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Influence of Engagement in Outdoor Activities on Environmental Awareness among Visitors at Taman Botani, Shah Alam

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ABSTRACT

This study investigates the relationship between engagement in outdoor activities and environmental awareness among visitors at Taman Botani, Shah Alam. As urbanisation and technological advancements increasingly disconnect individuals from nature, the role of outdoor recreational activities in enhancing environmental consciousness becomes vital. A quantitative research design was employed, with data collected from 132 respondents through structured questionnaires. The findings revealed strong positive correlations between physical activity, intrinsic and extrinsic motivation, and environmental awareness. Notably, extrinsic motivation was the strongest predictor, followed by intrinsic motivation and physical activity. Furthermore, participants who engaged in personalised outdoor education programs demonstrated significantly higher levels of environmental awareness compared to those in non-personalised programs. These results underscore the importance of motivational factors and structured learning in promoting pro-environmental behaviours within urban communities. The study provides valuable insights for policymakers, educators, and urban planners in designing effective environmental education strategies that integrate outdoor experiences for sustainable urban living.

1. INTRODUCTION

Rapid urbanisation has increasingly distanced people from nature, reducing their environmental awareness and connection to natural surroundings. As urbanisation expands, people's direct contact with nature drops, a phenomenon often called the "extinction of experience" Rasli and Kanniah (2023) show that green space in Kuala Lumpur was highly fragmented: the city-centre zone had only approximately 2.09% green cover of its urban area compared to higher percentages in other zones. Between 1990 and 2010, Kuala Lumpur experienced a steady decline in green spaces due to urban development and sprawl (Noor Mohd Noor, Abdullah & Manzahari, 2013). In terms of human-environmental relationship context, recent study found human–nature connectedness has declined by more than 60 % over the past 220 years, largely due to urban growth, reduced nature contact in childhood, and generational transmission failure. (Arnold, 2025). The

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growing detachment from the natural environment represents not only an ecological concern but also a social and psychological challenge. This disconnection from the natural environment poses not only ecological challenges but also social and psychological consequences, such as increased stress, mental fatigue and diminished sense of well-being (Bratman et al., 2019). However, these challenges can be mitigated through active engagement in outdoor recreational activities.

One effective approach to counteract this detachment is outdoor recreation, which provides opportunities for individuals to re-engage with natural environments and understand ecological processes. Participation in outdoor recreation activities has been shown to foster both intrinsic and extrinsic motivations (Ab Dulhamid et al., 2023; Mateer, 2022). Moreover, urban green spaces and parks have been associated with improved environmental awareness, pro-environmental attitudes, and overall well-being. (Petrunoff et al., 2021). As a prominent urban sanctuary with extensive green spaces, Taman Botani Shah Alam serves as an ideal site for investigating the impact of outdoor engagement on environmental awareness.

The purpose of this study is to explore how outdoor activities and motivation both intrinsic and extrinsic affect visitors' environmental consciousness at Taman Botani Shah Alam. By focusing on this area, this research narrows the broad issue of urban–nature disconnection to a specific and meaningful context, offering valuable insights for park management, environmental education initiatives, and urban green space planning. The findings are expected to contribute to the development of strategies that not only enhance visitors' enjoyment and engagement with outdoor environments but also cultivate a deeper, more enduring sense of environmental responsibility. In alignment with Malaysia's National Environmental Policy (2021), Core 4: Environmental Awareness, Education and Stewardship which focused on developing environmentally responsible citizens through education, awareness and participation, as well as the National Policy on Biological Diversity (2022–2030), Goal 4: Mainstream Biodiversity Across Sectors and Society which emphasise fostering environmental awareness and sustainable practices among citizens, this study aims to ensure that by 2030, Malaysians are aware of biodiversity's value and the steps they can take care to conserve and use it sustainably.

2. LITERATURE REVIEW

2.1 Environmental Awareness

Environmental Awareness (EA) is defined as encompassing knowledge of environmental issues, coupled with the attitudes and actions that promote conservation (Ballantyne & Packer, 2009; Chawla, 1998). The drive behind pro-environmental actions is largely governed by Self-Determination Theory (SDT), which distinguishes between two primary forms of motivation (Ryan & Deci, 2000). In the context of Southeast Asia, rapid urbanisation has increasingly disrupted the public's connection with natural environmental consciousness (Tan, Lee, & Chua, 2022; Abdullah & Mohd, 2023). While formal education provides foundational knowledge of environmental issues, the informal experiences like engagement in community-based environmental programs, nature exposure, and participatory ecological activities have emerged as critical avenues for enhancing EA, often translating knowledge into concern and action. (Lim, Ong, & Chong, 2021).

2.2 Intrinsic Motivation and Extrinsic Motivation

Intrinsic Motivation (IM) is defined as the engagement in an activity purely for the inherent satisfaction, enjoyment, or personal fulfilment it provides (Deci & Ryan, 2013). IM is crucial for sustained, long-term commitment to conservation efforts. Extrinsic Motivation (EM) is defined as the engagement in an activity to attain separable external outcomes, such as rewards, incentives, or social recognition (Ryan & Deci, 2000). While beneficial for initiating short-term behavioural change, EM must be carefully integrated to support, rather than undermine, intrinsic interest (Stern et al., 1999). While EM can initiate engagement in outdoor activities, its effect may be temporary if it does not support or align with intrinsic interest (Shah et al., 2021). Studies in urban forest and recreational parks indicate that IM enhances long-term participation

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and behavioural intention, whereas EM can sometimes undermine sustained engagement if overly emphasised (Zhang, Li, & Chen, 2023; Calogiuri & Chroni, 2014). Understanding the balance between intrinsic and extrinsic motivators is critical for designing outdoor programmes that promote continued participation and environmental stewardship (Fang et al., 2017).

2.3 Physical Activities

Physical activities (PA) particularly those conducted in natural settings (e.g., cycling, nature walking), foster a direct 'nature connectedness. (Pretty, Peacock, Hine, Sellens, South & Griffin, 2005). This direct, *hands-on* experience is a strong predictor of pro-environmental behaviour, providing context for environmental learning that surpasses traditional classroom-based methods (Ballantyne & Packer, 2009). The restorative qualities of nature also contribute to a positive feedback loop, linking psychological well-being to increased advocacy for environmental protection (Barton & Pretty, 2010). This interplay between health and environmental consciousness indicates that participation in physical activity (PA) within parks or botanical gardens can serve as a dual-purpose intervention: promoting physical and mental well-being while also fostering environmental awareness and stewardship. Meta-analyses show that physical activity in outdoor natural environments is associated with greater improvements in well-being and restorative outcomes than similar activity in indoor or highly built environments. (Wicks, Barton, Orbell & Andrews, 2022). In addition, evidence suggests that outdoor PA provides opportunities for informal environmental learning: activities in green spaces can lead to greater sensitivity toward conservation and the environment because participants encounter natural features, biodiversity, and ecosystem dynamics first-hand.

In urban contexts where access to green spaces may be limited, structured outdoor activity programs within parks become especially valuable: they offer opportunities not only to promote healthier lifestyles, but also to reconnect urban dwellers with nature, cultivate a sense of environmental responsibility, and translate these experiential encounters into sustainable behaviours and pro-environmental action.

2.4 Relationship between Motivations, Physical Activity and Environmental Awareness

In the context of intrinsic motivation and environmental awareness, studies consistently show that individuals with higher intrinsic motivation towards outdoor activities possess a greater sensitivity to and understanding of environmental problems. Outdoor education programs designed to maximise curiosity and self-satisfaction are effective in enhancing long-term pro-environmental behaviour (Malone & Tranter, 2003).

For extrinsic motivation and environmental awareness, extrinsic motivation through rewards and incentives (e.g., free access to educational programs, public acknowledgment), can serve as a vital mechanism to encourage initial participation and knowledge acquisition, particularly for visitors at Taman Botani who may lack pre-existing intrinsic motivation (Stern et al., 1999).

In relation with physical activity and environmental awareness: Engaging in physical activity in a natural environment allows for experiential learning. This direct interaction enhances conceptual understanding of environmental principles and develops a sense of stewardship, thus increasing environmental awareness (Ballantyne & Packer, 2009).

2.5 Conceptual Framework

The conceptual framework for this study illustrates the predictive relationship between three independent variables Intrinsic Motivation, Extrinsic Motivation, and Physical Activities and the dependent variable, Environmental Awareness. Based on Self-Determination Theory and environmental education literature, the model posits that internal enjoyment (intrinsic motivation) and external incentives or learning goals (extrinsic motivation) serve as primary psychological drivers for engagement. Simultaneously, direct physical participation in natural settings (physical activities) acts as an experiential mechanism. Together, these three forms of outdoor engagement are hypothesized to positively influence and enhance visitors' overall environmental consciousness and pro-environmental behaviours.

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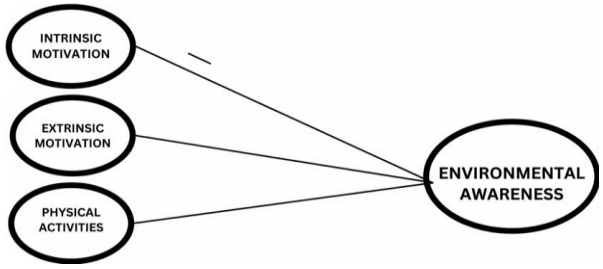

Figure 2.5: Conceptual Framework of Environmental Awareness

3. METHOD

This study adopted a quantitative correlational design. A total of 132 visitors at Taman Botani, Shah Alam participated voluntarily. Data were collected through a structured questionnaire comprising items on outdoor activity engagement, motivation, and environmental awareness using a 5-point Likert scale. Correlation and regression analyses were conducted to examine relationships among variables.

3.1 Research Design

This study employed a quantitative research design utilising a descriptive and correlational approach. The descriptive component was used to determine the central tendency (mean and standard deviation) of visitor engagement (motivation and physical activity) and their level of environmental awareness. The correlational component was applied to determine the direction and strength of the relationship between the independent and dependent variables.

3.2 Population and Sampling

The target population for this study comprised visitors engaging in various outdoor activities at Taman Botani, Shah Alam.

i. Sample Size: The sample size of 132 met the minimum requirement for multiple regression analysis as suggested by Hair et al. (2019), ensuring sufficient statistical power and representativeness.

ii. Sampling Technique: A convenience sampling technique was utilised. This non-probability method was deemed appropriate as it allowed for the efficient collection of data from readily available visitors at designated high-traffic activity areas within Taman Botani during the survey period.

3.3 Instrumentation

Data were collected using a structured, self-administered questionnaire divided into four main sections, anchored primarily on a 5-point Likert Scale (1 = Strongly Disagree to 5 = Strongly Agree). The main sections are:

i. Section A: Demographic Profile. (e.g., Age, Gender, Education Level).

ii. Section B: Intrinsic and Extrinsic Motivation. Items were adapted from the Self-Determination Theory frameworks (Ryan & Deci, 2000). This section measured the internal drive (Intrinsic Motivation) and the influence of external rewards/recognition (Extrinsic Motivation) related to outdoor engagement.

iii. Section C: Physical Activities. This measured the frequency and type of outdoor physical activities engaged in by the visitors at Taman Botani (e.g., walking, cycling, jogging, nature observation). Additionally, this section required participants to indicate the type of outdoor education program they experienced. For this study were operationalized as tailored, interactive activities guided by

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park staff based on visitor interests (e.g., customized guided tours or specific nature workshops). Conversely, non-personalized programs were defined as standard, self-guided experiences relying on general park infrastructure (e.g., walking along trails using standard informational signage).

iv. Section D: Environmental Awareness. Items were adapted from established scales in environmental education literature (e.g., Ballantyne & Packer, 2009). This assessed respondents' knowledge, attitude, and expressed commitment to pro-environmental actions (e.g., I pick up litter when I see it in a park).

3.3.1 *Validity and Reliability*

To ensure the robustness of the survey instrument, a pilot test was conducted prior to full-scale data collection. Face and content validity were established by reviewing the questions to ensure they aligned with the research objectives and appropriately utilized the 5-point Likert scale.

A measure of internal consistency, Cronbach's Alpha, was used to assess the reliability of the questionnaire. A coefficient of 0.70 or greater is widely accepted as indicating adequate reliability for survey instruments (Nunnally, 1978; Tavakol & Dennick, 2011). The pilot test yielded a Cronbach's Alpha score of 0.993 across the 27 items:

Reliability Statistics

Cronbach's Alpha	N of Items
0.993	27

This exceptionally high reliability coefficient demonstrates that the items possessed outstanding internal consistency in measuring the intended constructs—physical activities, intrinsic motivation, extrinsic motivation, and environmental awareness. These results verified that the survey instrument was highly reliable and suitable for the main data collection phase at Taman Botani, Shah Alam.

3.4 Data Collection Procedure

The necessary ethical clearance and official permission from the relevant authorities (e.g., Universiti Teknologi MARA and Taman Botani Management) were secured prior to data collection. Data were collected over a period of two months primarily during weekends when visitor traffic was highest. Respondents were briefed on the study's purpose and provided with an informed consent form. Confidentiality and voluntary participation were assured before the questionnaires were administered. The study adhered to ethical standards outlined by Universiti Teknologi MARA's Research Ethics Committee, ensuring informed consent, anonymity, and voluntary participation.

3.5 Data Analysis

Data were analysed using the Statistical Package for Social Sciences (SPSS) software. The following statistical techniques were employed to address the research questions:

i. Descriptive Statistics: Mean ($\bar{X}$) and Standard Deviation (SD) were computed to summarise the demographic characteristics of the sample and to determine the overall level of engagement and environmental awareness.

ii. Inferential Statistics:

   a. Pearson Correlation Coefficient (r): Used to examine the nature, strength, and direction of the linear relationship between the independent variables (Intrinsic Motivation, Extrinsic Motivation, and Physical Activities) and the dependent variable (Environmental Awareness).

   b. Multiple Regression Analysis: Used to determine the combined influence of all three independent variables on Environmental Awareness. Specifically, this analysis identified the

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most influential predictor variable as indicated by the highest standardized Beta (β) coefficient. The model fit was assessed using the R2 value and the F-statistic.

4. FINDING & DISCUSSION

Results indicated significant positive correlations between outdoor activity engagement and environmental awareness. Extrinsic motivation emerged as the strongest predictor of awareness, followed by intrinsic motivation and physical activity. Visitors involved in structured outdoor education programs exhibited higher environmental awareness levels. The findings highlight the role of motivational factors and educational experiences in encouraging sustainable behaviours in urban populations.

4.1 Demographic Overview

The analysis of participant demographics is summarised in Table 4.1. The sample comprised 55.3% (n=73) males and 44.7% (n=59) females, indicating a relatively balanced gender distribution. The largest proportion of visitors fell within the 18–24 age group (59.1%, n=78), suggesting the study captured a young, active adult population.

Ethnically, the sample was predominantly Chinese (49.2%, n=65), followed by Malay (31.8%, n=42) and Indian (18.9%, n=25). In terms of knowledge, 81.1% of participants reported having "some" (40.9%) or "a lot" (40.2%) of knowledge about outdoor activities. The majority (68.2%) reported no medical conditions affecting their participation. Educationally, the most common attainment was "Some college" (45.5%) or a "bachelor's degree" (35.6%).

4.2 Relationship between Outdoor Activities Engagement and Environmental Awareness among Shah Alam Community

Table 4.2. Correlations Between Outdoor Activities Engagement and Environmental Awareness

		Physical Activities	Intrinsic Motivation	Extrinsic Motivation	Environmental Awareness
Physical Activities	Pearson Correlation	1	.908**	.912**	.916**
	Sig. (2-tailed)		0.000	0.000	0.000
	N	132	132	132	132
Intrinsic Motivation	Pearson Correlation	.908**	1	.970**	.976**
	Sig. (2-tailed)	0.000		0.000	0.000
	N	132	132	132	132
Extrinsic Motivation	Pearson Correlation	.912**	.970**	1	.981**
	Sig. (2-tailed)	0.000	0.000		0.000
	N	132	132	132	132
Environmental Awareness	Pearson Correlation	.916**	.976**	.981**	1
	Sig. (2-tailed)	0.000	0.000	0.000	
	N	132	132	132	132

**. Correlation is significant at the 0.01 level (2-tailed).

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The Pearson correlation analysis (Table 4.2) revealed very strong, positive, and statistically significant relationships between all three dimensions of outdoor engagement and environmental awareness ($p < .001$). Specifically, extrinsic motivation showed the strongest correlation ($r = .981$), followed by intrinsic motivation ($r = .976$) and physical activities ($r = .916$). These results confirm that higher levels of engagement at Taman Botani are directly associated with increased environmental consciousness.

These remarkably strong correlations corroborate the findings of Pretty et al. (2005), who hypothesized that direct physical engagement with natural settings fosters a deep "nature connectedness." Furthermore, the strong link between motivational factors and awareness aligns with the core principle of Self-Determination Theory (Ryan & Deci, 2000). The results confirm that both internal enjoyment and external incentives are crucial, complementary pathways for enriching environmental stewardship, effectively bridging the gap between passive recreation and active environmental concern (Larson et al., 2011).

4.3 Key Factors that Influence Outdoor Activities Engagement among Shah Alam Community

Multiple linear regression analysis was conducted to identify the key factors of outdoor activities engagement that significantly influence environmental awareness among visitors at Taman Botani, Shah Alam. The analysis examined the predictive power of physical activities, intrinsic motivation, and extrinsic motivation on environmental awareness.

Table 4.3.1. Model Summary for Environmental Awareness Prediction

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.987[a]	0.974	0.973	0.18610

a. Predictors: (Constant), Extrinsic Motivation, Physical Activities, Intrinsic Motivation

Table 4.3.2. ANOVA Results for Environmental Awareness Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	164.28	3	54.8	1581.1	<.001b
	Residual	4.433	128	0.0		
	Total	168.713	131			

a. Dependent Variable: Environmental Awareness
b. Predictors: (Constant), Extrinsic Motivation, Physical Activities, Intrinsic Motivation

Table 4.3.3. Regression Coefficients for Environmental Awareness Predictors

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	0.178	0.067		2.653	0.009
	Physical Activities	0.101	0.049	0.073	2.043	0.043
	Intrinsic Motivations	0.376	0.060	0.381	6.249	0.000
	Extrinsic Motivations	0.518	0.059	0.545	8.751	0.000

a. Dependent Variable: Environmental Awareness

The multiple linear regression model was statistically significant, $F(3, 128) = 1581.1$, $p < .001$, and explained 97.4% of the variance in environmental awareness ($R^2 = 0.974$). All three factors of outdoor activities engagement emerged as significant predictors of environmental awareness. Extrinsic motivation was the strongest predictor ($\beta = 0.545$, $p < .001$), followed by intrinsic motivation ($\beta = 0.381$, $p < .001$), and physical activities ($\beta = 0.073$, $p = .043$). The results indicate that motivational factors, particularly

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extrinsic motivation such as wanting to be close to nature and studying about nature, have a substantially greater influence on environmental awareness compared to physical activities alone, suggesting that the psychological drivers of outdoor engagement are more critical than the mere physical participation in fostering environmental consciousness.

The emergence of extrinsic motivation as the most dominant predictor ($\beta = 0.545$) provides a compelling theoretical contribution to the existing literature. While traditional psychological models often champion intrinsic motivation for long-term behavioral change, community recreational contexts demonstrate that external rewards and structured goals are paramount. This aligns with the Self-Determination Theory perspective on internalization, which notes that external incentives, social recognition, and identified goals are vital for initiating participation among public audiences who may lack a deep-seated, pre-existing intrinsic drive (Ryan & Deci, 2020). Practically, this implies that visitors are highly responsive to externally validated learning objectives, which serve as critical catalysts for environmental awareness in urban green spaces.

4.4 Effectiveness of Community-based Outdoor Education Programmes in Enhancing Environmental Awareness among the Community in Shah Alam

The third research question examined the effectiveness of community-based outdoor education programs in enhancing environmental awareness among visitors at Taman Botani, Shah Alam. Specifically, this analysis compared environmental awareness levels between participants who experienced personalized versus non-personalized outdoor education programs using an independent samples t-test. As defined in the methodology, personalized programs involved tailored, guided interactions, whereas non-personalized programs consisted of standard, self-guided park experiences.

Table 4.4.1. Descriptive Statistics for Environmental Awareness by Programme Type

Programme Type		N	Mean	Std. Deviation	Std. Error Mean
Environmental Awareness	Personalised	55	4.60	0.44	0.06
	Non- personalised	77	3.47	1.24	0.14

The personalised program group demonstrated significantly higher environmental awareness scores with a large effect size (Cohen's d = 1.145, 95% CI [0.770, 1.516]), indicating that personalised outdoor education programs were substantially more effective in enhancing environmental awareness among visitors. Levene's test indicated unequal variances ($F = 138.83$, $p < .001$), therefore the equal variances not assumed results were interpreted, confirming the robustness of the findings with a mean difference of 1.13 points on the environmental awareness scale.

These results provide strong empirical support for the efficacy of individualised learning models, as advocated by educational theorists (Shemshack & Spector, 2020). The statistical superiority of personalised programmes demonstrates that when outdoor education is tailored to visitors' specific interests, it more effectively leverages their existing motivations. This directly aligns with a recent experimental study by Yapıcı (2025), which concluded that structured, field-based environmental education significantly increases individuals' environmental sensitivity and advocacy for sustainable resource use. By converting abstract ecological concepts into relatable, hands-on experiences, customised programmes yield superior environmental stewardship outcomes compared to traditional, non-personalised methods.

Table 4.4.2. Effect Size for Environmental Awareness by Programme Type

	Standardizer[a]	Point Estimate	95% Confidence Interval	
			Lower	Upper
Cohen's d	0.99	1.15	0.77	1.52
Hedges' correction	1.00	1.14	0.77	1.51
Glass's delta	1.24	0.91	0.54	1.29

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5. CONCLUSION

The study confirmed exceptionally **strong positive correlations** (r=.916 to .981) between all dimensions of outdoor activities engagement (Intrinsic Motivation, Extrinsic Motivation, and Physical Activities) and Environmental Awareness. This aligns with prior literature asserting that direct interaction with nature is a critical factor in fostering environmental consciousness (Pretty et al., 2005).

The Multiple Linear Regression model demonstrated that outdoor engagement factors are the primary determinants of Environmental Awareness, explaining an outstanding 97.4% of the variance (R2=0.974). Crucially, the analysis established a hierarchy of influence:

i. Extrinsic Motivation (β=0.545):
Emerged as the strongest predictor. This is a particularly noteworthy finding in the context of community-based recreational sites like Taman Botani. While Self-Determination Theory (Ryan & Deci, 2000) often champions intrinsic motivation for long-term change, this result suggests that visitors in a public, leisure-oriented setting are significantly driven by external incentives, such as the desire for scenic appreciation, environmental study objectives, or social acknowledgment. This supports the notion that structured exposure with specific, externally validated learning objectives (Environmental Education Theory) is more effective than casual leisure alone.

ii. Intrinsic Motivation (β=0.381):
the second strongest predictor, confirming that internal enjoyment and personal satisfaction significantly contribute to awareness.

iii. Physical Activities (β=0.073):
Demonstrated the weakest, albeit still significant, predictive power. This suggests that the quality and psychological driver of the engagement (motivation) are far more consequential than the mere quantity of physical participation itself. A visitor jogging without environmental focus gains less awareness than one walking with a specific observational goal.

The independent samples t-test provided compelling evidence that personalized outdoor education programs are substantially more effective ($\bar{X}$=4.60, SD=0.44) than non-personalized programs ($\bar{X}$=3.47, SD=1.24). The large effect size (Cohen′s d=1.145) signifies a practical, meaningful difference in awareness development.

This finding supports educational theories on individualized learning (Shemshack & Spector, 2020) and directly addresses the motivational hierarchy found in RQ2. By tailoring activities to a participant's interests and knowledge, personalised me can:

- leverage Extrinsic Motivation by framing activities around specific, appealing learning goals (e.g., guided birdwatching for nature appreciation).
- deepen Intrinsic Motivation by allowing participants to pursue areas of genuine personal interest, thereby fostering greater ownership and enduring commitment to environmental concepts.

This research makes a significant contribution to the environmental education literature by demonstrating that motivational engagement is the core driver of environmental consciousness in community outdoor settings, surpassing the influence of physical participation alone. The finding that Extrinsic Motivation is the most dominant predictor challenges conventional wisdom and highlights a valuable opportunity to refine how educational programs are designed for public spaces.

The study strongly concludes that personalized outdoor education programs are substantially more effective in fostering Environmental Awareness. Investment by Malaysian botanical gardens and outdoor facilities in customised visitor experiences and motivational assessment tools will yield superior environmental stewardship outcomes compared to traditional methods.

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5.1 Limitation and Future Research

While this study provides valuable insights into the relationship between outdoor activities and environmental awareness, several methodological limitations must be acknowledged. First, the reliance on a convenience sampling technique among visitors at Taman Botani, Shah Alam, limits the generalizability of the findings. The results represent this specific demographic and may not fully reflect the broader Malaysian population or visitors in different geographical contexts. Second, the exceptionally high correlation values suggest potential common method bias associated with self-reported questionnaires.

Furthermore, a critical limitation of this study is the presence of severe multicollinearity among the independent variables. The exceptionally high bivariate correlations, particularly between Intrinsic and Extrinsic Motivation (r = .970), indicate a lack of empirical distinctness between these constructs within this specific dataset. It is highly likely that respondents did not conceptually separate internal enjoyment from external learning objectives when completing the self-reported questionnaire, leading to potential common method bias. Because of this multicollinearity, the individual predictive weights (Beta coefficients) in the regression model should be interpreted with extreme caution, even though the overall model explains a high degree of variance (R^2 = 0.974). Future research should refine these measurement scales to ensure clearer distinctions between motivational constructs.

To address these limitations, future research should employ probability sampling methods across multiple urban green spaces to enhance representativeness. Furthermore, future studies are strongly encouraged to adopt a longitudinal design to determine whether the environmental awareness cultivated through these activities translates into sustained, long-term pro-environmental behaviours. Incorporating mixed methods approaches or experimental interventions would also provide deeper qualitative insights into why extrinsic motivation serves as the primary driver in public recreational settings.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES

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CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest regarding the publication of this article.

AUTHORS' CONTRIBUTIONS

Adam Afif Mohamad Azmi conceptualised the research idea, led the data collection process, and was primarily responsible for drafting the manuscript. Muhammad Aiman Syafiq Khadzari and Muhammad Farid Hilmi provided critical input in the development of the study design, methodology, and assisted with data collection. Muhammad Faizal Kutip performed the statistical analyses, assisted in interpreting the results, and revised the manuscript. All authors reviewed and approved the final version of the manuscript.

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