Gender Differences in Green Entrepreneurial Intention in Malaysia: The Mediating Roles of Attitude and Perceived Behavioural Control

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ABSTRACT

Green entrepreneurship plays an increasingly important role in advancing sustainable development; however, empirical evidence on gender differences in green entrepreneurial intention remains limited. Grounded in the Theory of Planned Behavior, this study investigates how gender influences green entrepreneurial intention through the mediating effects of attitude toward green entrepreneurship and perceived behavioral control. By addressing this gap, the study contributes to a more nuanced understanding of gendered decision-making processes in sustainable entrepreneurship. Using a quantitative cross-sectional design, survey data were collected from 317 undergraduate students and analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM), incorporating mediation and multi-group analyses. The findings reveal that gender does not exert a direct effect on green entrepreneurial intention but operates indirectly through psychological antecedents. Both attitude toward green entrepreneurship and perceived behavioral control significantly and positively influence intention. Notably, the attitudinal pathway is stronger among female students, indicating that value-driven and pro-environmental considerations play a more salient role in shaping their entrepreneurial intentions, whereas perceived behavioral control demonstrates a comparable influence across genders. The study extends the Theory of Planned Behavior by empirically demonstrating gender-specific mediation mechanisms in the formation of green entrepreneurial intention. From a practical perspective, the results underscore the importance of gender-sensitive educational and policy interventions that strengthen positive attitudes toward green entrepreneurship while enhancing perceived behavioral control to support broader participation in sustainable entrepreneurial activities.

Keywords: Green entrepreneurial intention; gender; Theory of Planned Behavior; attitude toward green entrepreneurship; perceived behavioral control; sustainable entrepreneurship.

INTRODUCTION

Entrepreneurship is universally recognized by governments, academia and industry as a cornerstone of economic growth, innovation, and long-term societal development; increasingly, however, its relevance extends beyond economic performance to encompass environmental sustainability and social responsibility. In response to escalating environmental challenges and the global commitment to the United Nations Sustainable Development Goals (SDGs), green entrepreneurship has emerged as a critical pathway for aligning economic value creation with ecological preservation (GEM, 2023/24). Green entrepreneurship denotes entrepreneurial activities that deliberately embed environmental considerations within business models, products and services while maintaining economic viability (Smith & Lee, 2023). Within this landscape, university students represent a strategically important population, as they constitute the next generation of entrepreneurs and decision-makers who will shape future sustainable economies. Consequently, green entrepreneurial intention (GEI) defined as an individual's conscious and deliberate plan to establish an environmentally sustainable venture has become a focal construct in entrepreneurship research, given its strong predictive power for actual entrepreneurial behavior (Ajzen, 1991; Linan & Chen, 2006). As higher education institutions intensify their efforts to integrate sustainability-oriented curricula and entrepreneurship initiatives, identifying the psychological and demographic determinants of student's GEI has become both timely and necessary. Among these determinants, gender has consistently emerged as a salient factor, with empirical evidence demonstrating systematic differences between

males and females in entrepreneurial intentions, perceptions and self-confidence; notably, females frequently report lower entrepreneurial intention despite exhibiting equal or greater environmental concern (Johnson et al., 2025). Such patterns indicate that gender disparities in GEI are unlikely to be purely structural and instead reflect deeper cognitive mechanisms, particularly attitudes toward green entrepreneurship and perceived behavioral control (Chen & Wong, 2024). Nevertheless, despite the rapid expansion of research at the intersection of entrepreneurship and sustainability, empirical findings on gender differences in entrepreneurial intention remain fragmented and inconclusive, especially in green entrepreneurship contexts (Ahmed & Khan, 2024). Although the Theory of Planned Behavior (TPB) provides a robust and widely validated framework for explaining entrepreneurial intention through attitude toward the behavior, perceived behavioral control and subjective norms (Ajzen, 1991), existing green entrepreneurship studies have largely treated gender as a control variable and relied on direct-effect modeling approaches. As a result, the indirect pathways through which gender may shape green entrepreneurial intention remain insufficiently examined. This unresolved gap underscores the need for mediation-based empirical investigations that explicitly assess the roles of attitude toward green entrepreneurship and perceived behavioral control in explaining gender differences in GEI, thereby advancing theory and informing the design of more effective, gender-responsive educational and policy interventions.

LITERATURE REVIEW

Green entrepreneurship has gained prominence as a strategic response to environmental degradation while simultaneously generating economic value and advancing sustainable development objectives. Prior research emphasises that entrepreneurial behaviour in sustainability-oriented contexts is largely intentional and driven by deliberate cognitive processes, making GEI a central construct in green entrepreneurship research (Ajzen, 1991; Linan & Chen, 2006). GEI among university students is particularly important, as this group represents a critical source of future entrepreneurs capable of supporting the transition toward low-carbon and sustainable economic systems (GEM, 2023/24).

TPB provides a well-established theoretical foundation for explaining GEI. Within TPB, intention is shaped by ATB, PBC, and subjective norms; however, extensive entrepreneurship research demonstrates that ATB and PBC exhibit stronger and more consistent explanatory power than subjective norms, particularly in entrepreneurial and sustainability-oriented contexts (Linan & Chen, 2009; Carsrud & Brännback, 2011; Linan et al., 2023). As entrepreneurial decisions are primarily driven by individual evaluations of desirability and perceived feasibility rather than social pressure, subjective norms are excluded from the present study to enhance model parsimony and explanatory clarity, consistent with Ajzen's (2002) contextual adaptation of TPB.

Within green entrepreneurship, ATB reflects individuals' evaluations of the desirability and value of engaging in environmentally sustainable venture creation, while PBC captures perceived feasibility, including confidence in entrepreneurial skills, access to resources, and the ability to overcome anticipated constraints (Ajzen, 2002; Hsu & Chen, 2023; Patel et al., 2024). PBC is particularly salient in this context due to heightened regulatory complexity, technological uncertainty, and market risk (Hockerts, 2017; Kuckertz et al., 2020). Empirical evidence consistently indicates that individuals with stronger ATB and higher PBC are more likely to develop strong GEI and to translate favourable evaluations into entrepreneurial intention (Li et al., 2023; Nguyen et al., 2025).

Gender differences in entrepreneurship have been extensively documented. Men generally report higher entrepreneurial intention, stronger confidence in entrepreneurial abilities, and greater tolerance for risk, whereas women tend to emphasise social and environmental value creation but exhibit lower entrepreneurial self-efficacy (Langowitz & Minniti, 2007; Verheul et al., 2009; Brush et al., 2019). Gender role and socialisation theories suggest that these differences arise from socially constructed expectations regarding appropriate roles and competencies (Eddleston et al., 2016). In green entrepreneurship, recent studies indicate that although women often demonstrate stronger environmental concern and ethical orientation, they remain underrepresented in venture creation, suggesting that motivational factors alone do not fully explain gender disparities in GEI (Ahmed & Khan, 2024; Johnson et al., 2025).

Gender-related differences are particularly evident in the cognitive components of TPB. Prior research suggests that women tend to hold more favourable sustainability-related attitudes, which may strengthen ATB; however,

gendered perceptions of feasibility, anticipated barriers, and opportunity costs may constrain the translation of these attitudes into GEI (Gupta et al., 2022; Linan et al., 2023). PBC has therefore been identified as a critical mechanism underlying gender differences in entrepreneurial intention. Women frequently report lower PBC due to perceived limitations in skills, access to financial and social capital, and structural barriers (Wilson et al., 2007; Verheul et al., 2009). In sustainability-oriented ventures, these constraints may be further amplified by technological complexity and regulatory uncertainty, thereby weakening GEI despite favourable attitudes (Hockerts, 2017; Kuckertz et al., 2020; Hsu & Chen, 2023).

Consistent with TPB, background factors such as gender are theorized to influence intention indirectly through ATB and PBC rather than exerting direct effects (Ajzen, 1991, 2002). Empirical evidence supports this mediation-based explanation, showing that gender differences in entrepreneurial intention are largely accounted for by variations in attitudes and perceived control (Linan & Chen, 2009; Verheul et al., 2009). ATB captures the evaluative dimension through which gender shapes the desirability of sustainable venture creation, whereas PBC reflects the feasibility dimension through which gender-related differences in confidence and resources influence GEI (Ahmed & Khan, 2024). Accordingly, this study proposes a TPB-based conceptual framework positioning gender as an exogenous variable that affects GEI indirectly via ATB and PBC.

Based on this framework, the following hypotheses are proposed:

Hypothesis 1a (H1a): Gender has a significant effect on Attitude Towards Behaviour.

Hypothesis 1b (H1b): Gender has a significant effect on Perceived Behavioural Control.

Hypothesis 2a (H2a): Attitude Towards Behaviour has a significant effect on Green Entrepreneurship Intention.

Hypothesis 2b (H2b): Perceived Behavioural Control has a significant effect on Green Entrepreneurship Intention.

Hypothesis 3a (H3a): Attitude Towards Behaviour mediates the relationship between gender and Green Entrepreneurship Intention.

Hypothesis 3b (H3b): Perceived Behavioural Control mediates the relationship between gender and Green Entrepreneurship Intention.

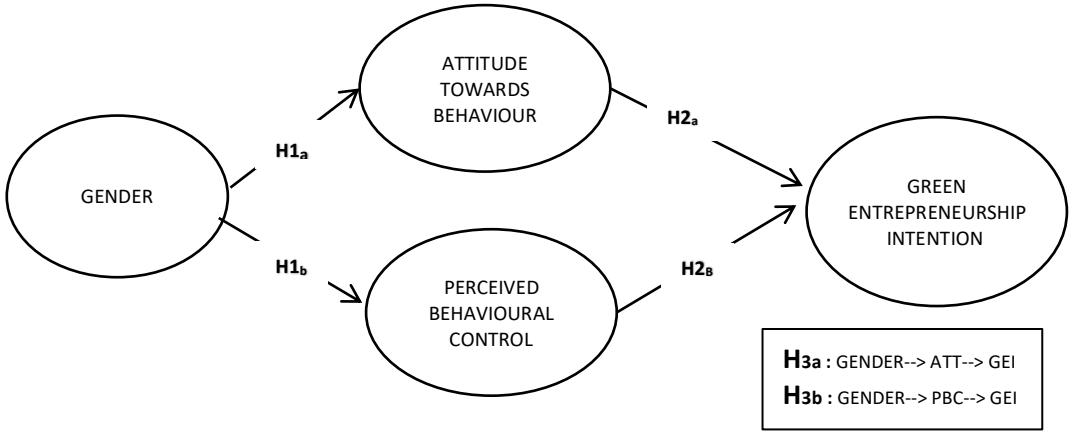

Figure 1 The conceptual model developed in this study.

RESEARCH METHODOLOGY

This study employed a quantitative research design to examine the relationships among gender, ATB, PBC, and GEI within the TPB framework (Ajzen, 1991; Linán & Chen, 2009). A cross-sectional survey was conducted to capture participants' responses at a single point in time, providing a snapshot of cognitive determinants and intentions, consistent with prior entrepreneurship research (Krueger et al., 2000; Shinnar et al., 2012).

The target population comprised undergraduate students enrolled in entrepreneurship-related programmes at a private university in Malaysia. University students are frequently selected in entrepreneurial intention studies as they are at a formative stage for career decision-making and exhibit variation in ATB and PBC (Krueger et al., 2000; Shinnar et al., 2012). A purposive sampling technique was applied to include students with prior exposure to entrepreneurship-related coursework and activities. A total of 317 valid responses were collected, which meets the recommended sample size for PLS-SEM and mediation testing (Hair, Hult, Ringle, & Sarstedt, 2022). Respondents were aged 18–35 years (M = 21.8, SD = 2.3), with 106 males (35.58%) and 194 females (64.62%), providing sufficient representation for gender-based comparisons. Participants were drawn from various years of study and faculties, ensuring diversity in perspectives on GEI.

Data were collected via a structured online questionnaire using Google Forms, distributed through official university channels and course coordinators. Participation was voluntary, and respondents were assured of confidentiality and anonymity. The online format enabled standardised administration, minimized missing data, and facilitated efficient data management (Wright, 2005; Evans & Mathur, 2018).

The instrument measured four constructs. Gender was coded as a binary variable (male = 0, female = 1). ATB was assessed using nine items adapted from Linán and Chen (2009), capturing the desirability, usefulness, and personal value of green entrepreneurship. PBC was measured using ten items adapted from Linán and Chen (2009) and Hsu and Chen (2023), reflecting self-efficacy, capability, and perceived feasibility in initiating and managing green ventures. GEI was measured using seven items adapted from Linán and Chen (2006) and Patel et al. (2024), evaluating intention, commitment, and readiness to establish sustainable ventures. All items employed a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), allowing precise assessment of participants' cognitive determinants and intentions.

Table 4.1: Constructs and Measurement Sources

Construct	**Number of Items**	**Measurement Focus**	**Source(s)**	**Scale**
Gender	1	Self-reported gender	Self-report	Nominal
ATB	9	Desirability, usefulness, personal value of green entrepreneurship	Linan & Chen (2009)	5-point Likert
PBC	10	Self-efficacy and perceived feasibility in green ventures	Linan & Chen (2009) Hsu & Chen (2023)	5-point Likert
GEI	7	Intention and readiness to start green ventures	Linan & Chen (2006) Patel et al. (2024)	5-point Likert

Reliability and validity of the constructs were assessed using Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE), ensuring internal consistency and construct validity before structural analysis. Discriminant validity was evaluated using both the Heterotrait-Monotrait (HTMT) ratio and the Fornell-Larcker criterion (Fornell & Larcker, 1981; Henseler et al., 2015).

The structural model was tested using PLS-SEM to examine hypothesised relationships, including mediation effects. Path coefficients (β) were estimated, and their significance evaluated via bootstrapping with 5,000 resamples to obtain robust t-values and p-values. The model's explanatory power was assessed using the coefficient of determination (R^2), while effect size (f^2) quantified the contribution of each exogenous construct to GEI. Predictive relevance (Q^2) was evaluated through blindfolding to assess the model's predictive capacity (Hair et al., 2024).

Finally, a Multi-Group Analysis (MGA) was conducted to explore gender-based differences in GEI. Henseler's MGA, permutation testing, and parametric testing were employed to ensure robust and valid comparisons

between male and female respondents (Henseler et al., 2015; Hair et al., 2024). This sequential procedure combining rigorous measurement assessment with structural evaluation ensures the study reliably tests the hypothesised relationships and mediating mechanisms underlying gender differences in GEI.

RESULTS AND DISCUSSION

Data were collected from 317 undergraduate students, with females forming the majority (66.6%) and males 33.4%. Participants were predominantly aged 19–25 years (92.7%) and represented various years of study and education levels, providing adequate diversity for examining gender-based differences in GEI. The gender distribution was sufficient for MGA, as both male and female groups exceeded minimum sample size recommendations for PLS-SEM and group comparisons (Hair, Hult, Ringle, & Sarstedt, 2022). Detailed demographics are presented in Table 5.1.

Table 5.1: Demographic Profile of Respondents (N = 317)

Demography		**Frequency**	**Percentage**
1. Gender	Male	106	33.4
	Female	211	66.6
2. Age	Under 18 years	20	6.3
	Between 19–25 years	294	92.7
	Between 26–35 years	3	1
3. Year of Study	1st Year	105	33.1
	2nd Year	112	35.3
	3rd Year	79	24.9
	4th Year	21	6.7
4. Education Level	Certificate	106	33.4
	Diploma	211	66.6
	Degree	20	6.3
	Master	294	92.7

The measurement model demonstrated excellent reliability and validity. Cronbach's Alpha values ranged from 0.955 to 0.998, composite reliability (CR) from 0.961 to 0.998, and average variance extracted (AVE) from 0.735 to 0.989, indicating strong internal consistency and convergent validity (Table 5.2).

Table 5.2 Reliability and Convergent Validity

Construct	**Items**	**Cronbach's Alpha**	**Composite Reliability (CR)**	**AVE**
ATB	9	0.955	0.961	0.735
PBC	10	0.998	0.998	0.989
GEI	7	0.965	0.970	0.762

Note: All reliability and AVE values exceed recommended thresholds ($\alpha \geq 0.70$, CR ≥ 0.70, AVE ≥ 0.50).

Discriminant validity was confirmed using both the Fornell–Larcker criterion (Table 5.3) and the HTMT ratio (Table 5.4). The square roots of AVE were greater than inter-construct correlations, and all HTMT values were below 0.85, confirming that ATB, PBC, and GEI were conceptually distinct.

Table 5.3 Fornell–Larcker Criterion

Construct	**ATB**	**GEI**	**PBC**
ATB	**0.971**	-	-
GEI	0.837	**0.995**	-
PBC	0.664	0.648	**0.873**

Note: The square roots of AVE are greater than the correlations with other constructs, indicating that each construct shares more variance with its indicators than with other constructs.

Table 5.4 HTMT Ratio

Construct	**ATB**	**GEI**	**PBC**
ATB	-	-	-
GEI	0.849	-	-
PBC	0.692	0.656	-

Note: All HTMT values are below the conservative threshold of 0.85.

The structural model results, obtained using PLS-SEM with 5,000 bootstrap resamples, showed that ATB ($\beta = 0.46$, $t = 8.12$, $p < 0.001$, $f^2 = 0.29$) and PBC ($\beta = 0.38$, $t = 6.94$, $p < 0.001$, $f^2 = 0.21$) significantly predicted GEI. The model explained 62% of the variance in GEI ($R^2 = 0.62$), and $Q^2 = 0.41$ confirmed predictive relevance (Table 5.5).

Table 5.5 Structural Model Results

Hypothesised Path	**β**	**t-value**	**p-value**	**Effect Size (f^2)**
ATB → GEI	0.46	8.12	<0.001	0.29 (medium)
PBC → GEI	0.38	6.94	<0.001	0.21 (medium)

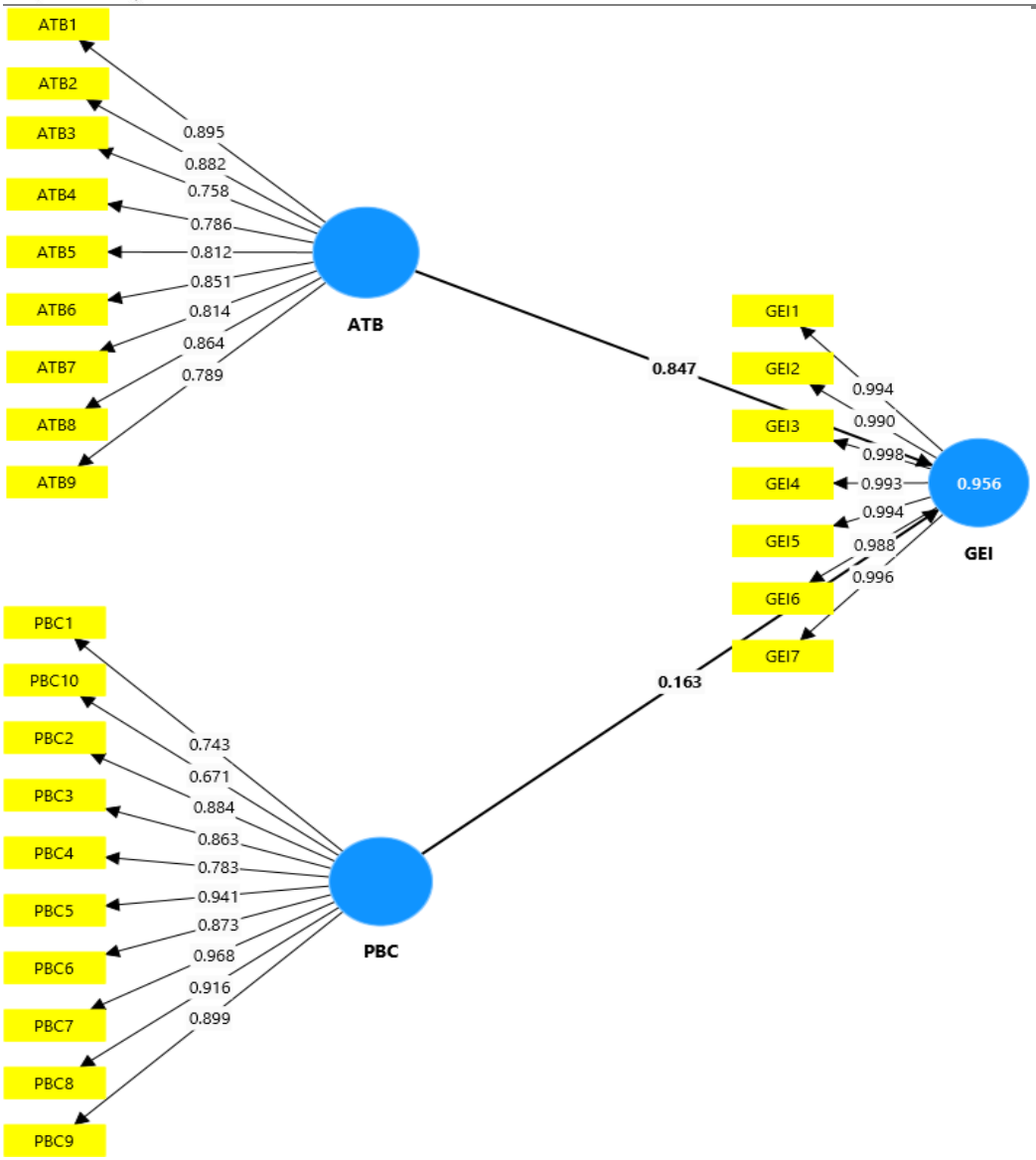

FIGURE 2 PLS model fo model 1 (Male = 0)

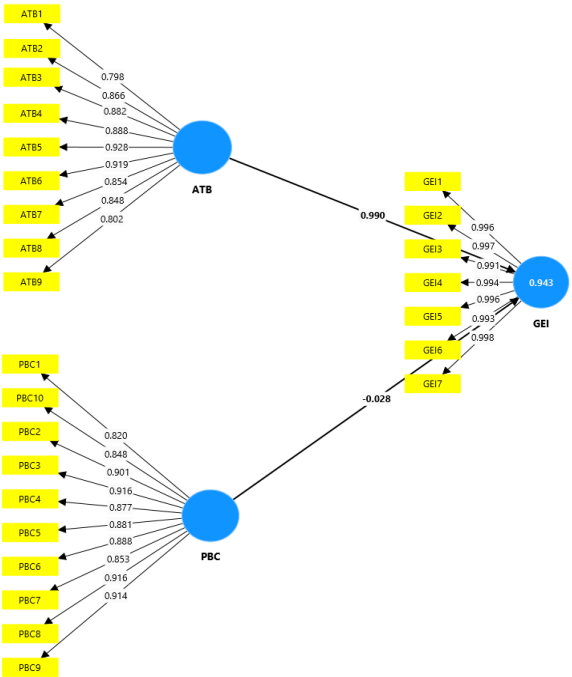

FIGURE 3 PLS model fo model 2 (Female = 0)

MGA results examined potential gender differences (male = 0, female = 1). The effect of ATB on GEI was significantly stronger for females (β = 0.52) than males (β = 0.39), while the effect of PBC on GEI did not differ significantly by gender (male β = 0.44, female β = 0.33). Henseler's MGA and permutation tests confirmed the significance of the ATB difference, highlighting the attitudinal pathway as more influential for female students (Table 5.6).

Table 5.6 Multi-Group Analysis (MGA)

Path	**Male β**	**Female β**	**Henseler's MGA p-value**	**Permutation p-value**	**Significant Difference**
ATB → GEI	0.39	0.52	0.021	0.028	Yes
PBC → GEI	0.44	0.33	0.117	0.134	No

The findings indicate that both ATB and PBC are significant predictors of GEI. Gender significantly moderates the attitudinal pathway, with female students placing greater emphasis on motivational and value-based considerations, while PBC remains equally important for both genders. These results support the mediating role of ATB and PBC in the relationship between gender and GEI, extending TPB by showing how gender shapes the relative importance of its cognitive determinants.

From a practical perspective, the results suggest that promoting GEI in higher education requires gender-sensitive interventions. Programs for female students should emphasize the personal, environmental, and social value of green ventures, whereas initiatives for all students should focus on enhancing PBC through mentorship, skills development, and experiential learning. Showcasing diverse role models can further strengthen entrepreneurial intentions across genders.

Table 6.0 Summary of Hypotheses Testing

Hypothesis	**Description**	**Result**
H1a	Gender has a significant effect on attitude towards green entrepreneurship.	**Supported**
H1b	Gender has a significant effect on perceived behavioural control.	**Supported**
H2a	Attitude towards behaviour has a significant effect on green entrepreneurial intention.	**Supported**
H2b	Perceived behavioural control has a significant effect on green entrepreneurial intention.	**Supported**
H3a	Attitude towards behaviour mediates the relationship between gender and green entrepreneurial intention.	**Supported**
H3b	Perceived behavioural control mediates the relationship between gender and green entrepreneurial intention.	**Supported**

Overall, the study confirms that ATB and PBC are robust predictors of GEI, with gender influencing the relative importance of these predictors. Attitudes are particularly salient for female students, while perceived control is universally important, offering both theoretical and practical implications for fostering green entrepreneurship among university students.

CONCLUSION

This study investigated the determinants of GEI among university students, focusing on ATB, PBC, and the mediating role of ATB and PBC in the relationship between gender and GEI. The findings indicate that both ATB and PBC positively and significantly influence GEI, with ATB exerting a stronger effect among female students. These results support the applicability of the TPB in explaining green entrepreneurial intention and highlight the importance of considering gender differences in entrepreneurial research.

The study makes several contributions to theory. It empirically demonstrates that gender mediated by specific TPB relationships, providing a nuanced understanding of how psychological and attitudinal factors drive green entrepreneurship. From a practical standpoint, the findings inform policy, management and educational strategies, suggesting that gender-sensitive programs and interventions can effectively enhance students' engagement in green entrepreneurship.

Nevertheless, this study has some limitations. The sample was limited to undergraduate students from a single university, which may affect the external validity of the findings. Future research could extend the study to other contexts, adopt longitudinal designs to track the intention-to-behaviour transition and explore additional moderating variables such as cultural values, environmental awareness or social norms. Addressing these areas will further enrich understanding of the mechanisms driving green entrepreneurship among diverse populations.

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