. Internal consistency was confirmed by calculating Cronbach's alpha coefficient, which yielded a reliability index of 0.890, indicating high reliability. Content validity was assessed by three experts in sports management, environmental education, and leisure tourism, using the Index of Item Objective Congruence (IOC). All items scored above 0.70, confirming content validity.

Additionally, the study was conducted in accordance with ethical standards and received approval from the ethics committee of Sripatum University Khon Kaen Campus, with the approval number SPUIRB-2025-050.

Data analysis

Data were collected online through Facebook and LINE groups, utilizing Google Forms for efficient and accessible distribution. The collected data were analyzed using statistical software through a multi-step procedure. First, descriptive statistics were employed to summarize demographic characteristics and key study variables. Following this, inferential statistics were used to investigate the relationships among the variables. To validate the measurement model, Confirmatory Factor Analysis (CFA) was applied to examine the relationships between latent constructs and their observed indicators. Subsequently, Structural Equation Modeling (SEM) was conducted to assess the hypothesized relationships among variables and to evaluate overall model fit. In addition, reliability testing was performed using Cronbach's Alpha, with a criterion threshold set at ≥ 0.70 to ensure internal consistency (Hair, 2010). Both convergent and discriminant validity were evaluated through Average Variance Extracted (AVE) and the Fornell-Larcker criterion to confirm the validity of the measurement model. Furthermore, Bootstrapping techniques were employed to estimate confidence intervals for parameter estimates and to support hypothesis testing and model adequacy assessments. Significance levels were analyzed to determine the strength and direction of the relationships among the studied variables.

Results

Based on data collected from 400 valid respondents, the results show that most individuals had participated in the Green Marathon more than once, representing the target population for this research. The high percentage of repeat participants suggests that the sample may not fully represent first-time runners, which could limit the generalizability of the findings. Most respondents were female, accounting for 58.7%, followed by males at 36.0%, and a small percentage (1.9%) identifying as other or with alternative gender identities. The most prevalent age group was 20-29 years old, comprising 66.2% of the sample, with the 30-39 age group at 18.4%, and smaller proportions in the 40-49 and 50-59 age brackets. In terms of occupation, students made up the largest segment at 42.3%, with entrepreneurs and corporate employees being the next significant groups; self-employed individuals and civil servants represented smaller portions. Regarding income levels, the largest group earned less than 15,000 baht, constituting 34.5%, followed by respondents earning between 15,001-25,000 and 25,001-35,000 baht. Few respondents reported a salary exceeding 55,000 baht. Concerning participation frequency, most had attended the marathon twice, at 55.8%, followed by those who participated 3-5 times at 33.1%, and a smaller group of over 5 times at 7.7%. Overall, the data indicates that most participants are young females, primarily students or entrepreneurs, with lower income levels, and tend to have multiple experiences of participating in the Green Marathon. The measurement model's fit statistics are summarized in Table 1, providing an overview of the model evaluation.

Table 1. Summarizes the fit statistics of the measurement model

Final measurement model	df	RMSEA [a]	SRMR [b]	CFI [c]	TLI [d]
	2.880	0.029	0.046	0.913	0.918
The target of the criterion (Hair et al., 2010)	3	< 0.07	< 0.08	> 0.90	> 0.90

Note: RMSEA = Root means square error approximation; b SRMR = standardized root mean squared; c CFI = comparative fit index; d TLI = Tucker Lewis Index.

Table 1 the study examined athletes' preparation practices, Physical Activities Self-Determination, and Green Marathon Perceived Quality related to participating in Thailand's Green Marathon. The measurement model's fit was evaluated using several indices summarized in Table 1. The RMSEA value of 0.029 and SRMR of 0.046 are both below the recommended thresholds of 0.07 and 0.08, indicating an excellent

model fit. Additionally, the CFI (0.913) and TLI (0.918) exceeded the 0.90 cutoff, confirming that the measurement model appropriately represents the data structure.

The assessment of the measurement model adhered to the guidelines proposed by Hair et al. (2017), focusing on evaluating the reliability, convergent validity, and discriminant validity of the fundamental constructs. A thorough validation process was conducted to ensure the robustness of the measurement instruments used in this research. The questionnaire items designed to measure each construct were carefully reviewed, with results shown in Table 2 indicating that all factor loadings surpassed the recommended threshold of 0.70 (Nunnally, 1978), which reflects satisfactory item reliability. To further confirm internal consistency, both composite reliability (CR) and Cronbach's alpha were calculated; all these values exceeded the acceptable cutoff of 0.70, demonstrating that the measurement scales are both consistent and reliable for subsequent analysis. The internal consistency and validity of the constructs were validated through the data presented in Table 2, where each item's factor loading ranged from 0.793 to 0.866, with t-values significantly above the threshold of 25, indicating strong reliability at the item level. The CR values remained above 0.90 across all constructs, and the AVE scores namely, 0.717 for Sport Preparation (SP), 0.695 for Physical Activities Self-Determination (PSD), 0.712 for Perceived Quality (PQ), and 0.755 for Activities for Athletes Participating in Thailand's Green Marathon (APG) confirmed good convergent validity. Additionally, the VIF values, spanning from 1.000 to 4.453, were well below the critical value of 5.0, which suggests that multicollinearity was not an issue in this analysis.

Table 3 displays the results of the discriminant validity assessment using the Fornell–Larcker criterion. According to established guidelines, discriminant validity is established when the square root of the average variance extracted (AVE) for each construct exceeds its highest correlation with any other construct in the model (Fornell & Larcker, 1981). As shown in the table, the square roots of AVE for all constructs Sport Preparation (0.860), Physical Activities Self-Determination (0.871), Perceived Quality of the Physical Activities for Athletes Participating in Thailand's Green Marathon (0.892), and Cultural Perspectives on Green Marathon Spending in Thailand (0.869) are all higher than their respective correlation coefficients with other constructs. For example, the AVE square root for Sport Preparation (0.860) is greater than all its correlations with other variables, confirming that it is a distinct construct. Similarly, the Athletes Participating in Thailand's Green Marathon *(*APG*)*construct has a square root of AVE of 0.869, which exceeds its correlations with all other constructs, thereby supporting its discriminant validity. Overall, these results indicate that each construct demonstrates adequate discriminant validity within the measurement model, confirming that they are measuring separate underlying concepts.

Table 2. Measurement model results.

Constructs	Measurement Label	Loading	t-value
Sport Preparation (SP) CR=.901; α = .903; AVE = .717	SP1.Physical readiness is the most important aspect for athletes to perform well in competitions.	0.843	39.890
	SP2. Having a systematic training plan helps improve performance in competitions.	0.827	40.481
	SP3. Preparing equipment and tools before the event affects the athlete's success.	0.881	59.188
	SP4. Rest and recovery during training are essential and should not be overlooked.	0.854	53.744
	SP5. Analyzing and studying competitors is crucial for effective preparation.	0.826	39.622
Physical Activities Self-Determination)PSD(VIF =1.000; CR= .890; α = .919; AVE = .695	PSD1. Choosing physical activities based on personal interest is important for long-term success.	0.842	49.282
	PSD2. Setting personal goals for exercising increases motivation to stay active.	0.844	42.528
	PSD3. Enjoying and having fun during physical activities helps strengthen commitment.	0.848	46.784
	PSD4. Having the freedom to select types of activities enhances dedication to regular exercise.	0.793	25.108
	PSD5. Support from family and friends is a key factor in maintaining motivation to exercise.	0.840	40.839
Green Marathon Perceived Quality)PQ(VIF=3.840; CR= .899; α = .899; AVE = .712	PQ1. I feel that the quality of the course and venue arrangements in the Green Marathon are very good.	0.822	36.994
	PQ2. The services and information provided by the event staff at the Green Marathon give me confidence in its quality.	0.838	40.309
	PQ3. The management and safety measures in the Green Marathon meet the expected quality standards.	0.851	55.084
	PQ4. The facilities, such as aid stations and health care services during the event, are of high quality and meet my expectations.	0.840	47.698

	PQ5. The Green Marathon offers an excellent overall experience, especially through its strong environmental practices like waste reduction and use of sustainable resources	0.866	48.943
Athletes Participating in Thailand's Green Marathon: A Cultural Perspective)APG(VIF=4.453; CR= .919; α = .919; AVE = .755	APG1. Planning training specifically for major events like Thailand's Green Marathon is essential.	0.883	63.374
	APG2. Athletes should adjust their training plans according to the remaining time before the race.	0.839	47.449
	APG3. Proper nutrition and health care are vital for marathon runners' preparedness.	0.844	40.780
	APG4. Training on environmentally sensitive routes like the Green Marathon helps raise athletes' awareness and encourages environmentally responsible behaviors during the event.	0.888	70.977
	APG5. Planning recovery and rest after training sessions helps athletes prepare for the race day.	0.888	74.632

Table 3. Discriminant validity using the Fornell–Larcker criterion

Construct	Mean	S.D.	SP	PSD	PQ	APG
Sport Preparation (SP)	4.0810	0.74271	0.860			
Physical Activities Self-Determination)PSD(	4.1335	0.72096	0.846	0.871		
Green Marathon Perceived Quality)PQ(	4.1845	0.70888	0.842	0.845	0.892	
Athletes Participating in Thailand's Green Marathon: A Cultural Perspective)APG(	4.1230	0.74206	0.816	0.834	0.844	0.869

Notes: the values of the square root of AVE are presented through the italicized diagonal elements. the other elements present the mutual correlations among the constructs.

Table 4. Cross loading

Items Codes	APG	PQ	PSD	SP
APG1	0.883	0.811	0.771	0.705
APG2	0.839	0.758	0.705	0.726
APG3	0.844	0.751	0.696	0.710
APG4	0.888	0.776	0.765	0.712
APG5	0.888	0.774	0.729	0.695
PQ1	0.723	0.822	0.735	0.688
PQ2	0.769	0.838	0.717	0.721
PQ3	0.750	0.851	0.721	0.663
PQ4	0.764	0.840	0.746	0.712
PQ5	0.753	0.866	0.754	0.766
PSD1	0.659	0.685	0.842	0.757
PSD2	0.721	0.704	0.844	0.753
PSD3	0.764	0.777	0.848	0.733
PSD4	0.607	0.644	0.793	0.613
PSD5	0.754	0.806	0.840	0.718
SP1	0.645	0.683	0.707	0.843
SP2	0.658	0.649	0.665	0.827
SP3	0.714	0.772	0.749	0.881
SP4	0.715	0.747	0.734	0.854
SP5	0.717	0.705	0.779	0.826

Table 5. Path analyses (direct effects).

Direct Effect	Path	t-Value	P-Values	Results
H1	SP→PSD	59.628**	0.000	Accepted
H2	SP→PQ	6.323**	0.000	Accepted
H3	PSD→PQ	10.150**	0.000	Accepted
H4	PQ→APG	9.962**	0.000	Accepted
H5	PSD→APG	3.402**	0.001	Accepted
H6	SP→APG	2.298**	0.022	Accepted

Notes: *** p<0.01; ** p<0.05

The results presented in Table 5 provide insights into the relationships among the key constructs of the study: Sport Preparation (SP), Physical Activities Self-Determination (PSD), Green Marathon Perceived Quality (PQ), and Athletes Participating in Thailand's Green Marathon (APG). The analysis confirms that all six hypotheses (H1 to H6) are statistically supported, with p-values less than 0.05, indicating significant relationships among these variables.

Specifically, H1 shows that Sport Preparation has a significant positive relationship with Self-Determination Theory ($t = 59.628$, $p < 0.001$). This suggests that effective sport preparation enhances athletes' motivation and personal commitment based on their intrinsic and extrinsic factors. H2 indicates that Sport Preparation also significantly influences perceptions of the Green Marathon's perceived quality ($t = 6.323$, $p < 0.001$), implying that thorough preparation contributes to perceived higher quality of the event.

H3 demonstrates that Physical Activities Self-Determination significantly impacts the Athletes participation in Thailand's Green Marathon ($t = 10.150$, $p < 0.001$). This indicates that stronger intrinsic motivation towards physical activity leads to better preparation practices. H4 confirms that perceived quality has a significant relationship with cultural perspectives regarding the Athletes in the Green Marathon ($t = 9.962$, $p < 0.001$). Positive perceptions of the event's quality promote more environmentally conscious attitudes toward preparation behaviors.

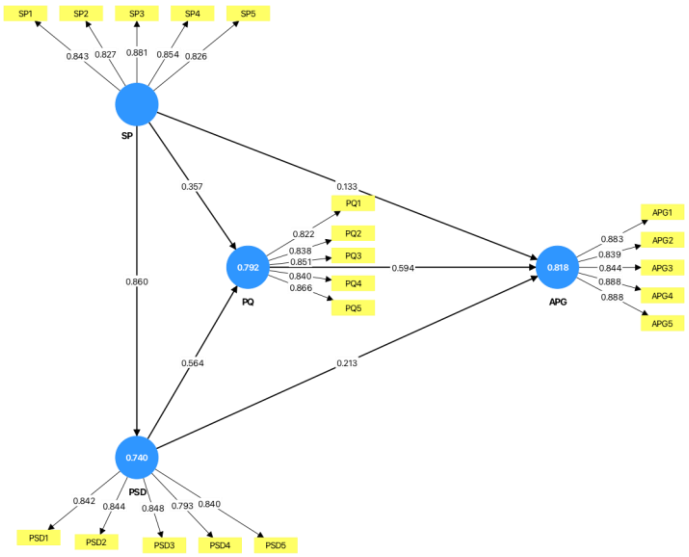
Furthermore, H5 shows that Physical Activities Self-Determination also significantly relates to the preparation of sports and physical activities ($t = 3.402$, $p < 0.001$), underscoring the role of intrinsic motivation in fostering proper preparation. H6 indicates that Sport Preparation directly influences the Athletes participating in the Green Marathon ($t = 2.298$, $p = 0.022$), suggesting that better sport preparation leads to more effective and environmentally conscious training and readiness behaviors.

These findings collectively highlight the importance of sport preparation and intrinsic motivation in shaping perceptions of quality and environmentally aligned preparations within the context of Thailand’s Green Marathon

Figure 2. This image depicts a Structural Equation Model (SEM) that examines the relationships among several latent variables such as Sport Preparation (SP), Green Marathon Perceived Quality (PQ), Physical Activities Self-Determination (PSD), and the Preparation of Sports and Physical Activities for Athletes Participating in Thailand's Green Marathon (APG). Each latent variable is measured by specific indicators with high factor loadings, ranging from approximately 0.713 to 0.921, reflecting their strong contributions.

The model also includes path coefficients (β) that indicate the strength and significance of the relationships between these constructs. For example, the path from Sport Preparation to Physical Activities Self-Determination shows a strong positive relationship ($\beta = 0.825$), indicating that better preparation is highly associated with higher self-determination. Additionally, the path from Green Marathon Perceived Quality to the Preparation of Sports and Physical Activities for Athletes ($\beta = 0.743$) suggests that the perceived quality of the event strongly influences an athlete's specialized preparation. Furthermore, a strong direct effect is observed between Sport Preparation and Green Marathon Perceived Quality ($\beta = 0.811$). R-squared values like 0.792, 0.740, and 0.818 are shown near each latent variable, representing the proportion of variance explained by the predictors in the model. Overall, the diagram highlights how preparation, motivation, perceived quality, and specialized training influence one another within the context of participating in the Green Marathon, emphasizing different aspects of readiness and awareness involved in marathon participation.

Figure 2. Results of PLS-SEM on Preparation of Sports and Physical Activities for Athletes Participating in Thailand's Green Marathon*:* A Cultural Perspective



Overall this study provides a comprehensive analysis of the key factors influencing athletes' participation in Thailand's Green Marathon. The findings confirm that effective sport preparation, intrinsic motivation, and perceptions of event quality are significantly interconnected and play crucial roles in shaping athletes' behavioral intentions and environmentally conscious practices. The structural equation modeling results demonstrate that thorough preparation and strong self-determination not only enhance perceptions of quality but also positively impact the actual preparation behaviors of athletes. The validity and reliability of the measurement model were thoroughly confirmed, supporting the robustness of these conclusions. Overall, the insights from this research highlight the importance of fostering proper training, motivation, and environmental awareness among marathon participants to promote sustainable and environmentally responsible participation in mass sporting events.

Discussion

The findings of this study highlight the significant roles of sport preparation, self-determination, and perceived event quality in shaping athletes' participation behaviors in Thailand's Green Marathon (Kelemen, et al., 2024; Hwang, et al., 2024). A strong positive relationship was found between sport preparation and self-determination, indicating that consistent training and structured practice routines, such as regular running and endurance building, enhance intrinsic motivation among athletes (Yendrizal, et al., 2024). This motivation, in turn, is closely linked to athletes' perceptions of the event's overall quality and their psychological readiness to engage with the experience (dos Santos, et al., 2023). Importantly, perceived quality encompasses both subjective evaluations and objective aspects of the event, such as course design, sustainability management, and operational logistics. These objective features play a critical role in shaping athletes' environmental attitudes and eco-conscious behaviors, emphasizing the need for professionally managed and sustainability-oriented marathon experiences (Gkarane, et al., 2024).

The results also demonstrate that self-determination significantly influences preparation behaviors, highlighting how intrinsic motivation drives athletes to maintain disciplined training routines essential for full marathon readiness. Furthermore, the significant influence of preparation on participation behaviors suggests that well-structured training, integrated with environmental education and awareness components, supports sustainable and health-oriented marathon participation. The validation of the measurement model through multiple fit indices and confirmatory factor analysis (Hösl, et al., 2024). confirms the internal consistency, discriminant validity, and structural coherence of the model. These findings reinforce the conceptual framework while remaining aligned with the study's core objective to

investigate the interconnected effects of motivation, preparation, and perceived quality on athletes' behavior in the context of green marathon events in Thailand.

Conclusion

This study underscores the importance of thorough physical and mental preparation in fostering environmentally conscious participation in Thailand's Green Marathon. The findings demonstrate that consistent training routines such as regular running and endurance exercises are closely linked to athletes' motivation, confidence, and engagement in eco-friendly behaviors. The validated measurement model confirms significant relationships among sport preparation, intrinsic motivation (self-determination), and perceived event quality, highlighting that effective athlete preparation supports not only performance but also environmental awareness and sustainable practices. Importantly, the results reveal that comprehensive preparation fundamental to both physical readiness and psychological motivation contributes to athletes' positive attitudes towards eco-friendly behaviors and their perception of the event's quality. The alignment of cultural values with environmental consciousness further reinforces sustainable sports participation in Thailand, promoting community involvement and the integration of ecological practices within marathon events. These insights suggest that fostering a holistic approach integrating physical, mental, and environmental preparation can play a vital role in encouraging long-term, sustainable engagement in mass sporting events. In practical terms, organizers and policymakers should focus on designing training programs that incorporate environmental education and cultural values, which can enhance athletes' motivation and commitment to sustainability. Promoting eco-conscious behaviors through targeted communication, providing eco-friendly materials, and emphasizing the cultural significance of environmental stewardship can foster a deeper sense of responsibility among participants. Such initiatives support Thailand's broader goals of sustainable sports tourism and community development, helping to create a lasting impact on environmental awareness and cultural identity within the context of mass sporting events.

Limitation

This study's limitations include its cross-sectional design, which precludes causal inferences. The use of convenience sampling may also limit the generalizability of the findings to a broader population of marathon runners. Future research should employ longitudinal designs and broader sampling methods to validate these findings and explore the causal pathways in greater detail. Additionally, the study relied on self-reported data, which may be subject to social desirability bias. Future studies could incorporate observational measures to corroborate self-reported behaviors.

Author contribution

For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used "Conceptualization, P.T and K.K.; methodology, P.T and J.L.; software, K.K.; validation, P.T. and J.L; formal analysis, K.K.; investigation, J.L.;resources, J.L.; data curation, K.K.; writing—original draft preparation, P.T. and J.L.; writing—review and editing, P.T and J.L.; visualization, P.T.; supervision, K.K.; project administration, J.L.; funding acquisition, K.K. All authors have read and agreed to the published version of the manuscript

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