

Response styles and value internalisation in entrepreneurship education evaluation: a survey of 16,075 Chinese students

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Article

Keywords: entrepreneurship education, effectiveness evaluation, value orientation, response styles, latent profile analysis, institutional differences

Posted Date: September 4th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10721454/v1>

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Additional Declarations: No competing interests reported.

Abstract

Effectiveness evaluation in entrepreneurship education relies heavily on students' self-reports, and whether high scale scores reflect genuine value internalisation determines both the credibility of evaluation conclusions and the allocation of educational policy resources. Drawing on a stratified survey of 16,075 Chinese university students, this study used a bifactor model, latent profile analysis (LPA), and a reliability-corrected path model to examine response-style components in self-reported value measurement at both the variable and the person level, and to test whether institutional environmental advantages translate into value advantages. Results indicated that (1) the scale was dominated by a general factor (ECV = 63.9%), high value-orientation scores were heavily contaminated by general response components, and 6.4% of students displayed a full-endorsing response profile; (2) six value-instrumental orientation profiles were identified, with the two orientations organised in coexistence rather than opposition; (3) elite-institution students reported significantly higher satisfaction and perceived climate but significantly lower value orientation and higher instrumental orientation, and their value-orientation high scores were more often produced by full-endorsing responding; the direct satisfaction–value association was stronger in elite institutions yet was not carried by the perceived-climate pathway (climate-mediated share 10.0% versus 20.4% in non-elite institutions), whereas the dose-response association between course-taking and value orientation ($r = 0.086$; $r = 0.098$ after excluding full-endorsing responders) was robust and, after exclusion, stronger in elite institutions. The study offers a psychometric diagnostic framework for educational effectiveness evaluation that relies on self-reported data, and suggests that substantive course provision, rather than climate-building alone, is a more verifiable pathway to value internalisation.

1. Introduction

The global expansion of entrepreneurship education (Kuratko, 2005) has made the evaluation of its effectiveness a matter of widespread concern. In China, innovation and entrepreneurship education has become a central agenda item in higher education reform. Since the State Council's Implementation Opinions on Deepening the Reform of Innovation and Entrepreneurship Education in Higher Education Institutions (2015), universities have generally offered entrepreneurship courses, established entrepreneurship platforms, and cultivated an entrepreneurship climate, and have listed the cultivation of innovative and entrepreneurial talent with sound value orientations among their educational goals. How is the effect of this educational process to be evaluated? A common practice is to ask students to self-report their satisfaction with the programme, their perceptions of the entrepreneurship climate, and their attitudes towards value-related beliefs. Evaluation conclusions bear directly on the direction of policy resource allocation and on institutional reform decisions, so their reliability carries practical weight that extends beyond academic debate.

This evaluation practice rests on an implicit premise: students' high scores genuinely reflect their level of value internalisation, and institutions with superior resources should therefore produce better value-

related outcomes. Drawing on data from 16,075 university students, however, this study finds that this premise is challenged on two dimensions.

Phenomenon 1: a better environment, but no higher value endorsement. Students at elite institutions reported significantly higher programme satisfaction and perceived entrepreneurship climate than students at ordinary institutions, yet their value orientation was significantly lower, whereas their instrumental orientation was significantly higher.

Phenomenon 2: a structural difference in the sources of elite-institution high scores. High scores among elite-institution students are more often produced by respondents who give the highest rating to every item, rather than by respondents who combine high value endorsement with moderate instrumental orientation.

Both phenomena point to the same psychometric root: high scores on self-report scales may simultaneously contain genuine attitude strength and systematic response style, and the two should not be conflated when educational effectiveness is interpreted.

The threat that response styles pose to self-report measurement is well documented (Paulhus, 1991; Baumgartner and Steenkamp, 2001). When all items are worded in the same direction (as are all 25 items used here), acquiescence may make high scores reflect a response habit rather than the attitude's true value; in East Asian cultural contexts such as China this tendency is especially pronounced (Smith, 2004). Response process theory likewise shows that questionnaire responding involves comprehension, retrieval, judgement, and response, and that simplification at any stage can produce systematic bias (Krosnick, 1999). Yet this risk has rarely been tested in entrepreneurship education evaluation: the proportion of high scores treated as evidence of effectiveness that is actually the product of response style has not been quantified.

In parallel, entrepreneurship education research has long been dominated by the average treatment effect paradigm (Martin et al., 2013), which compares means to estimate the average impact of programmes. Meta-analytic evidence shows the overall effect on entrepreneurial intentions is weak and highly heterogeneous (Bae et al., 2014), with hysteresis and persistence problems (Fayolle and Gailly, 2015), and students are far from homogeneous (Nabi et al., 2017; Liguori et al., 2018). Mean comparisons can mask heterogeneity in both student profiles and response styles, distorting judgements of effectiveness.

Against this background, this study addresses three interrelated research questions:

RQ1 (measurement structure)

Does a dominant general factor exist in the entrepreneurship education value evaluation scale? Do value orientation and instrumental orientation constitute distinguishable dimensions?

RQ2 (individual profiles)

What heterogeneity do students exhibit in their combinations of value and instrumental orientation? Is there a response-type profile characterised by full endorsement of all items?

RQ3 (environmental associations)

Does institutional environmental advantage translate into a value endorsement advantage? Do educational inputs such as course-taking survive robustness checks against response styles in their association with value orientation? Are these associations consistent across institutional types?

Drawing on Weber's typology of rationality, the internalisation continuum of self-determination theory, Astin's input-environment-output (I-E-O) model, and the response-style literature, this study adopts an analytical strategy that combines variable-centred and person-centred approaches to examine these questions in turn.

2. Theoretical background and hypotheses

2.1 Value rationality and instrumental rationality: conceptual origins and construct mapping

The classical distinction between value rationality and instrumental rationality. In *Economy and Society*, Weber (1978) distinguished value-rational from instrumentally rational action: the former is oriented to the value belief itself regardless of success or consequence; the latter follows means-end calculation. Kalberg (1980) reconstructed Weber's typology and showed that this distinction offers an analytical framework for motivation and action orientations. It has been widely imported into entrepreneurship research: entrepreneurship can be understood as a process of value realisation (e.g., social entrepreneurship, mission-driven ventures) or as a means of pursuing self-interest (e.g., opportunism, utilitarian orientation).

The internalisation continuum of motivation. Self-determination theory (SDT; Deci and Ryan, 2000) captures a similar distinction through the degree of motivational internalisation: identified and integrated regulation mean external norms have been internalised as personal values, corresponding to a value-rational orientation, whereas external and introjected regulation mean behaviour is driven by reward, punishment, or self-involvement, corresponding to an instrumental-rational orientation. A central SDT proposition is that environmental conditions (such as autonomy support and the satisfaction of relatedness and competence needs) promote internalisation.

Construct mapping and operationalisation. Weber's typology classifies social action and SDT describes motivational regulation; neither lies at the level of attitude-scale content. This study therefore treats the two rationalities as a **heuristic mapping**: the scales measure "endorsement of positive value beliefs consistent with a value-rational orientation" (value orientation) and "pragmatic, utilitarian, and risk-averse beliefs consistent with an instrumental-rational orientation" (instrumental orientation), not action types or motivational regulations directly; SDT serves as a mechanism framework for why environmental

support may promote value endorsement. Conclusions should be read as associations at the level of attitude endorsement; generalisation to action or motivation requires caution. The scale comprises 14 positive-value items (diligence and honesty, social responsibility, fairness and justice, ecological civilisation, and patriotic commitment; VR) and 11 items capturing pragmatic, utilitarian, opportunistic, and risk-averse beliefs about entrepreneurship (IR). IR is treated as a composite dimension; its relationship with the general factor is examined through the bifactor model in the measurement section.

2.2 Two competing interpretations of high scores: internalisation outcome or response style

As used above, "high scores" refers to high-scoring responses on self-report scales such as value orientation, and in particular the pattern of giving the highest rating to most or all items. Two competing interpretations of such high scores are the focus of this study.

Interpretation 1 (substantive): high scores reflect internalisation. The shared expectation of SDT and the I-E-O model is that a high-quality educational environment (resources, support, climate) promotes students' internalisation of external value norms, and thereby produces high scores on value orientation scales. On this account, the high satisfaction and high climate of elite institutions should be accompanied by higher value endorsement. This interpretation is the dominant implicit assumption of current entrepreneurship education evaluation.

Interpretation 2 (stylistic): high scores reflect response style. The response-style literature (Paulhus, 1991; Baumgartner and Steenkamp, 2001; Meisenberg and Williams, 2008) indicates that single-direction wording with no reverse-keyed items lets acquiescence systematically inflate scores; such high scores do not vary with item content and reflect a response habit. Response process theory (Krosnick, 1999) likewise shows that low-motivation respondents adopt "satisficing" strategies, giving similar or extreme responses to reduce cognitive load. On this account, elite institutions' high-score advantage may reflect response style rather than value internalisation.

The two interpretations carry opposite implications for evaluation: the former implies high-scoring institutions are effective, the latter that high scores may conceal ineffective or counterproductive realities. This study is a discriminating test of the two: the bifactor model quantifies the general component within common variance (variable-level evidence for the stylistic interpretation), LPA identifies respondents who fully endorse all items (person-level evidence), and robustness checks excluding such respondents test whether the environment-value association survives once the stylistic component is removed.

2.3 Institutional environment and student development: the I-E-O model

Astin's (1993) input-environment-output (I-E-O) model is among the most influential frameworks in higher education research: student development is the joint product of personal background (inputs) and

institutional environment, so evaluation must control for input differences. In China, institutional type constitutes a pronounced environmental stratification. Elite institutions, represented by "Double First-Class" universities, possess superior course resources, a stronger entrepreneurship climate, and higher societal expectations. ("Double First-Class" is a national initiative launched by the Chinese government in 2017 covering world-class universities and disciplines; the distinction is a reasonable approximation of resource- and prestige-based stratification.)

The I-E-O model suggests two directions of testing: first, whether elite-institution students have higher or structurally different value orientations; second, whether the associations between environmental perceptions (satisfaction, climate) and value formation differ by institutional type. Institutional type is the key grouping variable in both.

2.4 A person-centred perspective: heterogeneous profiles and respondent types

Entrepreneurship education research has long relied on variable-centred mean comparisons that conceal heterogeneity (Martin et al., 2013; Bae et al., 2014; Nabi et al., 2017; Fayolle and Gailly, 2015). Person-centred methods such as latent profile analysis (LPA) identify subgroups of individuals with similar characteristics on continuous variables and have been applied to entrepreneurial intention, motivation, and engagement (Liguori et al., 2018); they can also identify respondent types such as careless and extreme responding (Meade and Craig, 2012). This study uses LPA for both purposes (orientation profiles and response-type profiles), combining substantive and methodological aims.

2.5 Research hypotheses

On the basis of the above framework, the following hypotheses are proposed:

H1 (measurement structure)

Value orientation and instrumental orientation constitute distinguishable dimensions (H1a); the scale contains a significant general factor, and high value-orientation scores are heavily contaminated by general response components (H1b).

H2 (individual profiles)

Using value and instrumental orientation as indicators, multiple latent profiles with substantive differences can be identified (H2a); among them there exists a response-type profile characterised by full endorsement of all items (H2b).

H3 (environmental associations)

Institutional type is significantly associated with profile membership, with a higher proportion of response-type profiles in elite institutions (H3a); course-taking is positively associated with value

orientation and negatively associated with instrumental orientation (H3b); the effects of programme satisfaction and climate on the two orientations differ across institutional types (H3c).

3. Method

3.1 Data source and sample

The data come from the "Survey on the Value Leadership of Innovation and Entrepreneurship Education in Universities in the New Era", conducted in March-June 2022. Owing to the COVID-19 pandemic, questionnaires were distributed mainly online through the Wenjuanxing platform. The survey used a stratified, multi-stage design covering different institution types across all major regions of China, with full-time students completing the questionnaire through the student affairs system. The dataset comprises all 16,075 returned questionnaires; no respondents were excluded on the basis of missingness on the analysis variables.

Within this full sample, item-level missingness was handled as follows. The analyses use three sample definitions. (1) The profile analysis and multinomial logistic regression use the full sample, $N = 16,075$ (age missing for 284 respondents, 1.8%, imputed by the median in the regression). (2) The path model further excludes 1,791 respondents (11.1%) with missing perceived climate, giving $N = 14,284$. (3) The exclusion robustness check additionally removes 910 full-endorsing responders within the path sample, giving $N = 13,374$ (1,022 in the full sample, of whom 112 did not enter the path model because of missing climate). Composition and purpose are described in the note to Table 1.

Table 1
Sample characteristics (N = 16,075)

Variable	Category/statistic	n or M (SD)	%
Gender	Male	6,727	41.8
	Female	9,348	58.2
Age	Continuous	20.1 (2.69)	—
Place of origin	Urban	5,670	35.3
	Rural	10,405	64.7
Institutional type	Double First-Class	424	2.6
	Provincial Double First-Class	983	6.1
	Regular undergraduate	14,392	89.5
	Higher vocational college	276	1.7
Elite group (combined)	Double First-Class + provincial	1,407	8.8
Note: Missing data: age missing for 284 respondents (1.8%; imputed by the median in the regression); no missing values on gender, place of origin, or institutional type. Perceived climate was missing for 1,791 respondents (11.1%); after exclusion, the path analysis sample is N = 14,284 (elite 1,275, 8.9%), and the exclusion robustness check sample is N = 13,374 (1,022 full-endorsing responders in the full sample, of whom 112 did not enter the path model because of missing climate). The elite share is computed on N = 16,075.			

Sample composition (N = 16,075): 6,727 men (41.8%); mean age 20.1 years (SD = 2.69); 5,670 respondents from urban places of origin (35.3%); 424 from Double First-Class universities (2.6%), 983 from provincial-level Double First-Class universities (6.1%), 14,392 from regular undergraduate institutions (89.5%), and 276 from higher vocational colleges (1.7%). In this study, Double First-Class and provincial-level Double First-Class universities are combined and defined as **elite institutions**; the remaining institutions are classified as non-elite. The elite group comprises 1,407 respondents (8.8%). Within the path analysis sample (N = 14,284), 1,275 respondents (8.9%) attended elite institutions.

3.2 Measures

Value orientation and instrumental orientation. The 25 items of the questionnaire section "With regard to innovation and entrepreneurship, please rate the following statements" were used, scored on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Based on exploratory factor analysis (Section 4.1), 14 positive-value items form the value orientation dimension (VR; $\alpha = 0.955$, M = 4.35, SD = 0.63) and 11 items covering instrumental, opportunistic, and risk-averse beliefs form the instrumental orientation dimension (IR; $\alpha = 0.865$, M = 3.33, SD = 0.70); the correlation between the two dimensions is $r = 0.26$.

Programme satisfaction. Single item: "How do you rate your satisfaction with the innovation and entrepreneurship education at your university?", 5-point scale (M = 3.54, SD = 0.89).

Perceived entrepreneurship climate. Single item: "What do you think of the innovation and entrepreneurship education climate at your university?", 5-point scale; "not sure" was treated as missing (M = 3.52, SD = 0.85; missing for 1,791 respondents).

Course-taking. Number of entrepreneurship courses completed (0 = none offered or not taken, 1 = one course, 2 = two courses, 3 = three or more).

Demographic variables. Gender (male/female), age, and place of origin (rural/urban).

3.3 Analytical strategy

The analysis proceeds in four stages.

Stage 1: Measurement model. Exploratory factor analysis (EFA; maximum likelihood extraction with Varimax rotation) examined the dimensional structure, followed by confirmatory factor analysis (CFA) of a two-factor model. Because the two-factor CFA did not fit satisfactorily, an orthogonal bifactor model (general factor G plus specific factors F1/F2; Reise, 2012; Rodriguez et al., 2016) was estimated with fit indices, standardised loadings, and explained common variance (ECV) reported; Harman's single-factor test was also conducted. Both models were estimated by maximum likelihood (semopy). This stage corresponds to H1.

Stage 2: Latent profile analysis. Using standardised means of the two orientation dimensions as indicators, Gaussian mixture models (diagonal covariance) were fitted for $k = 2$ to $k = 6$, with selection based on BIC, aBIC, entropy, and interpretability. The $k = 6$ solution contains deterministic components with zero variance on the indicators (Section 4.2), and part of the pronounced BIC drop from $k = 5$ to $k = 6$ stems from the boundary behaviour of such components; selection therefore relied primarily on interpretability, entropy, and stability of the $k = 5/k = 6$ structure rather than BIC alone. Two sensitivity analyses tested whether these components reflect the true data structure: whether the full-score groups in the $k = 4/k = 5$ solutions are also zero-variance deterministic components, and whether the full-endorsing profile is stable when the indicators are perturbed by slight Gaussian noise before re-estimating $k = 6$ (results in Section 4.2). After identification, ANOVAs compared profiles on satisfaction, climate, and course-taking. This stage corresponds to H2.

Stage 3: Predictors of profile membership. With profile membership as the outcome and institutional type, gender, age, place of origin, and course-taking as predictors, a multinomial logistic regression was estimated (largest profile as reference), reporting odds ratios (OR) and 95% confidence intervals. Activity participation was included as a covariate. This corresponds to the person-level tests of H3a and H3b. The pseudo- R^2 is low (about 0.02), so the results should be read as descriptive associations.

Stage 4: Path model and robustness check. A reliability-corrected path model specified programme satisfaction, course-taking, and activity participation as exogenous variables, perceived climate as a mediator, and the two orientations as outcomes (measurement error fixed via $\alpha: \varepsilon = (1 - \alpha) \cdot \text{Var}$, $\alpha = 0.955$ for VR, 0.865 for IR). All paths, including the regression of climate on course-taking, are reported. After

estimating the full-sample coefficients, the model was estimated separately for elite and non-elite groups and between-group differences were tested with z-tests on unstandardised coefficients; indirect effects of satisfaction through climate were then decomposed. Because multiple paths were tested, no correction for multiple comparisons was applied and results should be regarded as exploratory. The robustness check re-estimated the model after excluding full-endorsing responders within the path sample.

Data analysis was carried out in Python (pandas, scikit-learn, statsmodels, semopy).

4. Results

4.1 Measurement structure: dominance of a general factor and the bifactor model

Exploratory factor analysis. EFA (N = 16,075) supported a two-factor solution: Factor 1 (value orientation) comprised the 14 positive-value items with primary loadings between 0.63 and 0.87; Factor 2 (instrumental orientation) comprised the 11 instrumental items with loadings between 0.29 and 0.76 (most above 0.40). One item, "entrepreneurship must be innovative" (item 10), showed a substantial secondary loading on the value factor (0.50) alongside a moderate instrumental loading (0.33); it was retained on the instrumental factor following the original scale-construction decision, and the bifactor analysis below provides a fuller account of its variance. Internal consistency of both dimensions was good ($\alpha = 0.955, 0.865$).

Confirmatory factor analysis. The two-factor CFA did not reach satisfactory fit ($\chi^2(274) = 47,072.3$; CFI = 0.834, TLI = 0.818, RMSEA = 0.103; Table 2), suggesting common variance beyond the specified model.

Table 2
Measurement model fit and bifactor decomposition

Model	χ^2	df	CFI	TLI	RMSEA	Note
Two-factor CFA	47,072.3	274	0.834	0.818	0.103	Below satisfactory fit
Bifactor (G + F1 + F2)	16,732.4	250	0.941	0.930	0.064	Good fit
Bifactor decomposition: ECV(G) = 63.9%; ECV(F1) = 8.2%; ECV(F2) = 27.9%. Harman single-factor first-factor variance = 39.6%.						

Bifactor model. The orthogonal bifactor model (general factor G + value-specific F1 + instrumental-specific F2) fitted well (Table 2): CFI = 0.941, TLI = 0.930, RMSEA = 0.064 ($\chi^2(250) = 16,732.4$). The general factor accounted for 63.9% of common variance, F1 for 8.2%, and F2 for 27.9%. The mean loading of the general factor was 0.76 on the 14 value items (range 0.64–0.85) but only 0.23 on the 11 instrumental items; the instrumental-specific factor loaded 0.58 on its 11 items (range 0.37–0.79); the value-specific loadings were concentrated on four items (fairness and justice, ecological civilisation,

community with a shared future, global vision with Chinese commitment; 0.45–0.53), with a weaker loading on the honesty item (0.27) and near-zero loadings on the remaining value items. Harman's single-factor test gave 39.6% for the first unrotated principal component; given the recognised limitations of the Harman test for common method variance (Podsakoff et al., 2003), it is reported only as a descriptive supplement, the primary evidence being the bifactor ECV decomposition. At $N = 16,075$ the χ^2 test is necessarily significant, so fit judgements rely on CFI/TLI/RMSEA (Fig. 1).

These results support H1a and H1b. The two orientations are distinguishable; instrumental orientation possesses substantial unique variance and is relatively independent, whereas high value-orientation scores are heavily mixed with general factor components. This general factor is driven mainly by common variance across positive value items concerning personal endeavour, interpretable as a general positive responding or value endorsement tendency. Full-endorsing responders therefore owe their high scores largely to this general tendency rather than to specific value internalisation: the first, variable-level piece of evidence that high scores do not equal internalisation.

4.2 Latent profile analysis: six profiles of value-instrumental orientation

Model selection. LPA was conducted with VR and IR as indicators ($N = 16,075$). The profile mean pattern of the $k = 6$ solution (BIC = 24,572.2, entropy = 0.842) was essentially stable between $k = 5$ and $k = 6$, with $k = 6$ further separating the "full-value, moderate-instrumental" and "full-value, full-instrumental" profiles. In the $k = 6$ solution, the full-endorsing profile (P1) has zero variance on both VR and IR, and P2 and the instrumental-leaning profile (P5) have zero variance on VR (deterministic components in LPA). Part of the pronounced BIC drop from $k = 5$ to $k = 6$ (38,457.9 to 24,572.2) stems from the boundary behaviour of such components. Selection therefore relied primarily on interpretability, entropy, and structural stability. Both the $k = 4$ and $k = 5$ solutions contain the full-endorsing versus value-endorsing distinction, and the size of the full-endorsing profile (6.4%) and the ordering of the main profiles remain consistent across $k = 5$ and $k = 6$, indicating that the core conclusions are insensitive to the selection criterion. Full fit statistics for $k = 2$ to $k = 6$ are provided in Supplementary Table S1.

Ceiling interpretation of the deterministic components and sensitivity analyses. To test whether the zero-variance components reflect the true data structure rather than a fitting artefact, two sensitivity analyses were conducted. First, the $k = 4$ and $k = 5$ solutions both contain a deterministic component with value orientation fixed at 5.000 and zero variance, with sample size exactly 2,886, equal to the total number of respondents with the maximum value-orientation score (VR = 5). "Full-score, zero-variance on value" thus appears at every k and is a truncated structure produced by the upper bound of the measurement distribution; the $k = 6$ solution merely splits this deterministic group further by instrumental orientation into the full-endorsing profile (1,022 respondents) and the value-endorsing profile (1,864 respondents).

Second, after perturbing the two indicators with slight Gaussian noise, $N(0, 0.1^2)$, and re-estimating $k = 6$, 1,020 of the 1,022 full-endorsing members remained in the same deterministic component (component

$n = 1,167$; value/instrumental means 4.994/4.980), indicating that the full-endorsing profile is a robust deterministic group. In contrast, the ordering of the remaining continuous components shifted under noise (adjusted Rand index = 0.40), so identification of the deterministic component is robust whereas partitioning of the continuous profiles is descriptive. The zero-variance components are thus not a fitting artefact but a direct manifestation of the ceiling effect in the measurement distribution. Combining model comparison and sensitivity analyses, the six-profile solution was selected as the main result.

The six profiles. Profile means and sizes on the original scale are reported in Table 3 and summarised as follows (Fig. 2):

Table 3
Profile means and covariates for the six profiles

Profile	n (%)	VR	IR	Programme satisfaction	Climate	Courses	Elite %
P1 Full-endorsing	1,022 (6.4)	5.00	5.00	4.11	4.11	1.09	17.1
P2 Value-endorsing	1,864 (11.6)	5.00	3.39	3.85	3.79	1.31	8.6
P3 High-value-moderate-instrumental	5,196 (32.3)	4.74	3.12	3.59	3.54	1.22	7.3
P4 Moderate	4,416 (27.5)	4.15	3.24	3.43	3.38	1.14	7.5
P5 Instrumental-leaning	1,689 (10.5)	4.00	3.53	3.45	3.43	1.11	7.0
P6 Disengaged	1,888 (11.7)	3.08	2.99	3.10	3.26	0.98	12.7
Between-profile ANOVAs: satisfaction $F = 262.8$, climate $F = 189.2$, courses $F = 26.8$, all $p < .001$ ($\eta^2 = 0.076, 0.062, 0.008$, respectively). Profile $\times$ institutional type $\chi^2(5) = 153.5$, $p < .001$. Elite % is the share of elite-institution students within each profile.							

P1, full-endorsing (6.4%, $n = 1,022$)

value orientation and instrumental orientation both 5.00 (full marks on all 25 items); satisfaction (4.11) and climate (4.11) both high; fewer courses taken (1.09); 62.7% male.

P2, value-endorsing (11.6%, $n = 1,864$)

value orientation at ceiling (5.00) with moderate instrumental orientation (3.39); satisfaction (3.85) and climate (3.79) relatively high; the most courses taken (1.31).

P3, high-value-moderate-instrumental (32.3%, $n = 5,196$)

value orientation 4.74, instrumental orientation 3.12; satisfaction (3.59) and climate (3.54) in the middle; the largest profile, used as the reference category in the multinomial logistic regression.

P4, moderate (27.5%, n = 4,416)

value orientation 4.15, instrumental orientation 3.24.

P5, instrumental-leaning (10.5%, n = 1,689)

value orientation 4.00, instrumental orientation 3.53; the smallest gap between the two orientations, with one of the highest instrumental means.

P6, disengaged (11.7%, n = 1,888)

value orientation 3.08 and instrumental orientation 2.99, both the lowest; satisfaction (3.10) and climate (3.26) the lowest.

Covariate differences across profiles. One-way ANOVAs showed significant differences across profiles in satisfaction ($F = 262.8, p < .001$), climate ($F = 189.2, p < .001$), and course-taking ($F = 26.8, p < .001$). Overall, profiles with higher value orientation also reported higher satisfaction and climate; among the substantive profiles, the profile with the highest instrumental orientation (P5) was not the one with the highest satisfaction.

The six-profile structure supports H2a: students exhibit systematic heterogeneity in value-instrumental orientation rather than the homogeneous high scores implied by the means. The full-endorsing profile P1 supports H2b: 6.4% of students gave the highest rating to all 25 items, a person-level response-type profile that corroborates the general factor finding of Section 4.1: the second layer of evidence that high scores do not equal internalisation.

4.3 Institutional and individual predictors of profile membership

The multinomial logistic regression with the largest profile (P3) as reference is reported in Table 4 ($N = 16,075$, pseudo- $R^2 = 0.021$; missing age imputed by the median in the regression). **P1 (full-endorsing) versus P3:** elite institution $OR = 1.92$ (95% CI [1.57, 2.34], $p < .001$); gender (female, male as reference) $OR = 0.29$ ([0.25, 0.34], $p < .001$), i.e., men were more likely to display full-endorsing responding; age $OR = 1.08$ ([1.05, 1.11], $p < .001$); urban origin $OR = 1.22$ ([1.06, 1.40], $p = .007$); course-taking $OR = 0.83$ ([0.78, 0.89], $p < .001$); activity participation $OR = 1.29$ ([1.18, 1.40], $p < .001$). Elite-institution students, men, urban-origin students, and students who had taken fewer courses were more likely to belong to the full-endorsing profile.

Table 4
Multinomial logistic regression (reference = P3; N = 16,075)

Predictor	P1 Full-endorsing	P2 Value-endorsing	P4 Moderate	P5 Instrumental-leaning	P6 Disengaged
Elite institution	1.92* [1.57, 2.34]	1.12 [0.93, 1.36]	0.94 [0.80, 1.10]	0.84 [0.67, 1.04]	1.34** [1.12, 1.60]
Gender (female)	0.29* [0.25, 0.34]	0.81* [0.72, 0.90]	0.63* [0.58, 0.68]	0.53* [0.47, 0.59]	0.38* [0.34, 0.42]
Age	1.08* [1.05, 1.11]	0.98 [0.95, 1.01]	1.04* [1.02, 1.06]	1.04** [1.01, 1.07]	1.12* [1.10, 1.14]
Urban origin	1.22** [1.06, 1.40]	1.09 [0.97, 1.21]	1.00 [0.92, 1.09]	1.16* [1.03, 1.30]	1.30* [1.16, 1.45]
Course-taking	0.83* [0.78, 0.89]	1.08** [1.02, 1.13]	0.92* [0.88, 0.96]	0.87* [0.82, 0.92]	0.75* [0.71, 0.79]
Activity participation	1.29* [1.18, 1.40]	1.13** [1.04, 1.22]	0.97 [0.91, 1.03]	1.07 [0.98, 1.16]	0.99 [0.91, 1.07]
Note: Values are OR (95% CI). Gender uses male as the reference; values are the ORs for female. Pseudo-R ² = 0.021; missing age (n = 284) imputed by the median. * p < .05; ** p < .01; *** p < .001.					

P2 (value-endorsing) versus P3: elite institution OR = 1.12 ([0.93, 1.36], n.s.); course-taking OR = 1.08 ([1.02, 1.13], p = .006); activity participation OR = 1.13 ([1.04, 1.22], p = .002). That is, the value-endorsing profile was not significantly associated with institutional type but was associated with higher course-taking and higher activity participation. **P6 (disengaged) versus P3:** elite institution OR = 1.34 ([1.12, 1.60], p = .002); gender OR = 0.38 ([0.34, 0.42], p < .001); age OR = 1.12 ([1.10, 1.14], p < .001); urban origin OR = 1.30 ([1.16, 1.45], p < .001); course-taking OR = 0.75 ([0.71, 0.79], p < .001). That is, elite-institution students were also more likely to appear in the disengaged profile, and this profile was characterised by markedly lower course-taking. **P4 (moderate) and P5 (instrumental-leaning) versus P3:** the elite-institution ORs were not significant (0.94 and 0.84, p > .05).

Decomposition of the sources of high scores. The chi-square test of profile by institutional type was significant ($\chi^2(5) = 153.5$, p < .001). Within institutional groups (column percentages), the full-endorsing profile accounted for 12.4% of elite-institution students, 2.1 times the share in ordinary institutions (5.8%); the share of the value-endorsing profile did not differ meaningfully between institution types (11.4% versus 11.6%); the disengaged profile was also more prevalent in elite institutions (17.0% versus 11.2%).

Internal composition of high scorers (a bridge between the variable and person levels). To test directly whether elite high scores are driven by response-type responding, the internal composition of respondents with the maximum value-orientation score (VR = 5) was examined. In the full sample, 2,886 respondents (18.0%) had VR = 5, of whom 1,022 (35.4%) were full-endorsing and 1,864 (64.6%) value-

endorsing. Stratified by institution, among elite respondents with VR = 5 (n = 336), 52.1% were full-endorsing; among non-elite respondents with VR = 5 (n = 2,550), 33.2% were full-endorsing ($\chi^2(1) = 45.4$, $p < .001$). About one in two elite students at the ceiling on value orientation thus endorsed every item fully, versus about one in three in non-elite institutions. In addition, 1,057 respondents (6.6%) had the maximum instrumental-orientation score (IR = 5), of whom 96.7% were full-endorsing: ceiling scores on instrumental orientation are almost entirely contributed by the full-endorsement pattern.

These results support H3a and reveal a key pattern: the value-orientation high scores of elite-institution students (at the mean level) are driven more by full-endorsing responders than by genuinely value-endorsing responders, whose share does not differ across institution types. This pattern is consistent with the psychometric finding of Section 4.1 that high value scores are mixed with general response components; the internal-composition analysis confirms this conclusion at the person level and directly addresses Phenomenon 2 of the introduction.

4.4 Decoupling of environmental advantage and value advantage

Before the path model, Table 5 presents the direct comparisons between institution types on environmental perceptions and orientation levels. "Decoupling" denotes a systematic pattern in which environmental advantage does not translate into value advantage, and this break is partial rather than absolute, as indicated by the small effect sizes. Programme satisfaction: N = 16,075 (elite 1,407, M = 3.641; ordinary 14,668, M = 3.528; $t = 3.88$, $p < .001$, Cohen's $d = 0.13$); perceived climate: N = 14,284 (elite 1,275, M = 3.723; ordinary 13,009, M = 3.503; $t = 7.85$, $p < .001$, $d = 0.26$). Elite-institution students perceived their environment significantly more favourably, yet their value orientation endorsement was significantly lower (4.290 versus 4.357; $t = -3.23$, $p = .001$, $d = -0.11$), and their instrumental orientation was higher (3.467 versus 3.318; $t = 6.53$, $p < .001$, $d = 0.21$).

Table 5
Comparison of environmental advantage and orientation levels by institution type

Indicator	Elite	Ordinary	t	p	Cohen's d
Programme satisfaction	3.641	3.528	3.88	< .001	0.13
Perceived climate	3.723	3.503	7.85	< .001	0.26
Value orientation mean	4.290	4.357	-3.23	.001	-0.11
Instrumental orientation mean	3.467	3.318	6.53	< .001	0.21

Note: Welch t-tests (two-tailed). Programme satisfaction is based on N = 16,075 (elite 1,407 / ordinary 14,668); perceived climate is based on N = 14,284 (elite 1,275 / ordinary 13,009, owing to 1,791 missing climate responses). Value orientation is significantly lower in elite institutions; instrumental orientation is significantly higher in elite institutions.

According to the I-E-O model, institutional environmental differences are real: elite institutions have superior resources and more favourable perceptions. But the value advantage predicted by SDT's proposition that environmental support promotes internalisation did not materialise; on the contrary, mean value endorsement was lower in elite institutions. This decoupling directly addresses Phenomenon 1 of the introduction and sets the premise for the path model: whether the pathway through which satisfaction relates to value orientation differs across institutional types must be re-examined.

4.5 Path model: environmental perceptions and course-taking as predictors of the two orientations

The reliability-corrected path model was first estimated in the full sample ($N = 14,284$). Model fit was good ($\chi^2(7) = 603.7$; CFI = 0.998, RMSEA = 0.077); the group-specific fit indices (elite CFI = 0.996, RMSEA = 0.134; non-elite CFI = 0.998, RMSEA = 0.070) were also good. Key path coefficients are reported in Table 6 (standardised coefficients; between-group tests on unstandardised coefficients). Programme satisfaction strongly predicted perceived climate ($\beta = 0.586$, $p < .001$); satisfaction ($\beta = 0.217$, $p < .001$) and perceived climate ($\beta = 0.081$, $p < .001$) were positively associated with value orientation; course-taking was associated with higher value orientation ($\beta = 0.026$, $p = .002$) and lower instrumental orientation ($\beta = -0.086$, $p < .001$); activity participation was negatively associated with value orientation ($\beta = -0.030$, $p < .001$) and positively with instrumental orientation ($\beta = 0.040$, $p < .001$).

Table 6
Path model: full sample and multi-group

Path	Full sample β	Elite β	Non-elite β	Between-group p
Programme satisfaction → climate	0.586*	0.560*	0.589*	0.028*
Courses → climate	-0.008	-0.008	-0.009	0.995
Activity participation → climate	0.069*	0.041	0.071*	0.121
Programme satisfaction → value orientation	0.217*	0.286*	0.205*	0.009**
Climate → value orientation	0.081*	0.057	0.090*	0.473
Courses → value orientation	0.026**	0.043	0.026**	0.471
Activity participation → value orientation	-0.030*	-0.057*	-0.024**	0.259
Programme satisfaction → instrumental orientation	0.137*	0.224*	0.121*	0.005**
Climate → instrumental orientation	0.074*	0.175*	0.056*	< 0.001*
Courses → instrumental orientation	-0.086*	-0.167*	-0.071*	< 0.001*
Activity participation → instrumental orientation	0.040*	-0.006	0.047*	0.067
Note: Full sample N = 14,284 (elite 1,275; non-elite 13,009). Standardised coefficients; between-group tests use z-tests on unstandardised coefficients. Fit: full sample $\chi^2(7) = 603.7$, CFI = 0.998, RMSEA = 0.077; elite CFI = 0.996, RMSEA = 0.134; non-elite CFI = 0.998, RMSEA = 0.070. Between-group tests were not corrected for multiple comparisons. * p < .05; ** p < .01; *** p < .001.				

Multi-group comparison (elite versus non-elite). Between-group difference tests showed that most associations were stronger in elite institutions. Satisfaction → value orientation was stronger in elite institutions (elite B = 0.201, non-elite B = 0.137, z = 2.62, p = .009); satisfaction → instrumental orientation (0.167 versus 0.090, z = 2.84, p = .005), climate → instrumental orientation (0.139 versus 0.043, z = 3.38, p < .001), and course-taking → instrumental orientation (- 0.118 versus - 0.046, z = - 3.41, p < .001) were likewise stronger in elite institutions. The satisfaction → climate link was slightly weaker in elite institutions (0.525 versus 0.576, z = - 2.20, p = .028). The climate → value orientation (p = .473) and course-taking → value orientation (p = .471) paths did not differ between groups.

Mediation decomposition. The mediation analysis of satisfaction through climate (Table 7) showed that, in the full sample, 18.0% of the total effect of satisfaction on value orientation was mediated by climate; in elite institutions this proportion was 10.0% (non-elite 20.4%). The proportion of the total effect of satisfaction on instrumental orientation mediated by climate was 30.5% in elite institutions (non-elite

21.4%). The climate pathway thus carried a substantially smaller share of the satisfaction–value association in elite institutions: in elite institutions the association between satisfaction and value orientation ran mainly through the direct path rather than through the environmental pathway of perceived climate.

Table 7
Mediation decomposition and robustness after excluding full-endorsing responders

Item	Full sample	Elite	Non-elite	Between-group p
Programme satisfaction → value orientation: climate-mediated share	18.0%	10.0%	20.4%	—
Programme satisfaction → instrumental orientation: climate-mediated share	24.2%	30.5%	21.4%	—
After exclusion: satisfaction → value orientation	$\beta = 0.198^*$	$\beta = 0.249^*$	$\beta = 0.189^*$	0.046*
After exclusion: climate → value orientation	$\beta = 0.062^*$	$\beta = -0.002$	$\beta = 0.075^*$	0.055
After exclusion: courses → value orientation	$\beta = 0.040^*$	$\beta = 0.097^{**}$	$\beta = 0.035^*$	0.030*
After exclusion: satisfaction → instrumental orientation	$\beta = 0.065^*$	$\beta = 0.141^*$	$\beta = 0.055^*$	0.038*
After exclusion: climate → instrumental orientation	$\beta = 0.005$	$\beta = 0.061$	$\beta = -0.002$	0.109
After exclusion: courses → instrumental orientation	$\beta = -0.058^*$	$\beta = -0.081^*$	$\beta = -0.055^*$	0.409
Note: After excluding 910 full-endorsing responders within the path sample, N = 13,374 (1,022 full-endorsing responders in the full sample, of whom 112 did not enter the path model because of missing climate); CFI = 1.000, RMSEA = 0.028. Mediation shares are from the pre-exclusion full-sample model (N = 14,284); the "after exclusion" rows are from the post-exclusion model. Standardised coefficients; between-group tests use z-tests on unstandardised coefficients.				

Robustness check (excluding full-endorsing responders). After excluding the 910 full-endorsing responders within the path sample (N = 13,374; 1,022 in the full sample, of whom 112 did not enter the path model because of missing climate), the model fitted well (CFI = 1.000, RMSEA = 0.028) and the between-group pattern was largely preserved. The difference for satisfaction → value orientation remained significant and in the same direction (elite B = 0.183, non-elite B = 0.129, z = 1.99, p = .046): the direct satisfaction–value association remained stronger in elite institutions. The difference for satisfaction → instrumental orientation also remained significant (0.084 versus 0.034, z = 2.08, p = .038). Finally, the difference for course-taking → value orientation became significant after exclusion (elite B = 0.066, non-elite B = 0.020, z = 2.16, p = .030): the course–value association was then stronger in elite institutions. In contrast, the differences for climate → instrumental orientation (z = 1.60, p = .109) and

course-taking → instrumental orientation ($z = -0.83, p = .409$) were no longer significant, and climate → value orientation did not differ between groups ($z = -1.92, p = .055$).

The corrected full-sample data do not support the interpretation that the satisfaction–value association is weaker or reversed in elite institutions; the direct association is stronger there and survives exclusion of full-endorsing responders. What differs between institution types is the pathway: in elite institutions the satisfaction–value association is carried by the direct path, with a markedly smaller climate-mediated share (10.0% versus 20.4%), and the course-taking–value association becomes stronger once response-type responders are removed. This supports H3c and indicates that the decoupling of environmental advantage from value advantage is a mean-level and pathway-level phenomenon rather than a reversal of the satisfaction–value association.

4.6 Dose-response association of course-taking and its robustness

The number of entrepreneurship courses taken (0 to 3 or more) showed a linear increase in value orientation means ($4.290 \rightarrow 4.346 \rightarrow 4.371 \rightarrow 4.465; r = 0.086, p < .001$) and an overall slight negative linear trend in instrumental orientation ($3.394 \rightarrow 3.296 \rightarrow 3.306 \rightarrow 3.335; r = -0.029, p < .001$), though the group means were not strictly monotonic (Table 8). The course-value association thus held monotonically across the 0–3 range, whereas the negative course-instrumental association was mainly a difference between taking no course and taking at least one.

Table 8
Dose-response effect of course-taking (N = 16,075)

Courses taken	0	1	2	3 or more	Linear trend
n	4,526	6,800	2,391	2,358	—
Value orientation mean	4.290	4.346	4.371	4.465	$r = 0.086^*$
Instrumental orientation mean	3.394	3.296	3.306	3.335	$r = -0.029^*$
After excluding the 1,022 full-endorsing responders in the full sample (N = 15,053): course-value $r = 0.098^{***}$ (robust and stronger). The overall linear trend for instrumental orientation is slightly negative, but the group means are not strictly monotonic. $^{***} p < .001$.					

For robustness, after excluding the 1,022 full-endorsing responders in the full sample (N = 15,053), the course-value association remained robust and became stronger ($r = 0.098, p < .001$); the multinomial logistic regression also showed that students who had taken fewer courses were more likely to fall into the full-endorsing profile (OR = 0.83) and the disengaged profile (OR = 0.75).

Across all analyses, course-taking is the only educational input that is positively associated with value orientation and negatively with instrumental orientation (a benign direction) and whose association is maintained or strengthened after excluding response styles. Compared with climate-building and

satisfaction experience, substantive course participation is thus more likely to reflect genuine value internalisation, offering an actionable policy direction for entrepreneurship education practice.

4.7 Four-quadrant structure and the response-style gradient

Four quadrants: coexistence of the two orientations. Splitting the sample at the full-sample medians of VR and IR (4.50, 3.18; scores above the median classified as high, at-or-below as low), the four-quadrant distribution was nearly uniform (Fig. 3): high-high (high VR-high IR) 23.6%, value-dominant (high VR-low IR) 23.8%, instrumental-dominant (low VR-high IR) 23.8%, low-low (low VR-low IR) 28.8% (Table 9). The high-high group was comparable in size to the value-dominant group, indicating that the two orientations are organised in coexistence rather than trade-off, consistent with their positive correlation ($r = 0.26$). Institutional differences were significant ($\chi^2(3) = 28.2, p < .001$): elite institutions had the highest share in high-high (28.6%) and the lowest in value-dominant (20.1%); within quadrants, the elite share was highest in high-high (10.6%) and lowest in value-dominant (7.4%). Elite high value scores were thus more often accompanied by equally high instrumental orientation rather than manifesting as pure value dominance.

Table 9 Four-quadrant structure and the response-style gradient

(a) Four-quadrant distribution and institutional differences (median split: VR = 4.50, IR = 3.18)

Quadrant	Overall %	Elite %	Non-elite %	Elite share within quadrant %
Q1 High-high (high VR-high IR)	23.6	28.6	23.1	10.6
Q2 Value-dominant (high VR-low IR)	23.8	20.1	24.1	7.4
Q3 Instrumental-dominant (low VR-high IR)	23.8	24.8	23.7	9.1
Q4 Low-low (low VR-low IR)	28.8	26.5	29.0	8.0

$\chi^2(3) = 28.2, p < .001$. Overall elite share 8.8%. Percentages within each column are rounded independently and may not sum to exactly 100.0 (e.g., non-elite: $23.1 + 24.1 + 23.7 + 29.0 = 99.9$).

(b) Programme satisfaction → value orientation association within response-style tiers (standardised β)

Tier	n (%)	Elite share %	SAT → VR β (overall)	SAT → VR β (elite)	SAT → VR β (non-elite)
T1 Full-endorsing (all 25 items rated 5)	1,022 (6.4)	17.1	Saturated (no variance)	Saturated	Saturated
T2 Partial-ceiling (≥ 1 item rated 5)	11,766 (73.2)	7.8	+0.160*	+0.183*	+0.159*
T3 No-ceiling (0 items rated 5)	3,287 (20.4)	9.5	+0.263*	+0.264*	+0.264*

Tier $\times$ institution $\chi^2(2) = 105.2$, $p < .001$. Within the partial-ceiling tier, the association declined monotonically with the number of ceiling-rated items (1–5 items: $\beta = +0.116^{***}$; 6–10: $+0.104^{***}$; 11–15: $+0.053^{***}$; 16–20: $+0.021$; 21–24: $+0.001$, n.s.). $*** p < .001$.

The response-style gradient: ceiling responding attenuates the satisfaction-internalisation association.

The full-sample median of value orientation is 4.50 and the mean 4.35; the high-score distribution exhibits a pronounced ceiling effect, the distributional root of the dominant general factor (ECV = 63.9%) and the full-endorsing profile. Splitting the sample by the number of maximum-rated items yields three tiers: full-endorsing (all 25 items rated 5, 6.4%), partial-ceiling (at least one item rated 5, 73.2%), and no-ceiling (20.4%). The partial-ceiling tier comprises nearly three quarters of the sample: in a single-direction-wording scale, most students rate at least one item at the ceiling, so the overall discrimination of responding is limited. The standardised satisfaction-value association differed clearly across tiers (Table 9). In the full-endorsing tier, value orientation has no variance (all scores 5), so the satisfaction-value association is identically zero and this group's high scores carry no satisfaction-related value information. In the no-ceiling tier, the association was substantial ($\beta = +0.263$, $p < .001$) and identical in strength across institution types (elite $\beta = +0.264$, non-elite $\beta = +0.264$). In the partial-ceiling tier, the overall association was weaker ($\beta = +0.160$, $p < .001$) and declined monotonically with the number of ceiling-rated items: $\beta = +0.116$ (1–5 items), $+0.104$ (6–10), $+0.053$ (11–15), $+0.021$ (16–20), and $+0.001$ (21–24, n.s.). Ceiling responding thus compresses and attenuates the satisfaction-value association: the more ceiling-rated items a respondent gives, the weaker the association, until it disappears in the near-ceiling range. Within the partial-ceiling tier, the association was stronger in elite than in non-elite institutions (elite $\beta = +0.183$, non-elite $\beta = +0.159$), whereas in the no-ceiling tier the two were identical. The institutional difference in the direct satisfaction–value association (Section 4.5) therefore emerges precisely where ceiling responding operates, and disappears among the cleanest responders.

The four-quadrant and response-gradient analyses together show that value and instrumental orientations coexist as the norm, and that simple either/or assumptions are inconsistent with the data; ceiling responding systematically attenuates the satisfaction-internalisation association; and the institutional difference in this association is confined to the response-style-contaminated partial-ceiling tier. These findings translate the psychometric evidence into an actionable diagnostic framework: before

reporting satisfaction-effectiveness associations, the response-style composition of the sample should first be diagnosed.

5. Discussion

5.1 Integration of the main findings: systematic decoupling of environmental advantage and value internalisation

The findings of this study can be integrated into a single storyline: a systematic decoupling between environmental advantage and value internalisation.

A better environment without a value endorsement advantage. The satisfaction and climate advantages of elite institutions (both $p < .001$) did not translate into a value endorsement advantage; value orientation was significantly lower in elite institutions ($t = -3.23$, $p = .001$, $d = -0.11$) and was accompanied by higher instrumental orientation ($t = 6.53$, $p < .001$, $d = 0.21$). According to the I-E-O model (Astin, 1993), institutional environmental differences are real, but the SDT expectation that environmental support promotes internalisation (Deci and Ryan, 2000) did not materialise: the chain from environmental input to value output is broken in elite institutions.

The sources of elite-institution high scores. High scores in elite institutions came mainly from full-endorsing responders (12.4% within-group versus 5.8%; $OR = 1.92$); among respondents at the ceiling of value orientation, 52.1% were full-endorsing versus 33.2% in non-elite institutions ($\chi^2(1) = 45.4$, $p < .001$), whereas the share of genuinely value-endorsing respondents did not differ (11.4% versus 11.6%). The bifactor model ($ECV(G) = 63.9\%$) and the LPA (6.4%) thus converge at the variable and person levels: these high scores contain a substantial response-style component.

Reading the pathway-level findings. The direct satisfaction-value association was stronger in elite institutions ($z = 2.62$, $p = .009$) and remained so after excluding full-endorsing responders ($z = 1.99$, $p = .046$); this does not support a simple "break in the satisfaction-value link" in elite institutions. What differs is the pathway and the response-style composition. First, the climate-mediated share of the satisfaction-value association was markedly smaller in elite institutions (10.0% versus 20.4%): the environmental pathway through perceived climate carries less of the association where environmental advantage is supposed to operate. Second, the institutional difference in the direct association was confined to the partial-ceiling tier (elite 0.183 versus non-elite 0.159) and disappeared in the no-ceiling tier (0.264 versus 0.264): the difference emerges precisely where ceiling responding operates. Third, course-taking, the only substantive educational input, showed a robust dose-response association with value orientation ($r = 0.086$; $r = 0.098$ after exclusion) that was stronger in elite institutions once response-type responders were removed ($z = 2.16$, $p = .030$). The decoupling is thus a mean-level and pathway-level phenomenon: elite institutions do not convert environmental advantage into value advantage, and the stronger satisfaction-value association in elite institutions is tied to the response-style-contaminated component of the scores.

An integrated interpretation: evaluation of high scores must separate internalisation from style. The two phenomena share a single root: self-report high scores are a mixture of genuine attitudes and response styles (Paulhus, 1991; Podsakoff et al., 2003). The methodological contribution is to convert this classic warning into a testable evidence chain: the bifactor model quantifies the general factor (ECV = 63.9%), the LPA identifies the full-endorsing profile (6.4%), the internal-composition analysis confirms its institutional difference at the person level, the pathway decomposition and the response-tier analysis locate the institutional differences in the response-style-contaminated component, and the exclusion robustness check shows which associations survive. The policy implication is a double break, psychometric and educational, between environmental perception indicators (satisfaction, climate) and value internalisation; course-taking is the only educational input that survives all robustness checks and is stably associated with value internalisation (dose-response $r = 0.086$; $r = 0.098$ after exclusion, with a stronger role in elite institutions).

On effect sizes. Most effect sizes are small: the pseudo- R^2 is only 0.021, between-institution Cohen's d values range from 0.11 to 0.26, and standardised path coefficients on the orientation outcomes range from 0.03 to 0.29 in absolute value. This study aims to diagnose systematic patterns in measurement and evaluation, not to predict profile membership or explain individual differences; small but cross-analysis-robust patterns (four-quadrant $\chi^2 = 28.2$, response-gradient $\chi^2(2) = 105.2$, consistent association directions before and after exclusion, and a stable six-profile structure across $k = 5$ and $k = 6$) still carry diagnostic significance, because they indicate that institution-level mean comparisons may be systematically contaminated by response styles. At the same time, the small effect sizes imply that the "decoupling" is partial: elite institutions are not entirely without value outputs, but the correspondence between self-reported high scores and genuine internalisation is systematically distorted. This reading preserves both the robustness of the findings and the boundaries of the conclusions.

5.2 Theoretical contributions

Contribution to measurement theory. The methodological contribution is threefold. First, the ECV decomposition of the bifactor model separates and quantifies the "general response component" in total scores, making it a testable variable rather than an unobservable residual. Second, the LPA identifies full-endorsing responders, turning response styles from a variable-level distributional property into an identifiable person-level profile. Third, the institutional difference in the internal composition of high scorers shows that "common method variance" exists in aggregate statistics and in individualised form alike: the same mean score can correspond to very different psychological processes in different institutions. This three-layer evidence chain provides an operational basis for elevating response styles from a "post-hoc correction item" to an "object of evaluative diagnosis." The combined use of a bifactor model and LPA remains uncommon in entrepreneurship education evaluation and can serve as a reference for comparable studies.

Contribution to entrepreneurship education effectiveness research. This study responds to the criticism that average effects conceal heterogeneity (Martin et al., 2013; Bae et al., 2014; Nabi et al., 2017; Fayolle and Gailly, 2015): the six-profile solution shows students are not homogeneous, and the person-centred

analysis reveals that the same mean high score can correspond to entirely different psychological processes (genuine internalisation versus response style), which a mean-based paradigm cannot capture. The comparable sizes of the high-high (23.6%) and value-dominant (23.8%) quadrants confirm that coexistence of the two orientations is the norm rather than a trade-off.

5.3 Practical implications

Implications for evaluation systems. Effectiveness evaluation in entrepreneurship education should not rely on a single self-report indicator such as satisfaction; it should combine behavioural indicators, objective achievements, and multi-source evaluation. Scale design should introduce reverse-keyed and balanced items to weaken acquiescence; the response quality of self-report data should be diagnosed (e.g., by identifying full-endorsing responders), and the sample's response-style composition should be reported before satisfaction-effectiveness associations; the three-tier gradient in Section 4.7 can serve as a diagnostic template, and the monotonic attenuation of the satisfaction-value association with the number of ceiling-rated items provides a direct check. The same logic applies to evaluations using employability, entrepreneurial intention, or career development as effectiveness indicators: any effectiveness judgement based on self-reported high scores should first rule out response style as an alternative explanation. More generally, the diagnostic logic extends to all higher education quality evaluations relying on student self-report, with cross-disciplinary, cross-policy methodological implications.

Implications for educational practice. The dose-response effect of course-taking suggests that expanding the substantive coverage of entrepreneurship courses (rather than merely building climate) may be a more effective pathway to value internalisation; courses are the only educational input that survives the robustness checks. That the course-value association is stronger in elite institutions after excluding response-type responders indicates that course provision matters equally for resource-rich institutions. The decoupling of value orientation from the environmental advantages of elite institutions suggests that resource-rich institutions should attend to the quality of value internalisation rather than resting on high satisfaction: "satisfied students" and "internalised students" are not the same thing. The disengaged (11.7%) and full-endorsing (6.4%) profiles suggest differentiated strategies for different student profiles, and alertness to full-endorsing responding being misread as educational effectiveness.

5.4 Limitations and future research

This study has several limitations. First, the design is cross-sectional: all effects are statistical associations and cannot establish causation. Both orientations are self-report measures, and the full-endorsing profile may reflect response style, genuine extreme endorsement, or social desirability motivation. The measurement design (all positively worded items, no reverse-keyed or lie-detection items) cannot distinguish acquiescence, social desirability, and careless responding, nor rule out that full-endorsing partly reflects fast, careless responding (Meade and Craig, 2012); future research could introduce reverse-keyed and attention-check items and response-time recording, and use behavioural experiments or longitudinal designs to test causation. Second, the IR items combine utilitarian-

opportunistic, risk-avoidance, and one content-ambiguous item ("entrepreneurship must be innovative"), and satisfaction and perceived climate are single-item measures; future research could use a purer IR scale and multi-item measures. Third, the $k = 6$ LPA solution contains deterministic components with zero variance on the indicators. The sensitivity analyses show these reflect deterministic groups produced by the ceiling of the measurement distribution (the full-value groups in the $k = 4/k = 5$ solutions are likewise deterministic, and 1,020/1,022 full-endorsing members are retained under noise perturbation) rather than fitting artefacts; nevertheless, the BIC remains only indicative, and the continuous profiles outside the full-endorsing group are sensitive to noise and should be regarded as descriptive. Re-estimating with latent class analysis (LCA) treating the indicators as ordered, or cross-validating with finer-grained response-pattern indicators, are worthwhile directions. Fourth, the elite subsample is relatively small (8.8%-8.9%), and the survey collected no school-level identifiers, preventing multi-level school-level analyses; institutional-type conclusions should be read as descriptive and generalised with caution.

6. Conclusion

Based on a stratified survey of 16,075 Chinese university students, this study examined whether high scores on self-report value scales reflect genuine value internalisation or response style in entrepreneurship education evaluation from three perspectives: measurement structure, individual profiles, and environmental associations. The main conclusions are as follows:

The value evaluation scale of entrepreneurship education contains a dominant general factor (ECV = 63.9%); instrumental orientation is a relatively independent dimension, whereas high value-orientation scores are heavily mixed with general response components; 6.4% of students displayed a full-endorsing response pattern, which was significantly more prevalent in elite institutions (12.4% within-group versus 5.8%; OR = 1.92).

Students' value-instrumental orientations exhibit six identifiable profiles (full-endorsing, value-endorsing, high-value-moderate-instrumental, moderate, instrumental-leaning, disengaged); the four-quadrant analysis shows that value and instrumental orientations are organised in coexistence rather than opposition (high-high 23.6% comparable to value-dominant 23.8%).

There is a systematic decoupling of environmental advantage from value internalisation: elite institutions reported significantly higher satisfaction and climate but significantly lower value orientation and higher instrumental orientation; among respondents at the ceiling of value orientation, 52.1% in elite institutions were full-endorsing (versus 33.2% in non-elite institutions); the climate-mediated share of the satisfaction-value association was markedly smaller in elite institutions (10.0% versus 20.4%), and the institutional difference in the direct satisfaction-value association was confined to the response-style-contaminated partial-ceiling tier.

Course-taking is the only educational input that survives the robustness checks: it shows a dose-response positive association with value orientation (measured by the number of courses taken, 0 to 3

or more; $r = 0.086$, $r = 0.098$ after excluding response-type responders) and an overall negative association with instrumental orientation; after exclusion, the course-value association was stronger in elite institutions (between-group $p = .030$).

These findings suggest that effectiveness evaluation in entrepreneurship education should move beyond a single satisfaction indicator and mean comparisons, incorporating psychometric diagnosis of response styles into routine evaluation practice; at the intervention level, substantive course provision, rather than climate-building alone, may be a more reliable and verifiable pathway to value internalisation.

Declarations

Author Contribution

LJ: Conceptualization, Methodology, Formal Analysis, Investigation, Data Curation, Writing – Original Draft, Writing – Review & Editing, Funding Acquisition.

Acknowledgement

The author gratefully acknowledges all participating universities and colleges for their institutional support in data collection, and sincerely thanks all student respondents who generously contributed their time and perspectives to this study.

Data Availability

The de-identified analysis dataset, codebook, and full reproducibility code supporting the findings of this study are available as Supplementary Information files accompanying this article. The complete datasets are available from the corresponding author on reasonable request.

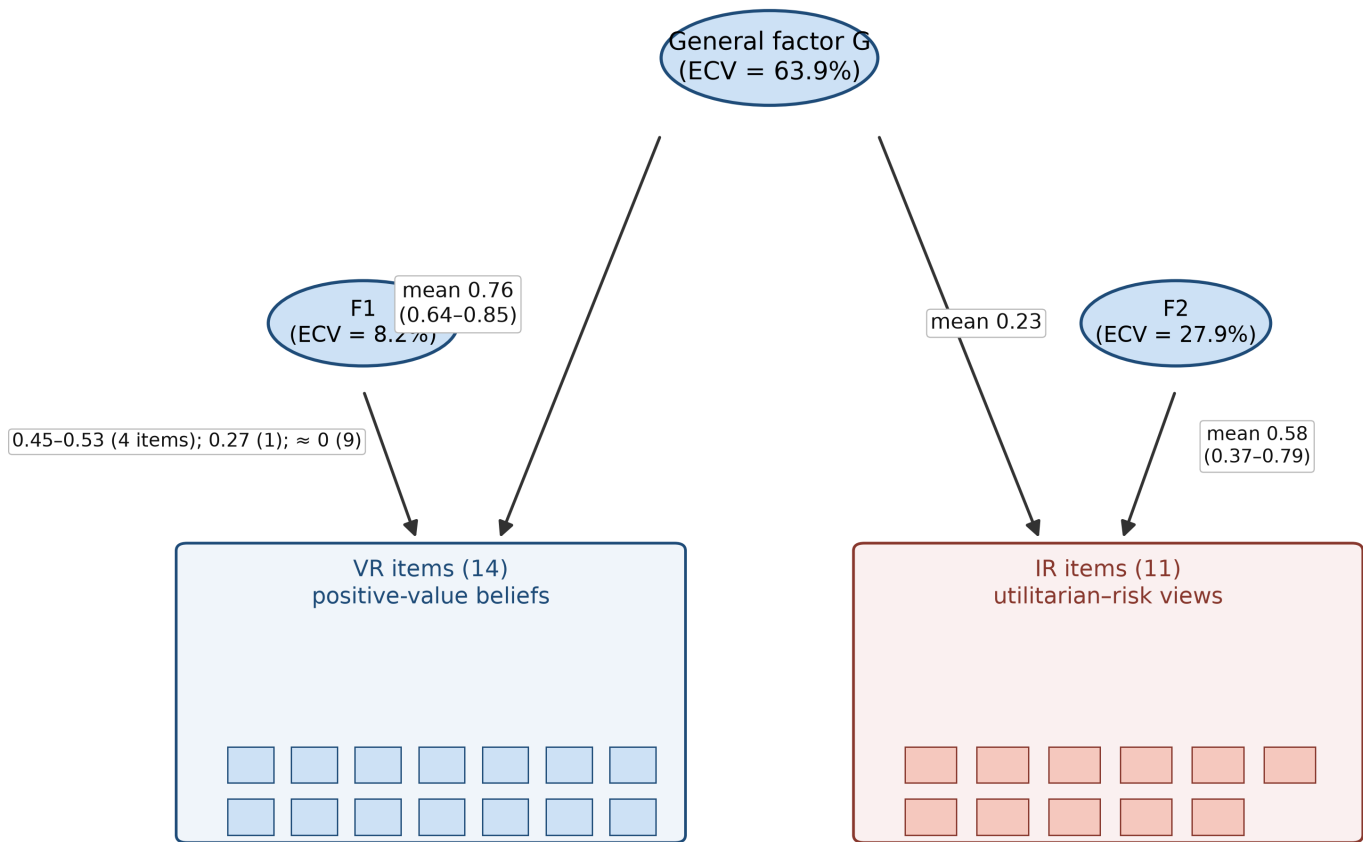
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Figures

Fit: CFI = 0.941, TLI = 0.930, RMSEA = 0.064 (N = 16,075)



Values are standardised loadings reported in Section 4.1; per-item loadings not shown.

Figure 1

Schematic illustration of the measurement structure of the 25-item scale: orthogonal bifactor model (general factor G; value-specific factor F1; instrumental-specific factor F2). Values are standardised loadings as reported in Section 4.1: G→VR items mean 0.76 (range 0.64–0.85); G→IR items mean 0.23; F2→IR items mean 0.58 (range 0.37–0.79); F1 loadings concentrated on four value items (0.45–0.53). Explained common variance: ECV(G) = 63.9%, ECV(F1) = 8.2%, ECV(F2) = 27.9%. Fit: CFI = 0.941, TLI = 0.930, RMSEA = 0.064 (N = 16,075).

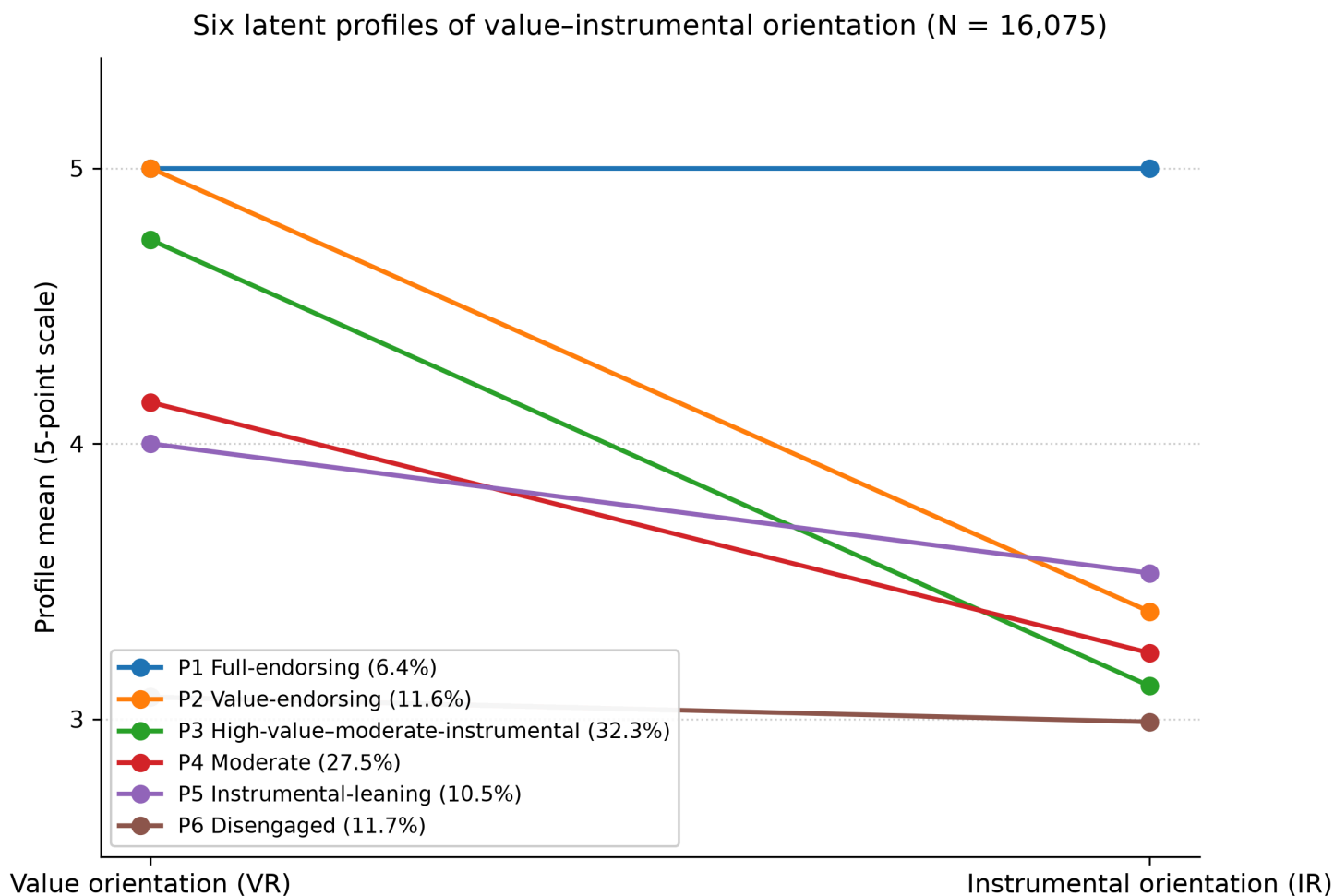


Figure 2

Six latent profiles of value-instrumental orientation (N = 16,075). Lines connect each profile's mean on the value orientation (VR) and instrumental orientation (IR) indicators on the original 5-point scale. Profile sizes: P1 full-endorsing (6.4%), P2 value-endorsing (11.6%), P3 high-value-moderate-instrumental (32.3%), P4 moderate (27.5%), P5 instrumental-leaning (10.5%), P6 disengaged (11.7%).

Four-quadrant structure of value-instrumental orientation
(median split: VR = 4.50, IR = 3.18; $\chi^2(3) = 28.2$, $p < .001$)

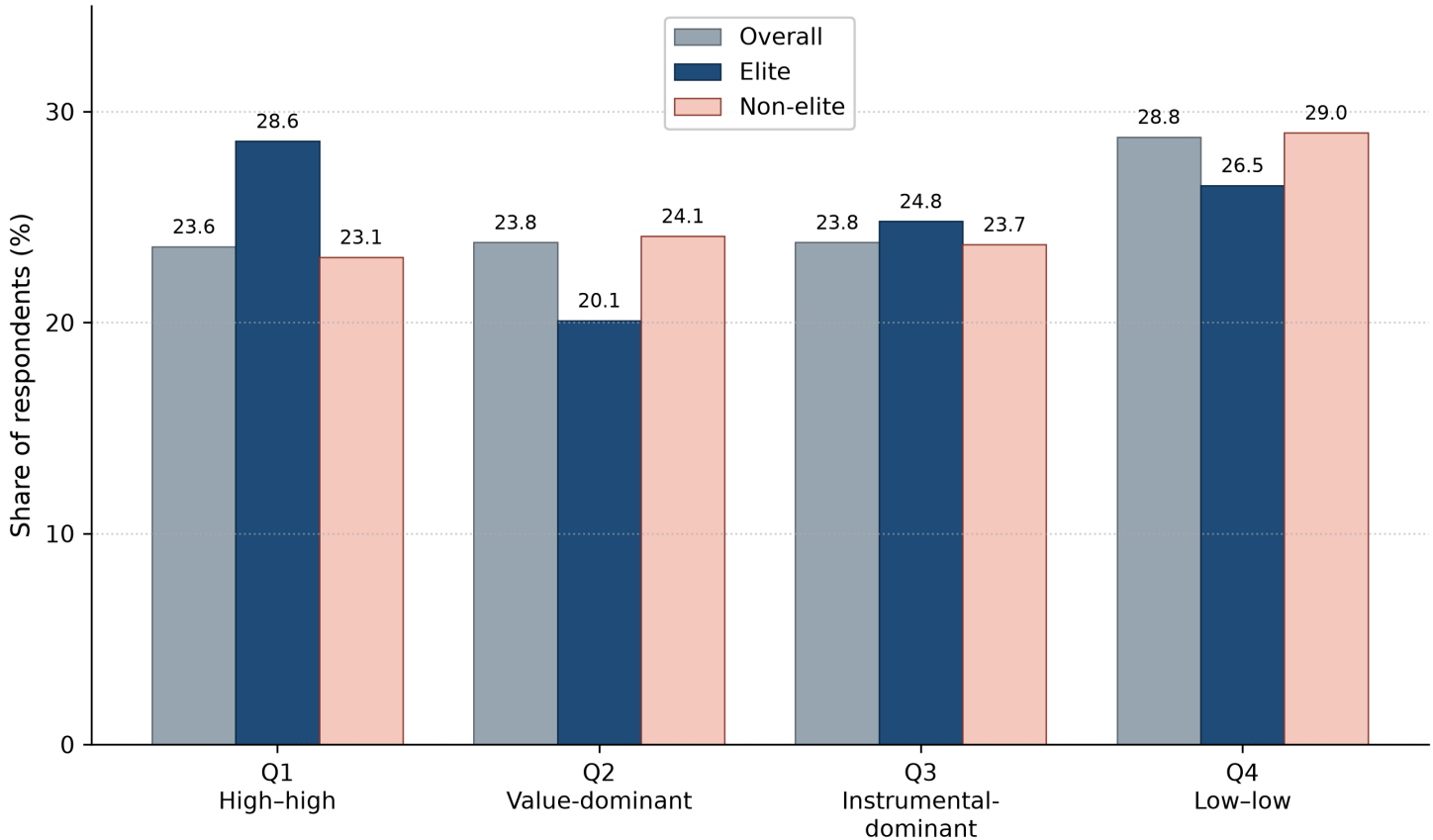


Figure 3

Four-quadrant structure of value-instrumental orientation (median split: VR = 4.50, IR = 3.18). Bars show the percentage of respondents in each quadrant overall and by institution type: Q1 high-high (high VR-high IR), Q2 value-dominant (high VR-low IR), Q3 instrumental-dominant (low VR-high IR), Q4 low-low. Elite institutions had the highest share in Q1 (28.6%) and the lowest in Q2 (20.1%); $\chi^2(3) = 28.2$, $p < .001$.

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