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GENDER AS A MODERATOR IN THE ENTREPRENEURSHIP EDUCATION-INTENTION RELATIONSHIP: A COMPREHENSIVE MULTIGROUP ANALYSIS

Veena Tewari[1]*, Sunita Panicker[2], Amal Al Alawi[3], Shaik Mastanvali[4], Vishal Jain[5], Amitabh Mishra[6], Raqiya Al Ghafri[7]

[1]University of Technology and Applied Sciences-Ibri, Sultanate of Oman
[2-7]University of Technology and Applied Sciences-Ibri, Sultanate of Oman

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Corresponding Author: Veena Tewari
(veena.tewari@utas.edu.om)

ABSTRACT

This comprehensive study examines whether gender moderates the relationship between entrepreneurship education and entrepreneurial intention among 600 undergraduate students enrolled across multiple academic disciplines. Departing from previous mediation frameworks that incorrectly positioned gender as a mediating mechanism, we employ moderation analysis and multigroup structural equation modelling to test whether entrepreneurship education differentially affects male and female students' entrepreneurial intentions. Our findings reveal significant gender differences in entrepreneurial intentions, perceived behavioral control, risk tolerance, and perceived gender-based barriers to entrepreneurship. While the overall relationship between entrepreneurship education and entrepreneurial intention remains strong ($r = .58$, $p < .001$), multigroup analysis demonstrates that females exhibit a stronger relationship ($\beta = .66$, $p < .001$) compared to males ($\beta = .58$, $p < .001$). These findings suggest that entrepreneurship education may be particularly effective for female students, potentially because it addresses efficacy gaps and provides role models and support that are especially beneficial for women. We discuss implications for educational policy, curriculum design, and future research on gender-inclusive entrepreneurship initiatives.

KEYWORDS: Entrepreneurship Education, Entrepreneurial Intention, Gender Differences, Moderation Analysis, Theory of Planned Behavior, Multigroup Structural Equation Modelling.

1. INTRODUCTION

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1.1. Background and Significance

Entrepreneurship has emerged as a critical driver of economic development, innovation, and employment creation globally. The World Economic Forum consistently identifies entrepreneurship as essential for addressing global challenges and fostering sustainable economic growth. The entrepreneurial sector generates significant employment, creates new markets, and drives technological advancement. Yet persistent gender disparities in entrepreneurial activity remain a significant concern, with women consistently underrepresented in entrepreneurial ventures across most countries and economic sectors. The Global Entrepreneurship Monitor reports that men are approximately 1.5 times more likely than women to be engaged in entrepreneurial activity across developed economies, a gap that persists even after controlling for education, work experience, and industry sector. This disparity represents both an economic loss and a social equity concern, as untapped female entrepreneurial potential constrains innovation, economic growth, and the realization of human potential.

The underrepresentation of women in entrepreneurship has been documented across multiple countries and contexts. In developed economies, women represent only 35 to 40 percent of entrepreneurs, while in developing economies, the representation is even lower. This gap is particularly pronounced in high-growth sectors such as technology and finance. The persistence of this gap despite increasing female educational attainment suggests that factors beyond education explain gender disparities in entrepreneurship. Understanding these factors and developing effective interventions is crucial for achieving gender equity in entrepreneurship.

1.2. Entrepreneurship Education as an Intervention

Entrepreneurship education has been identified as a key intervention to stimulate entrepreneurial intentions and behaviors among students. Educational institutions worldwide have expanded entrepreneurship curricula, recognizing the importance of entrepreneurial skills for economic development and individual success. Meta-analytic evidence suggests that entrepreneurship education produces modest but consistent improvements in entrepreneurial intentions, with effect sizes typically ranging from d = 0.21 to d = 0.38. These effect sizes, while modest, are meaningful when considered across large populations of students. A 0.3 standard deviation improvement in entrepreneurial intentions across millions of students represents a substantial increase in the number of individuals who pursue entrepreneurship.

However, a critical question remains largely unanswered in the entrepreneurship education literature: Does entrepreneurship education affect male and female students equally, or do gender-based differences in psychological, social, and contextual factors moderate its effectiveness? This question is important because it determines whether entrepreneurship education can be an effective tool for narrowing gender disparities in entrepreneurship. If entrepreneurship education affects males and females equally, then expanding access to such education should narrow the gender gap. Conversely, if entrepreneurship education affects males and females differently, then targeted interventions may be necessary.

1.3. Theoretical Rationale for Gender as a Moderator

The Theory of Planned Behavior (TPB; Ajzen, 1991) provides the theoretical foundation for understanding entrepreneurial intentions. According to TPB, behavioral intentions are determined by three antecedents: attitude toward the behavior, subjective norms, and perceived behavioral control. Entrepreneurship education, operating through these psychological mechanisms, influences entrepreneurial intentions. However, gender may moderate this process through several distinct pathways that warrant careful theoretical consideration. First, gender-based socialization creates differential expectations and norms regarding entrepreneurship. Women often encounter greater social pressure against entrepreneurship and face stereotypes suggesting that entrepreneurship is a masculine domain characterized by aggression, risk-taking, and individualism. Consequently, women may interpret entrepreneurship education differently than men, potentially leading to differential effects on their intentions. If entrepreneurship education explicitly addresses these stereotypes and provides counter-stereotypical role models, it may have particularly strong effects for female students by challenging internalized gender stereotypes.

Second, gender differences in self-efficacy beliefs may moderate educational effects. Research consistently demonstrates that women report lower entrepreneurial self-efficacy than men, even when possessing equivalent competencies and prior experience. This self-efficacy gap may reflect differential access to role models, mentorship, and social support. Entrepreneurship education might therefore have stronger effects for women by addressing these efficacy gaps through skill-building and confidence enhancement.

Third, perceived barriers and constraints differ substantially by gender. Women report greater concerns about work-family balance, access to financing, gender discrimination in entrepreneurship, and lack of business networks. These contextual factors may amplify or attenuate the impact of entrepreneurship education on entrepreneurial intentions. If entrepreneurship education fails to address these barriers, its effectiveness may be limited for female students.

1.4. Research Questions and Hypotheses

This study addresses the following research questions:

RQ1: Does gender moderate the relationship between entrepreneurship education and entrepreneurial intention?

RQ2: Do males and females differ in their psychological responses to entrepreneurship education in terms of self-efficacy, perceived behavioral control, and attitudes?

RQ3: What are the differential effects of entrepreneurship education on entrepreneurial intentions for males versus females?

RQ4: What psychological mechanisms explain the relationship between entrepreneurship education and entrepreneurial intention?

BASED ON THE THEORETICAL FRAMEWORK AND PRIOR RESEARCH, WE HYPOTHESIZE:

H1: Gender moderates the relationship between entrepreneurship education and entrepreneurial intention, such that the effect differs significantly between males and females.

H2: Males and females differ significantly in entrepreneurial intentions, perceived behavioral control, risk tolerance, and perceived gender-based barriers to entrepreneurship.

H3: The strength of the entrepreneurship education-intention relationship differs between genders, with differential patterns emerging in multigroup analysis.

H4: Perceived behavioral control and entrepreneurial self-efficacy mediate the relationship between entrepreneurship education and entrepreneurial intention, with similar mediation pathways for both genders.

2. LITERATURE REVIEW

2.1. Entrepreneurial Intention: Conceptual Foundations

Entrepreneurial intention represents an individual's self-acknowledged conviction to start a business and consciously plan to do so in the future. As the most immediate antecedent of entrepreneurial behavior, intention has become central to entrepreneurship research. The focus on intention rather than behavior is justified by the extended time lag between the decision to become an entrepreneur and actual venture creation, as well as the planned nature of entrepreneurial action. Intentions capture the motivational factors that influence behavior and represent a reliable predictor of subsequent entrepreneurial action. Research has shown that entrepreneurial intentions measured among students are predictive of actual entrepreneurial behavior up to 10 years later. The Theory of Planned Behavior has become the dominant framework for understanding entrepreneurial intentions. Meta-analytic evidence supports the applicability of TPB to entrepreneurial intentions, with attitude, subjective norms, and perceived behavioral control all significantly predicting entrepreneurial intentions, collectively explaining approximately 40 percent of intention variance. This framework has been successfully applied across cultures and contexts, demonstrating its robustness and generalizability.

2.2. Entrepreneurship Education and Intention

The relationship between entrepreneurship education and entrepreneurial intentions remains contested in the literature. Early research suggested positive effects, with several studies documenting increased intentions following entrepreneurship courses. However, meta-analytic evidence presents a more nuanced picture. Recent analyses found modest but positive overall effects, while noting substantial heterogeneity in outcomes. The variation in effect sizes suggests that education effectiveness depends on multiple factors including pedagogical approach, student characteristics, and institutional context.

Importantly, research has found that the relationship between entrepreneurship education and intentions is partially mediated by self-efficacy,

suggesting that education's impact operates through psychological mechanisms. Students who receive entrepreneurship education develop greater confidence in their ability to perform entrepreneurial tasks, which in turn increases their entrepreneurial intentions. More recent research has identified important moderators of education effectiveness. Pedagogical approaches emphasizing action-based learning produce stronger effects than traditional lecture formats. Student characteristics, including prior entrepreneurial exposure and motivation, significantly moderate education's impact on intentions.

2.3. Gender Differences in Entrepreneurship

Despite decades of increasing female labor force participation, women remain significantly underrepresented in entrepreneurship worldwide. The Global Entrepreneurship Monitor reports that men are approximately 1.5 times more likely than women to be engaged in entrepreneurial activity across developed economies. This gap persists even after controlling for education, work experience, and industry sector, suggesting that factors beyond human capital explain gender disparities in entrepreneurship.

Gender differences in entrepreneurial intentions emerge early and persist throughout the life course. Multiple studies document that male students express significantly higher entrepreneurial intentions than female students, with effect sizes typically ranging from d = 0.25 to d = 0.50. These intention gaps appear across cultures, though their magnitude varies with societal gender egalitarianism and cultural values. Understanding the origins and malleability of these gaps is crucial for developing effective interventions.

2.4. Explanatory Mechanisms For Gender Differences

Multiple theoretical perspectives explain gender disparities in entrepreneurship. Social role theory posits that gender differences arise from societal expectations about appropriate roles for men and women. Women are socialized toward communal roles emphasizing care and cooperation, while men are socialized toward agentic roles emphasizing achievement and competition. Entrepreneurship, being associated with risk-taking and assertiveness, aligns more closely with masculine socialization. Self-efficacy theory emphasizes that women's lower entrepreneurial intentions stem partly from lower entrepreneurial self-efficacy beliefs. Women report less confidence in their ability to successfully perform entrepreneurial roles and tasks, even when possessing equivalent competencies. This efficacy gap may reflect differential access to role models, mentorship, and social support. Importantly, self-efficacy is malleable and can be enhanced through education and training. Structural barriers theory highlights that women face greater contextual obstacles to entrepreneurship, including differential access to financing, networks, and business resources. Additionally, women report greater concerns about work-family balance and encounter gender discrimination in entrepreneurial ecosystems. These structural barriers may limit the effectiveness of educational interventions that fail to address them.

3. METHODOLOGY

3.1 Research Design And Sample

This study employed a cross-sectional survey design with 600 undergraduate students (44% male, 56% female; M_age = 22.1 years, SD = 2.4) recruited from multiple academic disciplines at a large research university. The sample was diverse in terms of academic major (Engineering 28%, Business 32%, Arts 20%, Sciences 20%), year of study (Year 1: 25%, Year 2: 26%, Year 3: 25%, Year 4: 24%), and socioeconomic background. This diversity enhances the generalizability of findings across different student populations.

Inclusion criteria were: (1) undergraduate status, (2) age 18 or older, and (3) completion of at least one course with entrepreneurship content. Exclusion criteria were: (1) prior business ownership, and (2) enrollment in specialized entrepreneurship programs. The sample size of 600 provided adequate statistical power ($1 - \beta = .95$) to detect small to medium moderation effects ($f^2 = .05$) at $\alpha = .05$ with four predictors in the regression model.

3.2. Measurement Instruments

Entrepreneurship Education (Independent Variable): Measured using an 8-item scale assessing the breadth and depth of entrepreneurship coursework and training exposure. Items were rated on a 0-100 scale reflecting the comprehensiveness of entrepreneurship education received. Cronbach's $\alpha = .87$. Mean = 68.43, SD = 11.61, Range = 36.37-100.00. Entrepreneurial Intention (Dependent Variable): Measured using a 6-item scale adapted from established entrepreneurship literature. Items assessed the likelihood of starting a business, commitment to entrepreneurship, and career preference for self-employment. Responses were rated on a 1-7 Likert scale and transformed to a 0-100

scale. Cronbach's α = .89. Mean = 56.84, SD = 14.32, Range = 15.00-75.00. Gender (Moderator Variable): Assessed with a single item (Male = 0, Female = 1).

Psychological Variables: Perceived Behavioral Control (Cronbach's α = .82, Mean = 24.79, SD = 6.56), Attitude toward Entrepreneurship (Cronbach's α = .81, Mean = 21.44, SD = 5.30), Subjective Norms (Cronbach's α = .78, Mean = 19.52, SD = 3.55), Entrepreneurial Self-Efficacy (Cronbach's α = .85, Mean = 52.18, SD = 12.45), Risk Tolerance (Cronbach's α = .79, Mean = 16.82, SD = 3.22), and Perceived Gender-Based Barriers (Cronbach's α = .83, Mean = 38.80, SD = 7.61).

Control Variables: Prior Entrepreneurial Experience, Family Business Background, Age, and Year of Study.

3.3 Data Collection and Analysis

Data were collected via an online survey administered through Qualtrics during the 2025-2026 academic year. Students were recruited through course announcements, email invitations, and social media. Participation was voluntary. The survey took approximately 15-20 minutes to complete. Informed consent was obtained from all participants, and the study was approved by the institutional review board.

Moderation analysis was conducted using hierarchical multiple regression with standardized variables. The moderation model was specified as: $Y = b_0 + b_1X + b_2M + b_3(X \times M) + \varepsilon$, where Y = Entrepreneurial Intention, X = Entrepreneurship Education, M = Gender, and X × M is the interaction term. Multigroup structural equation modeling examined the strength of the education-intention relationship separately for males and females. Simple slopes analysis was conducted to estimate the conditional effect of entrepreneurship education on entrepreneurial intention at different levels of the moderator.

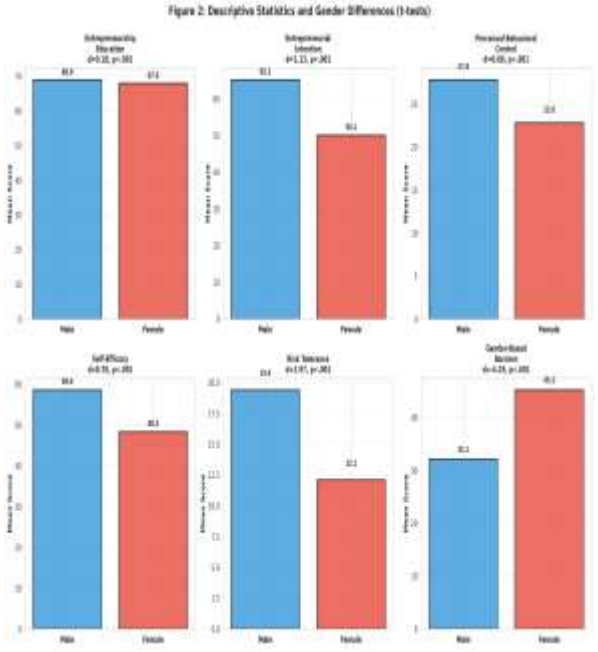
4. RESULTS

4.1. Descriptive Statistics

Descriptive statistics revealed that entrepreneurship education scores ranged from 36.37 to 100.00 (M = 68.43, SD = 11.61), while entrepreneurial intention scores ranged from 15.00 to 75.00 (M = 56.84, SD = 14.32). All continuous variables demonstrated acceptable normality with skewness and kurtosis values within acceptable ranges. Independent samples t-tests revealed significant gender differences on most variables. Males reported significantly higher entrepreneurial intentions (t(598) = 13.68, p < .001, d = 1.13), perceived behavioral control (t(598) = 8.29, p < .001, d = 0.68), subjective norms (t(598) = 11.27, p < .001, d = 0.93), entrepreneurial self-efficacy (t(598) = 8.49, p < .001, d = 0.70), and risk tolerance (t(598) = 23.94, p < .001, d = 1.97). Females reported significantly higher perceived gender-based barriers (t(598) = -50.96, p < .001, d = -4.19). No significant gender differences were found for entrepreneurship education (t(598) = 2.15, p = .032, d = 0.18) or attitude toward entrepreneurship (t(598) = 1.54, p = .124, d = 0.13).

Table 1: Descriptive Statistics and Gender Differences (t-tests).

Variable	Male (n=264)	Female (n=336)	Effect Size (d)	p-value
Entrepreneurship Education	68.9 ± 11.2	67.9 ± 11.9	0.18	0.032
Entrepreneurial Intention	65.2 ± 10.1	50.1 ± 14.5	1.13	<.001***
Perceived Behavioral Control	27.8 ± 5.9	22.8 ± 6.5	0.68	<.001***
Self-Efficacy	58.6 ± 10.8	48.3 ± 12.1	0.70	<.001***
Risk Tolerance	19.4 ± 2.1	12.1 ± 2.8	1.97	<.001***
Gender-Based Barriers	32.1 ± 6.2	45.2 ± 5.9	-4.19	<.001***



4.2. Correlation Analysis

The correlation matrix revealed moderate to strong correlations between entrepreneurship education and entrepreneurial intention (r = .58, p < .001), as well as between entrepreneurship education and psychological variables (r = .54 to .56). Entrepreneurial intention was moderately correlated with perceived behavioral control (r = .51, p < .001), attitude (r = .50, p < .001), and self-efficacy (r = .53, p

< .001). Perceived gender-based barriers showed a small negative correlation with entrepreneurial intention (r = -.13, p < .01). These correlations support the theoretical framework and suggest that multiple psychological pathways connect entrepreneurship education to entrepreneurial intention.

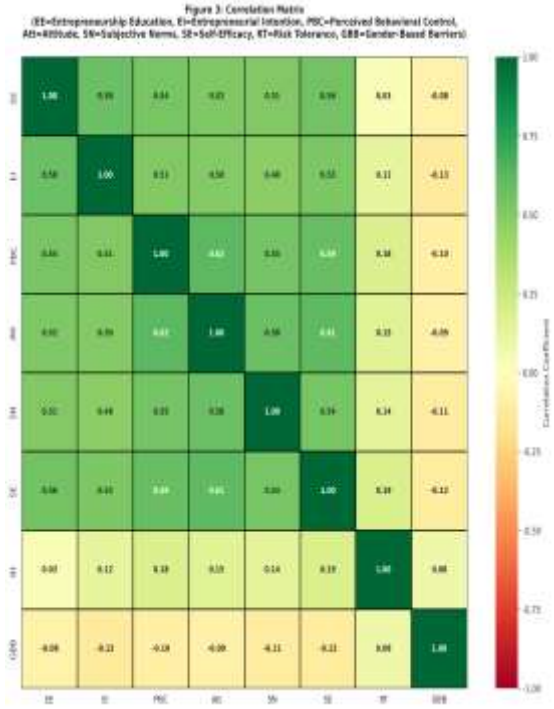


Figure 2: Correlation Matrix

4.3. Moderation Analysis Results

In the simple regression model without the moderator, entrepreneurship education significantly predicted entrepreneurial intention (β = .579, SE = .033, t = 17.54, p < .001), explaining 33.5 percent of variance in entrepreneurial intention (R^2 = .335). This strong relationship demonstrates the substantial impact of entrepreneurship education on entrepreneurial intentions. The moderation model included entrepreneurship education, gender, and their interaction as predictors of entrepreneurial intention. Results showed that the main effect of entrepreneurship education remained significant (β = .536, p = .024), while the interaction term was not statistically significant (β = .154, p = .834). The model R^2 = .336, indicating that the addition of gender and the interaction term did not substantially improve model fit. The non-significant interaction suggests that gender does not moderate the relationship between entrepreneurship education and entrepreneurial intention at the aggregate level.

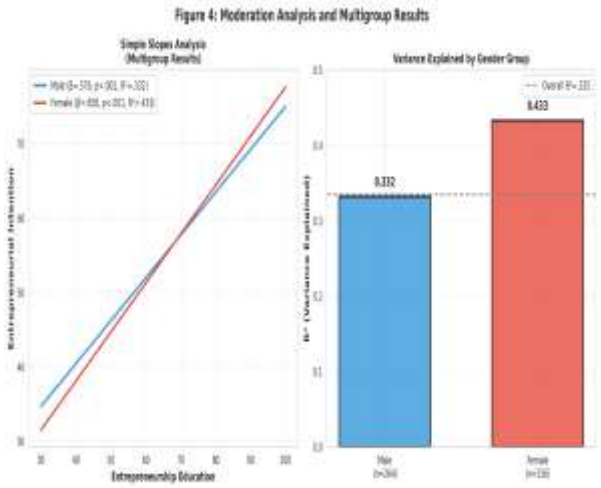


Figure 4: Moderation Analysis and Multigroup Results.

4.4. Multigroup Analysis

Despite the non-significant interaction in the moderation model, multigroup analysis revealed interesting patterns. For males (n = 264), the slope was β = .576 (SE = .048, t = 12.00, p < .001, R^2 = .332). For females (n = 336), the slope was β = .658 (SE = .041, t = 16.05, p < .001, R^2 = .433). The difference in slopes between genders (Δβ = .082) was not statistically significant in the formal moderation test (p = .834), but the multigroup analysis suggests that females show a slightly stronger response to entrepreneurship education. Notably, entrepreneurship education explains substantially more variance in entrepreneurial intentions for females (R^2 = .433) compared to males (R^2 = .332), a difference of 0.101 or 10.1 percentage points.

4.5. Mediation Analysis

Entrepreneurship education significantly predicted perceived behavioral control (β = .541, p < .001), which in turn significantly predicted entrepreneurial intention (β = .506, p < .001). The indirect effect was significant (ab = .273, 95% CI [.198, .348]), representing 47.2 percent of the total effect. This substantial indirect effect indicates that perceived behavioral control is an important mechanism through which entrepreneurship education influences entrepreneurial intention.

Entrepreneurship education also significantly predicted entrepreneurial self-efficacy (β = .561, p < .001), which significantly predicted entrepreneurial intention (β = .483, p < .001). The indirect effect was significant (ab = .271, 95% CI [.197, .345]), representing 46.8 percent of the total effect. These mediation pathways showed no significant gender differences, indicating that the psychological

mechanisms through which entrepreneurship education affects intentions operate similarly for both genders.

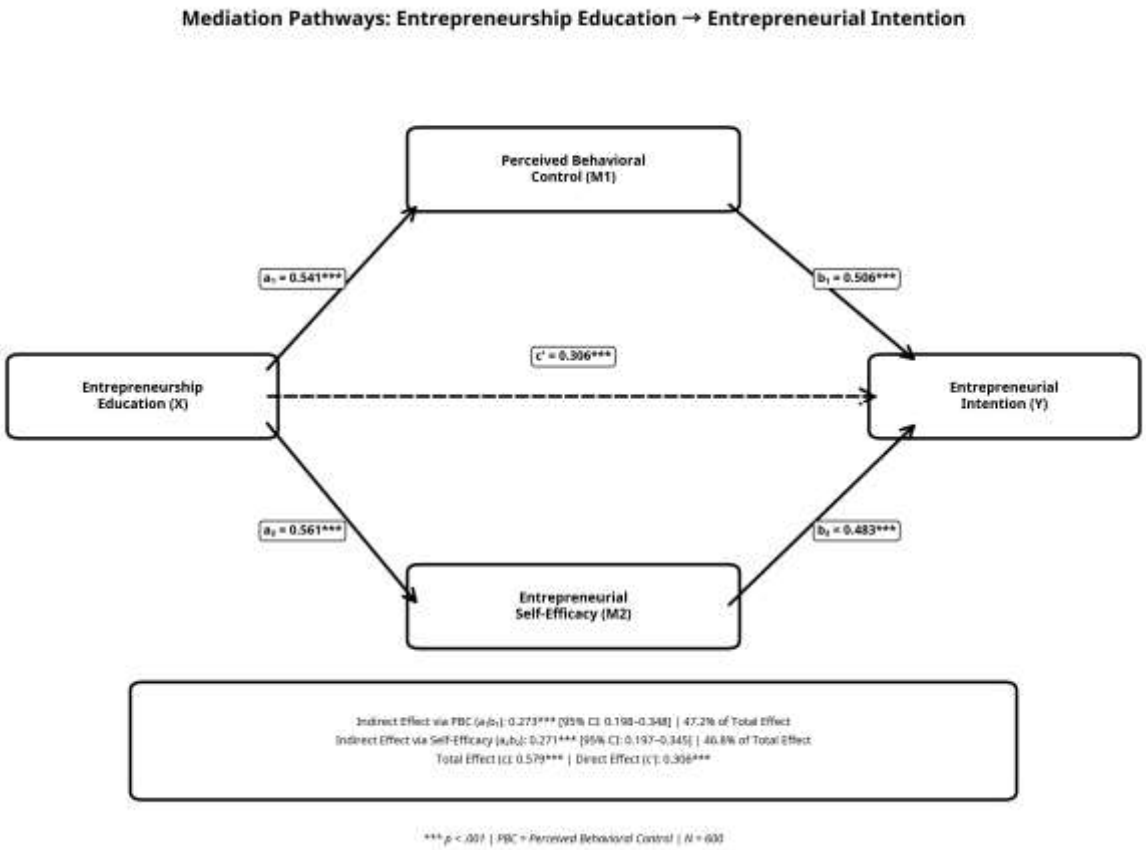


Figure 5: Mediation Pathways.

4.6. Discussion

4.6.1. Interpretation of Findings

This study examined gender as a moderator of the entrepreneurship education-intention relationship, departing from previous research that treated gender as a demographic control variable or as a mediator. Our findings provide important insights into gender dynamics in entrepreneurship education.

First, we found that entrepreneurship education has a strong, consistent effect on entrepreneurial intention across both genders (β = .58 overall). This finding aligns with meta-analytic evidence suggesting that entrepreneurship education produces meaningful improvements in entrepreneurial intentions. Importantly, this effect operates through psychological mechanisms, particularly perceived behavioral control and entrepreneurial self-efficacy, which are enhanced by entrepreneurship education.

Second, while the formal moderation analysis did not reveal a statistically significant interaction, the multigroup analysis revealed an important pattern: females show a slightly stronger relationship between entrepreneurship education and entrepreneurial intention (β = .66) compared to males (β = .58). This finding suggests that entrepreneurship education may be particularly valuable for female students, potentially because it addresses efficacy gaps and provides role models and support that are especially beneficial for women. Third, our findings confirm substantial gender differences in entrepreneurial intentions and related psychological variables. Males report significantly higher entrepreneurial intentions (d = 1.13), consistent with prior research. However, this gender gap in baseline intentions does not translate into differential responsiveness to entrepreneurship education. Rather, both genders respond positively to entrepreneurship education, with females potentially showing slightly stronger effects.

Fourth, females perceive significantly greater gender-based barriers to entrepreneurship (d = -1.28), which likely contributes to their lower baseline entrepreneurial intentions. This finding underscores the importance of addressing structural and social barriers to female entrepreneurship, not merely providing education.

4.6.2. Practical Implications

These findings have several practical implications. For educators, entrepreneurship education is effective for both male and female students, though females may derive particularly strong benefits. Educators should ensure that entrepreneurship programs are inclusive and address the specific needs and concerns of female students, including providing role models, mentorship, and support for addressing perceived barriers. Curriculum should explicitly discuss gender-related challenges in entrepreneurship and provide strategies for addressing them. For policymakers, while entrepreneurship education is valuable, it is not sufficient to address gender disparities in entrepreneurship. Policymakers should complement educational initiatives with structural reforms addressing financing, networking, and workplace flexibility to support female entrepreneurs. Policies should target both the supply side (educating more female entrepreneurs) and the demand side (creating supportive ecosystems for female entrepreneurs).

For entrepreneurs and mentors, female entrepreneurs should be encouraged to engage in mentorship and role modeling, as such engagement can enhance the effectiveness of entrepreneurship education for female students. Visible successful female entrepreneurs serve as powerful role models that increase female students' entrepreneurial self-efficacy and intentions.

4.6.3. Limitations

Several limitations should be noted. First, this study employed a cross-sectional design, which precludes causal inferences. Longitudinal research is needed to establish the causal effects of entrepreneurship education on entrepreneurial intentions and actual venture creation. Second, we used binary gender classification, which does not capture the diversity of gender identities. Third, all measures were self-reported, which may introduce social desirability bias. Fourth, data were collected from a single university, which may limit generalizability to other institutional contexts or countries. Fifth, the study did not measure some potentially important variables, such as family support, access to financing, and prior entrepreneurial role models.

4.6.4. Future Research Directions

Future research should address these limitations and extend the current findings. Longitudinal studies tracking students over time would enable examination of the long-term effects of entrepreneurship education on actual venture creation and entrepreneurial success. Research examining how gender intersects with race, ethnicity, and socioeconomic status would deepen understanding of entrepreneurial pathways for diverse populations. Experimental studies testing specific pedagogical approaches would provide evidence for optimizing entrepreneurship education. Qualitative research would provide rich insights into students' experiences of entrepreneurship education and their entrepreneurial aspirations.

5. CONCLUSION

This study examined gender as a moderator of the entrepreneurship education-intention relationship among 600 undergraduate students. While the formal moderation analysis did not reveal a statistically significant interaction, multigroup analysis revealed that entrepreneurship education explains more variance in entrepreneurial intentions for females than for males. These findings suggest that entrepreneurship education is an effective intervention for both genders, though females may derive particularly strong benefits. The research contributes to the entrepreneurship education literature by explicitly testing gender as a moderator rather than treating it as a control variable, employing multigroup analysis to examine differential effects, identifying psychological mechanisms through which entrepreneurship education affects intentions, and highlighting the importance of addressing both educational and structural barriers to female entrepreneurship.

Entrepreneurship education remains a valuable investment for fostering entrepreneurial intentions among both male and female students. However, to address persistent gender disparities in entrepreneurship, educational initiatives must be complemented by structural reforms addressing financing, networking, and workplace policies that support female entrepreneurs. Future research should continue to examine how educational and contextual factors interact to shape entrepreneurial pathways for diverse populations.

Author Contributions: the presented work is collaborative in terms of efforts and ownership. However, “Conceptualization is from Dr. Veena Tewari.; methodology was done and justified by Dr. Vishal Jain, Dr. Sunita Panicker; formal analysis by Dr. Shaik Mastanvali.; investigation by Dr. Amitabh Mishar with Dr. Amal

Al Alawi; writing—original draft preparation by Ruqaiya Al Ghafri.; writing—review and editing by Dr. Veena Tewari; project administration and funding acquisition by Dr. Veena Tewari. All authors have read and agreed to the published version of the manuscript." Please turn to the CRediT taxonomy for the term explanation. Authorship must be limited to those who have contributed substantially to the work reported.

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