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The Roles of Extraversion and Risk-Taking Propensity in the Relationship Between Internal Locus of Control and Entrepreneurial Intention

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ABSTRACT

This study examines how extraversion and risk-taking propensity shape the relationship between internal locus of control and entrepreneurial intention among undergraduate management students at Universitas Islam Indonesia (UII), Yogyakarta. Although internal locus of control, risk-taking propensity, and extraversion are each known to predict entrepreneurial intention, they are rarely modelled together in a single parallel mediation framework within a specific institutional context. A cross-sectional survey of 244 undergraduate management students was conducted using a bilingual (English-Indonesian) online questionnaire with positively keyed short scales adapted from the IE-4 internal locus of control scale, the Risk Propensity Scale, the Big Five Inventory-2 short form extraversion domain, and the Entrepreneurial Intention Questionnaire tradition. Partial Least Squares Structural Equation Modelling (PLS-SEM) was implemented in Python with 5,000 bootstrap resamples. The measurement model satisfied all criteria for reliability (Cronbach's alpha from 0.82 to 0.93), convergent validity (AVE from 0.53 to 0.73), and discriminant validity (Fornell-Larcker and HTMT ratios all below 0.80). Results showed that internal locus of control significantly predicts entrepreneurial intention directly and indirectly through both mediators. Risk-taking propensity and extraversion contributed comparably to the mediated pathway, with no significant difference between them. The indirect pathway accounted for 52.8 percent of the total effect, indicating substantial partial mediation. Findings support a hierarchical trait architecture in which internal control beliefs foster both risk tolerance and social engagement, and both of these traits channel control beliefs into entrepreneurial intention. Implications for psychologically informed entrepreneurship education in faith-based private universities in Indonesia are discussed.

Keywords: Internal locus of control, Extraversion, Risk-taking propensity, Entrepreneurial intention, Parallel mediation.

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Introduction

Entrepreneurship is widely recognised as a driver of employment creation, innovation, and economic resilience, particularly in emerging economies where graduate unemployment remains a persistent concern. In Indonesia, the entrepreneurship rate hovers around 3.1 percent, markedly lower than many

comparable Asian economies, despite policy initiatives and substantial investment by universities in entrepreneurship education, incubators, and student start-up programs. A systematic review of 159 studies by Nabi et al. (2017) shows that entrepreneurship education in higher education is generally associated with stronger entrepreneurial attitudes and intentions, though the effect sizes vary substantially across contexts. This variation suggests that beyond educational interventions, underlying psychological characteristics may play a decisive role in whether business students seriously intend to create ventures.

Entrepreneurial intention is typically conceptualised within Ajzen's (1991) theory of planned behaviour (TPB), which posits intention as the most proximal predictor of planned action, shaped by attitudes, subjective norms, and perceived behavioural control. Within this framework, personality traits and stable individual differences operate as distal antecedents that influence the proximal cognitions. Meta-analytic evidence by Zhao et al. (2010) confirms that Big Five traits and risk propensity explain meaningful variance in entrepreneurial intention. Schlaegel and Koenig (2014) further showed in a meta-analytic integration that intention-based models outperform purely situational or demographic predictors, establishing the intention-centred paradigm that still dominates the field.

Three trait variables are particularly prominent in the entrepreneurship literature: locus of control, risk-taking propensity, and extraversion. Internal locus of control, introduced by Rotter (1966), refers to a generalised expectancy that outcomes depend on one's own effort and decisions rather than on luck or external forces. Individuals with strong internal control beliefs are theorised to engage in proactive opportunity recognition, goal setting, and persistence under uncertainty. Recent evidence supports this association. Tseng et al. (2022) demonstrated, among 242 Taiwanese students, that internal locus of control enhances cyber-entrepreneurial intention by strengthening TPB cognitions. Gebresilase et al. (2025) similarly reported, in a sample of 455 Ethiopian graduating students, that internal locus of control positively predicts entrepreneurial intention, with entrepreneurial self-efficacy serving as a significant mediator. In the Indonesian context, Tentama and Abdussalam (2020) confirmed a significant positive relationship between internal locus of control and entrepreneurial intention among vocational high-school students in Yogyakarta, and Amenah et al. (2024) showed that locus of control mediates the effect of entrepreneurship education and orientation on intention.

Risk-taking propensity captures an individual's general tendency to accept uncertainty and potential loss in pursuit of valued goals. Meertens and Lion (2008) developed the Risk Propensity Scale, which has become one of the most widely used short measures of risk-taking in adult samples. Zhao et al. (2010) established, in a seminal meta-analysis, that risk propensity is positively associated with entrepreneurial intention although not with realised entrepreneurial performance, underscoring that risk tolerance predicts selection into entrepreneurship more than venture outcomes. Recent empirical work continues to refine this relationship. Shukla and Kumar (2024) showed that attitude toward entrepreneurship fully mediates the risk-taking propensity link to entrepreneurial intention among Indian students, while Nguyen et al. (2024) reported in a sample of 1,046 Vietnamese students that risk-taking propensity functions as a significant mediator between Big Five traits and intention. Kurjono et al. (2025) similarly reported that risk-taking propensity directly enhances entrepreneurial intention among Indonesian economics students, with entrepreneurial self-efficacy mediating the path.

Extraversion, one of the Big Five personality dimensions, reflects sociability, assertiveness, and positive emotionality. The Big Five Inventory-2 short form developed by Soto and John (2017) is a psychometrically robust instrument for measuring this trait with substantially reduced respondent burden. Meta-analytic evidence indicates that extraversion is consistently linked to entrepreneurial intention and performance (Zhao et al., 2010; Brandstätter, 2011). Recent studies extend this finding. Awwad and Al-Aseer (2021) found that extraversion and openness predict entrepreneurial intention among Jordanian undergraduates, with entrepreneurial alertness functioning as a mediator, while Ta et al. (2026) demonstrated in a Taiwanese sample that extraversion contributes to digital entrepreneurial intention via digital self-efficacy. Extraverted individuals are more likely to initiate social interactions,

build networks, and engage in persuasive communication, all behaviours relevant to opportunity recognition and resource mobilisation.

Although internal locus of control, risk-taking propensity, and extraversion have each been examined as predictors of entrepreneurial intention, most studies treat them as parallel predictors rather than as components of a structured pathway. Rauch and Frese (2007), in an influential meta-analysis, argued that narrow traits matched to specific entrepreneurial behaviours produce stronger associations with venture creation than broad Big Five domains, suggesting that trait hierarchies should be considered in integrated models. A plausible hierarchical architecture would position internal locus of control as a generalised expectancy that fosters more specific behavioural tendencies such as risk-taking and extraverted social engagement, which in turn map more directly onto behaviours central to entrepreneurship. Yet empirical tests of this integrated structure remain fragmented. To the best of current evidence, no study has simultaneously modelled internal locus of control, risk-taking propensity, extraversion, and entrepreneurial intention in a single parallel mediation framework among undergraduate management students at a faith-based private university in Indonesia.

This study addresses that gap by testing a parallel mediation model at Universitas Islam Indonesia (UII), Yogyakarta. The study is deliberately scoped to a single institution to provide institution-specific evidence that can inform the university's entrepreneurship education design and serve as a baseline for future multi-campus replications. Three research questions guide the investigation:

RQ1. Does internal locus of control still predict entrepreneurial intention directly once risk-taking propensity and extraversion are modelled as parallel mediators?

RQ2. Through which pathway, risk-taking propensity or extraversion, is the effect of internal locus of control on entrepreneurial intention more strongly channelled?

RQ3. What is the total indirect effect of internal locus of control on entrepreneurial intention, and does this indirect pathway dominate the direct effect?

These questions are tested with Partial Least Squares Structural Equation Modelling (PLS-SEM) implemented in Python using open-source libraries, with 5,000 bootstrap resamples for bias-corrected confidence intervals. The study contributes institution-specific trait pathway evidence from a faith-based Indonesian private university, and a reproducible analytical template that does not depend on commercial software.

Hypotheses

Drawing on the theoretical reasoning above, seven hypotheses are derived to test the parallel mediation structure. The direct effects (H1 to H5) jointly address RQ1 and set the stage for mediation analysis. The indirect effects (H6 and H7) jointly address RQ2 and RQ3.

H_1. *Internal locus of control positively predicts entrepreneurial intention.*
H_2. *Internal locus of control positively predicts risk-taking propensity.*
H_3. *Internal locus of control positively predicts extraversion.*
H_4. *Risk-taking propensity positively predicts entrepreneurial intention.*
H_5. *Extraversion positively predicts entrepreneurial intention.*
H_6. *Risk-taking propensity mediates the relationship between internal locus of control and entrepreneurial intention.*
H_7. *Extraversion mediates the relationship between internal locus of control and entrepreneurial intention.*

Method

Research Design

This study uses a quantitative, cross-sectional, single-site survey design to test a parallel mediation model among undergraduate management students at Universitas Islam Indonesia, Yogyakarta. The model specifies internal locus of control as the exogenous predictor, risk-taking propensity and extraversion as correlated mediators, and entrepreneurial intention as the focal outcome. The model is analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM), which is suitable for prediction-oriented research, mediation structures with multiple mediators, and sample sizes in the 200 to 300 range (Hair et al., 2022). Rather than using proprietary software, the analytical pipeline is implemented entirely in Python with pandas, numpy, scipy, statsmodels, scikit-learn, matplotlib, and seaborn, ensuring full reproducibility and eliminating dependency on paid licenses.

Participants and Sampling

Participants were 244 undergraduate management students enrolled at the Faculty of Business and Economics, Universitas Islam Indonesia, Yogyakarta. Inclusion criteria were current enrolment in the undergraduate management programme and provision of informed consent. One respondent who reported having already graduated was excluded to maintain a coherent active-student frame. A non-probability convenience sampling approach was used within the single institution; the survey link was distributed through course messaging groups, the faculty learning management system, and student organisation channels. The gender distribution was balanced (127 female, 52.0 percent; 117 male, 48.0 percent). The semester distribution concentrated at lower-intermediate levels, with Semester 4 comprising 66.4 percent of the sample, Semester 6 comprising 25.0 percent, Semester 8 comprising 6.1 percent, Semester 10 comprising 2.0 percent, and Semester 12 comprising 0.4 percent. The obtained sample exceeds the minimum estimated by Kock and Hadaya's (2018) inverse square root method for detecting a minimum path coefficient of 0.20 at 80 percent power and 5 percent significance level, which requires approximately 155 observations. Table 1 summarises these characteristics.

Table 1. Participant Characteristics

Characteristic	Category	n (%)
University	Universitas Islam Indonesia	244 (100.0)
Location	Yogyakarta	244 (100.0)
Gender	Female	127 (52.0)
	Male	117 (48.0)
Semester	4	162 (66.4)
	6	61 (25.0)
	8	15 (6.1)
	10	5 (2.0)
	12	1 (0.4)

Instruments

All four constructs were measured using adapted, positively keyed items presented bilingually (English-Indonesian) on a 6-point Likert-type agreement scale (1 = strongly disagree, 6 = strongly agree). Internal locus of control (four items) was adapted from the internal dimension of the IE-4 scale (Kovaleva, 2012; Nießen et al., 2022). Risk-taking propensity (seven items) was adapted from the Risk Propensity Scale (Meertens & Lion, 2008).

Extraversion (six items) was adapted from the extraversion domain of the Big Five Inventory-2 short form (Soto & John, 2017). Entrepreneurial intention (six items) was adapted from the

Entrepreneurial Intention Questionnaire tradition (Liñán & Chen, 2009). Because all items were rephrased into positively keyed forms and translated for a new language context, the resulting scales constitute adapted rather than original instruments; their psychometric properties are therefore reported in full in the Results section.

Procedure and Data Screening

Data were collected via Google Forms. The first page contained an information sheet describing the study purpose, voluntary nature of participation, anonymity, and data protection; participants provided informed consent by ticking an agreement box before proceeding. Data screening involved three steps: exclusion of the one respondent who had already graduated, inspection of missingness patterns with no missing indicator responses detected, and harmonisation of free-text semester responses to numeric values, with odd-numbered semesters rounded up to the nearest even value to align with the even-semester academic calendar. After screening, 244 valid cases were retained.

Data Analysis

The analytical pipeline ran in Python 3.12 on Jupyter. PLS-SEM estimation followed the standard Wold algorithm with Mode A reflective outer weights and path weighting scheme for inner weights. The measurement model was evaluated using indicator loadings, Cronbach's alpha, composite reliability (rho_c), average variance extracted (AVE), the heterotrait-monotrait ratio of correlations (HTMT; Henseler et al., 2015), and the Fornell-Larcker criterion.

The structural model was evaluated using path coefficients, coefficient of determination (R-squared), effect size (f-squared), and predictive relevance (Q-squared) estimated via 5-fold cross-validation. Mediation hypotheses were tested via bootstrapping with 5,000 resamples to obtain bias-corrected 95 percent confidence intervals for indirect effects. Common method bias was assessed using Harman's single-factor test via principal component analysis and the full collinearity variance inflation factor criterion (Kock, 2015) with the 3.3 threshold. The random seed for numpy and the bootstrap sampler was fixed at 42 to ensure reproducibility.

Results

Descriptive Statistics

Composite construct scores were computed as the mean of their respective indicators. All four constructs showed means above the midpoint of the 6-point scale, with the highest observed for entrepreneurial intention (M = 4.98, SD = 0.96) and the lowest for extraversion (M = 4.54, SD = 0.98). Skewness values ranged from -1.39 to -0.66 and kurtosis values from 0.43 to 2.71, indicating moderately skewed but acceptable distributions for PLS-SEM, which is a non-parametric method.

Before turning to relationships between variables, Table 2 reports how strongly the 244 students endorsed items measuring belief that outcomes depend on their own effort, willingness to accept calculated risk, sociability and assertiveness, and intention to start a business. All scores sit on a 1 to 6 scale, so a mean near 4.5 or higher signals a generally positive self-rating on that trait.

Table 2. Descriptive Statistics of Composite Construct Scores

Construct	M	SD	Min	Max	Skew	Kurt
Internal LoC	4.881	0.783	1.500	6.000	-1.209	2.708
Risk-Taking Prop.	4.582	0.789	1.286	6.000	-0.932	2.328
Extraversion	4.538	0.984	1.000	6.000	-0.663	0.427
Entrepr. Intention	4.977	0.961	1.000	6.000	-1.390	2.377

Measurement Model

All indicator loadings exceeded the recommended threshold of 0.60 (range: 0.635 to 0.879), with bootstrap t-values ranging from 10.88 to 53.53 (all $p < 0.001$). Cronbach's alpha values ranged from 0.823 to 0.926, and composite reliability (rho_c) from 0.883 to 0.942, well above the 0.70 threshold. Average variance extracted ranged from 0.533 to 0.730, exceeding the 0.50 threshold for all constructs, confirming convergent validity.

A survey is only as trustworthy as the questions that make it up. Table 3 checks, for each of the four traits, whether the items designed to measure that trait actually hang together and point in the same direction. Three numbers matter here: Cronbach's alpha above 0.70 signals consistent items, composite reliability above 0.70 confirms the same from a different angle, and average variance extracted (AVE) above 0.50 means the items genuinely capture the trait rather than random noise.

Table 3. Measurement Model: Reliability and Convergent Validity

Construct	k	Loading range	α	ρc	AVE
Internal LoC	4	0.785 to 0.845	0.823	0.883	0.653
Risk-Taking Prop.	7	0.635 to 0.780	0.854	0.888	0.533
Extraversion	6	0.807 to 0.879	0.919	0.937	0.712
Entrepr. Intention	6	0.818 to 0.878	0.926	0.942	0.730

Discriminant Validity

Discriminant validity was assessed using both the Fornell-Larcker criterion and the HTMT ratio. The square root of AVE for each construct exceeded its correlations with all other constructs, satisfying the Fornell-Larcker criterion. All HTMT ratios were below the 0.85 threshold (range: 0.628 to 0.759), with the highest observed between internal locus of control and risk-taking propensity (0.759), which is theoretically expected given their proximity as control-related dispositions.

Table 4. Fornell-Larcker Criterion (diagonal in bold = sqrt(AVE); off-diagonal = LV correlations)

	ILoC	RTP	EXT	EI
ILoC	**0.808**	0.651	0.574	0.627
RTP	0.651	**0.730**	0.559	0.604
EXT	0.574	0.559	**0.844**	0.607
EI	0.627	0.604	0.607	**0.855**

Figure 1 visualises the HTMT matrix. Each cell quantifies how empirically similar two constructs are, scaled so that values near zero indicate strong distinctiveness and values near one indicate near-identity. Every cell in the present study falls comfortably below the 0.85 threshold.

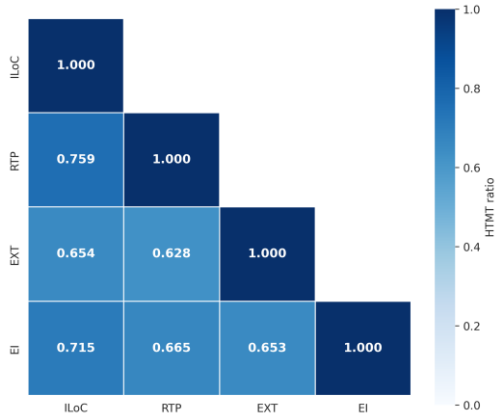


Figure 1. HTMT Ratio Matrix (All Below 0.85)

Common Method Bias Diagnostics

Two diagnostics were performed to assess the risk of common method bias inherent in single-source, single-wave self-report designs. First, Harman's single-factor test via principal component analysis showed that the first unrotated factor explained 45.74 percent of the total variance, below the 50 percent threshold commonly used to rule out severe common method bias. Second, the full collinearity variance inflation factor approach (Kock, 2015) yielded values between 1.824 and 2.134, all well below the 3.3 threshold. Both diagnostics indicate that common method bias does not pose a substantial concern for the present model.

Structural Model

Figure 2 presents the complete structural model in one diagram. Each arrow carries a standardised coefficient (β) indicating the strength and direction of the relationship, with three asterisks signalling statistical significance at $p < 0.001$. The R-squared value inside each endogenous construct indicates the proportion of its variance explained by its predictors.

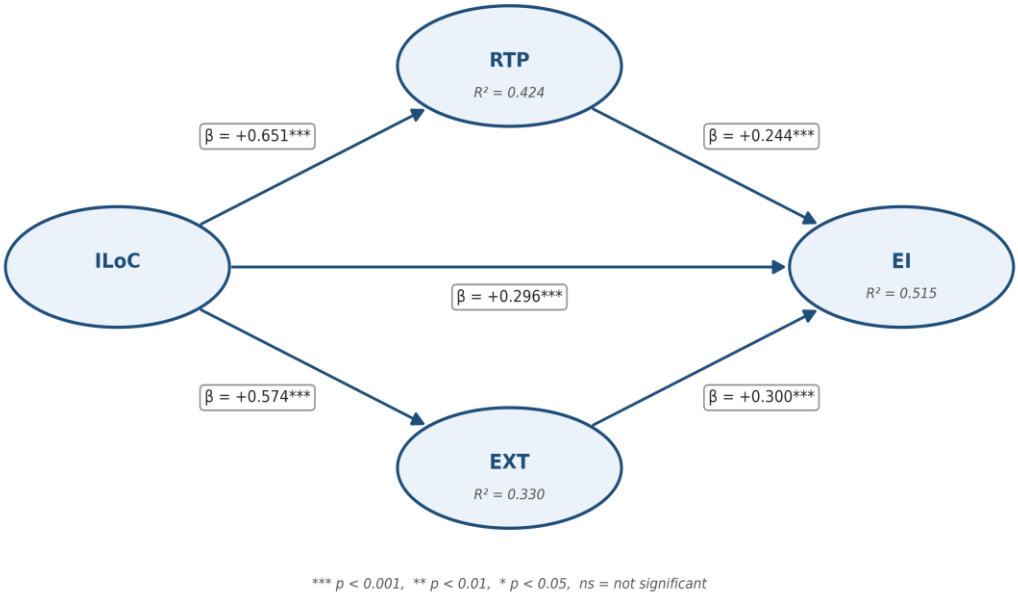


Figure 2. Structural Model with Standardised Path Coefficients

The structural model explained substantial variance in all three endogenous constructs. R-squared values were 0.424 for risk-taking propensity, 0.330 for extraversion, and 0.515 for entrepreneurial intention. Q-squared values from 5-fold cross-validation were 0.396, 0.303, and 0.507 respectively, all exceeding zero and indicating strong predictive relevance. Inner model variance inflation factors ranged from 1.000 to 1.954, well below the 3.3 threshold, confirming the absence of problematic multicollinearity among predictors.

All five hypothesised direct paths were statistically significant at $p < 0.001$. Internal locus of control showed strong positive effects on risk-taking propensity ($\beta = 0.651$, $t = 11.59$) and extraversion ($\beta = 0.574$, $t = 10.20$), supporting H2 and H3. The direct effect of internal locus of control on entrepreneurial intention remained significant after including both mediators ($\beta = 0.296$, $t = 3.96$), supporting H1. Both mediators predicted entrepreneurial intention positively: risk-taking propensity ($\beta = 0.244$, $t = 3.82$) supported H4, and extraversion ($\beta = 0.300$, $t = 4.58$) supported H5.

Table 5 reports the same five direct pathways shown in Figure 2 with complete statistical detail. The β column shows the strength and direction of each relationship, SE its estimated variability, t and p its statistical reliability, and the 95 percent bias-corrected and accelerated (BCa) confidence interval the plausible range of the true effect based on 5,000 bootstrap resamples. A confidence interval that does not cross zero indicates a statistically meaningful effect.

Table 5. Structural Model: Direct Path Coefficients (N = 244; 5,000 bootstrap resamples)

Hyp.	Path	β	SE	t	p	95% BCa CI	Result
H1	ILoC → EI	0.296	0.075	3.96	< 0.001	[0.149, 0.438]	Supported
H2	ILoC → RTP	0.651	0.056	11.59	< 0.001	[0.524, 0.747]	Supported
H3	ILoC → EXT	0.574	0.056	10.20	< 0.001	[0.457, 0.677]	Supported
H4	RTP → EI	0.244	0.064	3.82	< 0.001	[0.122, 0.366]	Supported
H5	EXT → EI	0.300	0.066	4.58	< 0.001	[0.172, 0.431]	Supported

Mediation Analysis

Table 6 decomposes the effect of internal locus of control on entrepreneurial intention into three parts: how much travels through risk-taking propensity (H6), how much travels through extraversion (H7), and how the two indirect channels compare to the total effect. The Variance Accounted For (VAF) in the final row captures the fraction of the overall influence that flows through the two mediators rather than going directly.

Table 6. Indirect Effects and Mediation Summary

Hyp.	Effect	Estimate	SE	t	p	95% BCa CI
H6	ILoC → RTP → EI	0.159	0.046	3.46	< 0.001	[0.080, 0.256]
H7	ILoC → EXT → EI	0.173	0.043	4.02	< 0.001	[0.097, 0.264]
-	Total indirect effect	0.331	0.053	6.25	< 0.001	[0.232, 0.440]
-	Total effect (direct + indirect)	0.627	0.063	10.01	< 0.001	[0.487, 0.733]
-	VAF (indirect / total)	0.528	0.094	5.63	< 0.001	[0.363, 0.727]

Both indirect pathways were statistically significant. The indirect effect through risk-taking propensity was β = 0.159 (SE = 0.046, t = 3.46, p < 0.001, 95 percent BCa CI [0.080, 0.256]), supporting H6. The indirect effect through extraversion was β = 0.173 (SE = 0.043, t = 4.02, p < 0.001, 95 percent BCa CI [0.097, 0.264]), supporting H7. The two indirect effects did not differ significantly from one another (difference = -0.014, SE = 0.071, t = -0.20, p = 0.845, 95 percent CI [-0.151, 0.131]), indicating comparable mediating contributions. The total indirect effect was β = 0.331 (SE = 0.053, t = 6.25, p < 0.001), and the total effect (direct plus indirect) was β = 0.627 (SE = 0.063, t = 10.01, p < 0.001). The VAF of 0.528 indicates that 52.8 percent of the total effect of internal locus of control on entrepreneurial intention was transmitted through the two mediators, establishing substantial partial mediation.

Figure 3 visualises the uncertainty around these mediation findings. Each curve shows the distribution of plausible values for an indirect effect across 5,000 bootstrap resamples. The red vertical line marks the original point estimate, and the dashed lines mark the 95 percent BCa confidence bounds. Because all three distributions sit entirely to the right of zero, every indirect pathway is statistically meaningful.

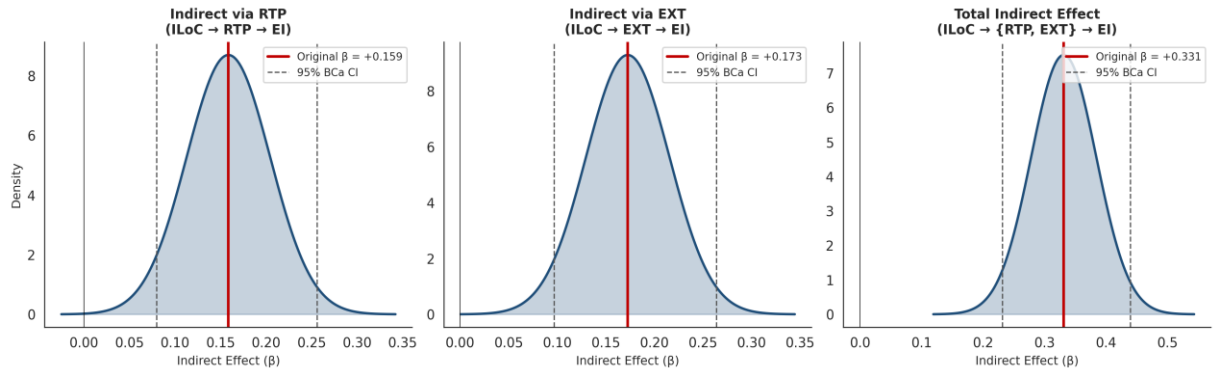


Figure 3. Bootstrap Distributions of Indirect Effects

Discussion

This study tested a parallel mediation model linking internal locus of control, risk-taking propensity, extraversion, and entrepreneurial intention among 244 undergraduate management students at a faith-based private university in Indonesia. The findings provide consolidated empirical support for a hierarchical trait architecture and address each of the three research questions with substantive answers.

Three Questions, Three Answers, One Coherent Story

The first question asked whether internal locus of control retains direct predictive power once risk-taking propensity and extraversion are modelled as parallel mediators. The answer is yes: the direct path remained robust ($\beta = 0.296$, $p < 0.001$), indicating that control beliefs exert influence that cannot be entirely absorbed by more specific dispositions. This result converges with Tseng et al. (2022) among Taiwanese students and Gebresilase et al. (2025) among Ethiopian graduating students, both of whom found that internal locus of control retains a significant direct path to entrepreneurial intention even when proximal mediators are introduced. It also aligns with Tentama and Abdussalam (2020) and Amenah et al. (2024), who demonstrated in Indonesian samples that locus of control continues to operate as a significant antecedent of entrepreneurial intention. The persistence of the direct path likely reflects mechanisms that Rotter (1966) originally emphasised but which modern mediation models often omit: proactive goal-setting, self-regulation, and persistence under adversity.

These capacities are not reducible to risk tolerance or sociability; as Ajzen (2002) argued in clarifying perceived behavioural control, internal control beliefs operate at a different conceptual level from task-specific self-efficacy or domain-specific dispositions, and therefore retain unique variance even when proximal predictors are included. The second question asked which mediating pathway carries more of the control-to-intention effect. The answer is unexpectedly symmetric: risk-taking propensity ($\beta = 0.159$) and extraversion ($\beta = 0.173$) produced indirect effects that did not differ significantly ($p = 0.845$). This symmetry is theoretically informative. Much of the entrepreneurship trait literature has emphasised risk-taking as the defining entrepreneurial disposition (Zhao et al., 2010; Shukla & Kumar, 2024; Nguyen et al., 2024), implicitly positioning social traits as secondary. The present findings challenge that hierarchy. They suggest that entrepreneurial intention emerges from two functionally distinct but empirically equivalent pathways: an uncertainty-facing pathway routed through risk tolerance, and a socially-engaging pathway routed through extraversion. This dual structure resonates with Rauch and Frese's (2007) meta-analytic argument that different trait clusters predict entrepreneurship through different behavioural mechanisms, and with Brandstätter's (2011) synthesis of five meta-analyses showing that both agentic and social traits contribute meaningfully to entrepreneurial outcomes. Recent Indonesian and Asian evidence supports the non-redundant role of extraversion specifically: Awwad and Al-Aseer (2021) in Jordan and Ta et al. (2026) in Taiwan both

demonstrated that extraverted tendencies translate into entrepreneurial intention through identifiable proximal cognitions such as alertness and digital self-efficacy. Read together with these studies, the present symmetric pattern indicates that frameworks privileging a single dominant mediator understate the importance of social engagement as an independent channel.

The third question asked how much of the total effect travels through the indirect versus the direct route. The VAF of 0.528 places the model squarely in the partial-mediation range defined by Hair et al. (2022), with the indirect pathway being the larger but not dominant contributor. This magnitude has substantive implications. It rules out the strong mediation claim that control beliefs influence entrepreneurial intention only by reshaping more specific dispositions. It equally rules out a direct-effects-only account in which risk tolerance and social engagement are peripheral. Instead, roughly half of the total effect is absorbed by the two mediators, and the remaining half operates directly through mechanisms that our model did not specify. Krueger et al. (2000) long noted that intention-based models improve when distal antecedents are linked to proximal cognitions rather than treated as direct predictors, yet the present results suggest a more balanced architecture: control beliefs still act as direct drivers, while simultaneously channelling their influence through dispositional mediators. This partial-mediation pattern mirrors recent Indonesian findings by Kurjono et al. (2025), who reported that risk-taking propensity directly enhances entrepreneurial intention while also operating through entrepreneurial self-efficacy, and is consistent with the broader intention-based tradition in which traits work both directly and via proximal cognitions (Schlaegel & Koenig, 2014).

Locus of Control as a Gateway, Not a Shortcut

The hierarchical trait architecture implied by these results deserves careful interpretation. Internal locus of control, as a generalised expectancy about reinforcement contingencies (Rotter, 1966), sits at a higher level of abstraction than risk-taking propensity or extraversion. Its predictive power in the present model therefore reflects both a direct motivational influence and an indirect influence through dispositions that are more behaviour-proximal. This distinction matters because internal locus of control is often conflated with perceived behavioural control or entrepreneurial self-efficacy, despite operating at different conceptual levels. Ajzen (2002) showed that locus of control and perceived behavioural control are empirically separable: the former concerns generalised attributional beliefs, while the latter concerns task-specific controllability expectations. The present data are consistent with that distinction, because the direct effect of internal locus of control on entrepreneurial intention ($\beta = 0.296$) is meaningful but smaller than effects typically reported for entrepreneurial self-efficacy, which serves as a closer analogue of perceived behavioural control in the entrepreneurship literature (Bandura, 1997; Krueger et al., 2000; Gebresilase et al., 2025). In other words, internal control beliefs are not a shortcut to entrepreneurial intention; they are a gateway that opens onto more specific dispositional and cognitive channels.

A further theoretical contribution concerns the comparable weights of the two mediators. Brandstätter (2011) argued, after integrating five meta-analyses, that narrow personality traits predict entrepreneurial outcomes more strongly than broad Big Five factors, but noted that different trait clusters operate through different mechanisms. The present results extend this view by showing that a trait primarily associated with uncertainty orientation (risk-taking propensity) and a trait primarily associated with social orientation (extraversion) can function as parallel, empirically equivalent channels for translating generalised control beliefs into entrepreneurial intention. This dual-channel pattern may reflect the fundamentally mixed nature of early-stage entrepreneurial cognition, which requires both risk-weighted decision-making under ambiguity (Meertens & Lion, 2008) and network-building through social initiative (Soto & John, 2017; Awwad & Al-Aseer, 2021). Purely risk-centred accounts of entrepreneurial intention (Zhao et al., 2010; Shukla & Kumar, 2024) or purely trait-of-extraversion accounts would each capture only half of the story these data tell.

Two features of the present setting warrant additional theoretical framing. First, the data come from a faith-based private university in Indonesia, a context underrepresented in trait-based entrepreneurship research. Recent Indonesian work has shown that Islamic religiosity positively associates with entrepreneurial activity in large-scale provincial data (Wijaya et al., 2025), and that religiosity channels into entrepreneurial intention among Muslim students through entrepreneurial motivation and self-efficacy (Siswanto, 2024) and through attitudes toward green entrepreneurship (Pusparini et al., 2025). Across four countries, Giacomin et al. (2023) similarly reported that religiosity shapes entrepreneurial intention, although the pathways depend on denominational and national context. The present study does not measure religiosity directly, but the high mean scores on internal locus of control (M = 4.88 on a 6-point scale) and entrepreneurial intention (M = 4.98) are consistent with a student population in which faith-based values may coexist with strong agentic self-views. Second, the sample concentrates at semesters 4 and 6 (91.4 percent), a developmental window in which career exploration and self-concept formation are especially active (Nabi et al., 2017). The symmetric RTP-EXT pattern observed here may partly reflect this developmental stage: students who have not yet committed to a specific career trajectory may process entrepreneurial possibilities through whichever dispositional lens is more salient in their immediate environment, yielding two channels of roughly equal weight rather than one dominant route.

Why Entrepreneurship Programmes Need Two Engines

For entrepreneurship education at UII and comparable faith-based private universities in Indonesia, the results carry a specific implication: interventions should engage both engines of the mediated pathway, not just one. The evidence base for this recommendation is triangulated across several streams of literature. Nabi et al.'s (2017) systematic review of 159 studies found that entrepreneurship education effects are heterogeneous, with stronger outcomes among programmes that combine cognitive skill-building with experiential and social learning components. Zhao et al.'s (2010) meta-analysis similarly demonstrated that risk propensity predicts selection into entrepreneurship, while extraversion predicts venture performance once entrepreneurs are active, suggesting that both traits deserve curricular attention but for different reasons. Schlaegel and Koenig (2014) reinforced this point by showing that intention-based models outperform purely situational or demographic predictors, but only when multiple psychological antecedents are jointly modelled. Taken together, these findings support a curriculum design that integrates risk-competency modules (simulated venture decisions under uncertainty, small-stakes experimentation, reflection on failure) alongside social-interactional modules (pitch clinics, collaborative idea generation, networking with alumni entrepreneurs).

The faith-based institutional context adds a further design consideration. Siswanto (2024) showed that religiosity operates on entrepreneurial intention among Indonesian Muslim students via entrepreneurial motivation and self-efficacy, and Pusparini et al. (2025) demonstrated the same mediation structure for green entrepreneurship at Indonesian Islamic universities. Wijaya et al. (2025), using GEM data on 21,279 Indonesian respondents, reported that Islamic religiosity is not incompatible with entrepreneurial activity and may in fact enhance it. Giacomin et al. (2023) found in a four-country study that religiosity shapes entrepreneurial intention through value-based rather than purely cognitive channels. A faith-aware curriculum at UII can therefore leverage both the risk-tolerance engine and the social-engagement engine while framing entrepreneurship within Islamic ethical principles such as the prohibition of riba, the encouragement of halal livelihood, and the social obligation of beneficial enterprise. Academic advisors and incubator staff may also find it useful to screen incoming students on all three dimensions (internal locus of control, risk-taking propensity, and extraversion) to tailor mentoring, since the mediation architecture implies that interventions may need to compensate for the weakest dispositional channel rather than reinforce the strongest.

What This Study Cannot Tell Us (Yet)

Six limitations frame the scope of inference. First, the single-institution design sacrifices external validity for institutional specificity; generalisation to other Indonesian universities, ASEAN contexts, or non-Muslim-majority settings requires replication. Second, the sample concentrates at semesters 4 and 6 (91.4 percent), so the entrepreneurial intention observed here reflects exploratory orientation more than imminent venture readiness (Nabi et al., 2017). Third, the cross-sectional design precludes strict causal inference; longitudinal replication would be needed to establish temporal precedence among internal locus of control, risk-taking propensity, extraversion, and entrepreneurial intention, following the developmental logic implied by Rauch and Frese (2007). Fourth, all variables were measured through single-source self-report. Although the Harman single-factor test (45.7 percent) and full collinearity variance inflation factors (all below 2.2) (Kock, 2015) indicate that common method bias is unlikely to threaten the main conclusions, multi-source and behavioural validation would strengthen the evidence. Fifth, the scales were adapted and positively keyed, which simplified administration but relinquished the original instruments' protection against acquiescent responding (Soto & John, 2017; Kovaleva, 2012). Sixth, the model did not include religiosity, entrepreneurial self-efficacy, or attitudes toward entrepreneurship, all of which recent Indonesian work has shown to be theoretically relevant (Siswanto, 2024; Pusparini et al., 2025; Kurjono et al., 2025). Integrating these into a more comprehensive structural model is the natural next step for future research in this line.

Conclusion

This study tested a parallel mediation model of entrepreneurial intention among undergraduate management students at Universitas Islam Indonesia. All hypothesised paths were significant, and the indirect pathway through risk-taking propensity and extraversion accounted for more than half of the total effect of internal locus of control on entrepreneurial intention. The two mediators contributed comparably, supporting a hierarchical trait architecture in which control beliefs are translated into entrepreneurial intention through both uncertainty-facing and socially-engaging dispositions. The study provides institution-specific empirical evidence for a faith-based private university in Indonesia, a segment of the higher-education landscape that has been under-represented in trait-based entrepreneurship research.

Recommendations

Three recommendations follow from the findings. First, for institutional practice at UII and comparable faith-based private universities, entrepreneurship curricula should integrate both risk-competency modules (simulated venture decisions under uncertainty, calculated risk-taking exercises) and social-interactional modules (networking workshops, pitch clinics, collaborative idea development) rather than focusing on only one dimension. Second, for future research, longitudinal replication is warranted to establish temporal precedence among the traits, and multi-campus replication would enable cross-institutional comparison across public, private, and faith-based settings in Indonesia. Third, for methodological transparency, future PLS-SEM studies in the ASEAN entrepreneurship research community may benefit from adopting open-source Python implementations like the one used here, which provide full reproducibility and reduce dependence on commercial software licenses.

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