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Research Article

Educational Position and Moral–Civic Values among Tertiary-Educated Young Adults: A Bayesian Mundlak Analysis across 66 World Values Survey Samples

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ABSTRACT

Higher educational attainment may correlate with public-oriented dispositions, but pooled cross-national estimates can obscure multidimensionality and conflate individual and contextual differences. This study examined adjusted within-country relationships between completed ISCED level and a six-domain formative profile while assessing clustering, domain heterogeneity, and specification dependence. A cross-sectional secondary analysis used World Values Survey (WVS) Wave 7 data collected in 2017–2022 from 8,931 respondents aged 18–30 with completed ISCED levels 5–8 in 66 countries or territories. The profile integrated prosocial concern, achievement–responsibility, public-harm rejection, institutional confidence, gender-equitable education, and generalized trust. A multilevel correlated-random-effects model decomposed respondent deviations from country means and country-sample composition; robustness was evaluated through alternative estimators, scoring rules, retention weighting, priors, ordinal coding, and random slopes. Complete-case analysis retained 92.70% of eligible respondents, and posterior-predictive diagnostics reproduced central distributional features. The null intraclass correlation was 0.210 (95% credible interval [CrI], 0.160–0.280), declining to 0.150 (0.110–0.200) after adjustment. Completed education showed a small positive within-country association (β = 0.061; 95% CrI, 0.040–0.082). Female gender, current-student status, family salience, and friend salience were positively associated with the composite; religious salience was negatively associated. Age remained uncertain, and organizational-membership breadth was estimator- and scoring-sensitive. False-discovery-rate-controlled models revealed opposing relationships across constituent domains, indicating that aggregate coefficients did not represent uniform shifts. Results were broadly stable across principal sensitivity checks. Higher attainment was associated with a modest, selective profile difference rather than generalized transformation. Contextual clustering and domain divergence require noncausal, domain-specific interpretation.

KEYWORDS country-level clustering • formative measurement • false-discovery-rate control • generalized social trust • institutional confidence • posterior predictive checking • world values survey

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1. INTRODUCTION

Higher education is evaluated not only by credentials, disciplinary competence, and labor-market returns, but also by its relationship with capacities relevant to social cooperation and public life. These capacities include concern for others, personal responsibility, rejection of socially harmful conduct, confidence in institutions, support for gender-equitable educational opportunity, and generalized social trust. Meta-analyses associate service-learning and meaningful exposure to diversity with stronger civic attitudes, engagement, prosocial orientations, and related student outcomes [1], [2]. Other studies connect college completion, curricular exposure, and institutional experience with political or civic engagement [3], [4] and link higher education to prosocial behavior, social trust, institutional confidence, gender-equitable educational attitudes, and reported value priorities [5]–[9]. Recent WVS evidence also shows that education gradients vary markedly across value domains and demographic contexts [10]. Educational differences should therefore be examined as outcome-specific and context-dependent rather than as a uniform moral or civic return.

Observed education gradients must, however, be distinguished from causal effects. Education may develop civic knowledge, cognitive resources, social networks, and exposure to heterogeneous perspectives; quasi-experimental studies have identified effects on selected civic outcomes in some settings [11], [12]. Nevertheless, prior achievement, family background, socioeconomic resources, personality, and pre-adult socialization also shape attainment. Curricular pathways and the social position education confers may generate additional sorting effects [3], [13], [14]. Reviews consequently find mixed causal evidence, with estimates varying by outcome, design, population, and institutional setting [15], [16]. Cross-sectional survey models can thus estimate adjusted conditional associations, but they cannot establish that tertiary education produced the observed differences in value.

The outcome is also multidimensional. Prosocial concern, achievement-responsibility, public-harm rejection, institutional confidence, gender-equitable education, and social trust are conceptually distinct and need not covary as reflections of one latent moral trait. A respondent may endorse one domain while rejecting another. The proposed profile is therefore defined as a theory-bounded formative composite: its domains jointly constitute the index rather than operate as interchangeable manifestations of an underlying construct [17]–[20]. Because formative measurement remains methodologically contested [21], the profile is treated as a transparent descriptive summary, not as a psychometric scale. Domain deletion, substitution, or reweighting changes its substantive meaning; explicit content boundaries, a common-content rule, and domain-specific analyses are therefore required.

Cross-national analysis introduces additional threats. A standardized questionnaire does not ensure equivalent interpretation across languages and institutional settings. Translation, response styles, reference standards, fieldwork timing, and sample composition can produce non-equivalent responses [22]–[24]. WVS research has specifically questioned the cross-national comparability of broad value orientations [25]. Respondents are also nested within country or territorial samples. A conventional pooled coefficient may conflate the individual-level association within samples with the contextual association between sample means. A correlated-random-effects or Mundlak specification separates these components by including respondents' deviations from country-sample predictor means together with the corresponding sample means [26]–[28].

Four gaps follow. First, prior research commonly examines isolated civic outcomes or broad value dimensions rather than a prespecified multidomain moral-civic profile. Second, composite content is often modified as though omission affected only reliability, although it can redefine the construct. Third, cross-national observational studies do not consistently distinguish within-sample gradients from between-sample contextual differences. Fourth, conclusions may depend jointly on defensible choices concerning missingness, coding, standardization, weighting, estimation, priors, heterogeneity, and sample composition [29]–[31]. One-at-a-time sensitivity checks cannot represent this combined uncertainty. Multiverse and specification-curve approaches instead evaluate results across a structured set of theoretically admissible analyses [32], [33].

This study addresses these gaps using the final World Values Survey Wave 7 country-pooled data file, comprising 66 country or territorial samples fielded during 2017–2022 [34]. The analytical sample contains 8,931 complete-case tertiary-educated respondents aged 18–30. We operationalize moral-civic orientation as a preliminary six-domain formative profile covering prosocial values, achievement-responsibility, public-harm rejection, institutional confidence, gender-equitable education, and social trust. We analyze both the aggregate profile and its constituent domains to identify heterogeneity concealed by aggregation.

A Bayesian Mundlak multilevel model separates within-country-sample associations from between-sample differences while modeling residual clustering. The primary estimands are the within-sample associations of completed ISCED level, gender, age, current-student status, family salience, friendship salience, religious salience, and organizational-membership breadth. Country-sample components are interpreted descriptively. We address domain-specific multiplicity through a prespecified false-discovery-rate procedure [35], and assess interpretive stability across alternative content, completeness, standardization, weighting, ordinal-coding,

estimator, prior, random-slope, and regional-composition specifications.

The contribution is analytical rather than causal or strongly psychometric. The profile summarizes six prespecified domains; it does not diagnose individual moral worth. Coefficients represent adjusted associations, and country-sample components describe contextual variation rather than inherent characteristics of national populations. The study addresses four questions:

- RQ1. How much variation in the standardized six-domain moral-civic profile is attributable to country-sample clustering before and after adjustment?
- RQ2. How are the prespecified predictors associated with the moral-civic profile within country samples?
- RQ3. How do these within-sample associations vary across the six domains, and which satisfy the prespecified multiplicity-adjusted evidential criterion?
- RQ4. How stable are the primary interpretations across alternative specifications of public-harm content, domain completeness, standardization, domain weighting, ordinal coding, survey and retention weighting, estimator, priors, random slopes, and regional composition?

2. LITERATURE REVIEW

2.1. Higher Education and Moral-Civic Values

Higher education may be associated with outcomes extending beyond academic credentials and labor-market attainment. University environments expose students to disciplinary knowledge, heterogeneous peer groups, civic organizations, institutional norms, and opportunities for public participation. These experiences may provide mechanisms linking educational participation to value orientations and civic behavior. Using World Values Survey data, Koshy et al. [8] found that higher educational attainment was associated with differences in the importance assigned to several life-value domains. However, the magnitude and direction of these relationships varied by value, gender, generation, and country group. This heterogeneity indicates that higher education should not be conceptualized as producing a uniform shift in values.

Evidence on prosocial and civic outcomes supports a similar interpretation. Alfirević et al. [5] found that civic and political involvement and the institutional influence of higher education were associated with pathways linking individual responsibility to prosocial behavior among young adults. Earlier research on service-learning and collegiate civic experiences likewise identifies associations with civic attitudes and participation [2]. However, studies addressing pre-existing individual differences indicate that estimated educational effects may attenuate once selection factors are considered [14], [15]. Educational attainment should therefore be interpreted as an educational position associated with moral-civic outcomes rather than as direct evidence that education caused those outcomes.

This distinction is particularly relevant for adults aged 18–30. Early adulthood involves simultaneous transitions in education, employment, social relationships, organizational participation, and family roles. Personal values demonstrate substantial rank-order stability but may still exhibit systematic developmental change during this period [36]. Sagiv and Schwartz [37] similarly conceptualize values as broad desirable goals that guide behavior across situations while remaining embedded within cultural and social contexts. Completed ISCED level and current-student status therefore indicate educational position, but neither directly measures curriculum, instructional quality, institutional climate, peer composition, or duration of educational exposure.

2.2. Moral-Civic Orientation

Moral-civic orientation cannot be adequately represented as a single homogeneous latent disposition. Schwartz's theory of basic values conceptualizes values as distinct motivational priorities organized through patterns of compatibility and conflict [38]. Contemporary cross-cultural research similarly demonstrates that value priorities relate differently to pro-sociality, religiosity, prejudice, and political behavior [37]. Prosocial concern, personal responsibility, rejection of harmful conduct, institutional confidence, support for gender equality, and generalized social trust should therefore not automatically be treated as interchangeable manifestations of one underlying moral characteristic.

Trust illustrates this conceptual distinction. Generalized social trust concerns expectations regarding people in general, whereas institutional confidence reflects evaluations of political, administrative, and social institutions [39]. These forms of trust may arise from different mechanisms. Herreros and López-Pérez [40], for example, question straightforward assumptions that formal education directly generates generalized trust. Characteristics of institutional environments similarly influence institutional confidence and should not be interpreted as equivalent to interpersonal or generalized trust.

The present framework therefore specifies moral-civic orientation as a “six-domain formative profile” consisting of prosocial values, achievement-responsibility, public-harm rejection, institutional confidence, gender-equitable education, and social trust. Under formative measurement theory, component indicators constitute the composite rather than reflect a common latent cause [17], [19]. Changes in domain inclusion, coding, or weighting can consequently alter the substantive meaning of the profile. Internal consistency across all six domains is therefore not the principal criterion of construct adequacy. Greater emphasis is placed on conceptual coverage, transparent operationalization, explicit content boundaries, redundancy assessment, and

sensitivity to alternative weighting and standardization procedures.

The public-harm and social-trust domains require particularly restricted definitions. WVS justifiability items refer to behaviors with different normative meanings and should not be combined solely because they use a common response scale. Integrity violations and interpersonal violence can be positioned within a public-harm domain, whereas suicide represents self-directed conduct and is conceptually distinct. Generalized social trust likewise captures only one component of trust and is therefore retained separately from institutional confidence. These restrictions reduce construct contamination and permit sensitivity analyses of alternative domain specifications.

2.3. Social Context and Domain-Specific Heterogeneity

Moral-civic orientations develop within social contexts and formal educational institutions. Families, friendship networks, religious communities, and voluntary organizations may transmit norms, establish interpersonal obligations, provide opportunities for civic participation, and shape exposure to social diversity [41], [42]. These environments should nevertheless be represented as distinct predictors rather than collapsed into a general measure of social embeddedness. Family, friendship, and religious importance capture subjective salience rather than interaction frequency or relationship quality. In contrast, organizational membership breadth does not identify participation duration, leadership responsibility, ideological orientation, or bridging versus bonding forms of association.

Domain-specific analysis is required because relationships with education and social-context predictors may differ across constituent moral-civic outcomes. Education may be positively associated with one domain while exhibiting a weaker, null, or inverse association with another. Koshy et al. [8] identified substantial heterogeneity in education-related value differences across values and population groups. Evidence concerning generalized trust also cautions against assuming a uniformly positive relationship with education [40]. An aggregate moral-civic profile can therefore conceal divergent relationships among its components. Aggregate analysis identifies the overall pattern, whereas domain-specific analysis determines which dimensions contribute to, weaken, or offset that pattern.

2.4. Cross-National Comparability and Interpretation

Cross-national values research introduces measurement and inferential challenges. Standardized questionnaires do not necessarily produce substantively equivalent measurements because translation, response styles, institutional meanings, fieldwork conditions, and cultural contexts may affect how respondents interpret survey items. Davidov et al. [23] argue that cross-national comparisons require evidence that observed differences reflect substantive variation rather than measurement-process differences. Meuleman et al. [43] similarly show that measurement-invariance violations may distort cross-group comparisons. Cross-cultural value research further indicates that cultural environments affect both the development and expression of personal values [37].

For a formative multidomain profile, comparability therefore depends primarily on maintaining consistent substantive content and evaluating sensitivity to operational choices. Common-content rules, harmonized coding, alternative standardization procedures, separate domain reporting, and alternative weighting specifications can assess whether substantive conclusions depend on particular measurement decisions. These procedures do not establish universal measurement equivalence. Instead, they provide evidence on the stability of substantive interpretations across plausible operational specifications.

Cross-national data also possess a hierarchical structure because respondents are nested within country samples. Conventional pooled coefficients may combine differences among individuals within the same country with differences between country-sample means. The Mundlak correlated-random-effects framework separates these components by representing predictors through respondent deviations from their country-sample means together with the corresponding country-level means [26], [28]. The respondent-deviation coefficient can therefore be interpreted as a within-country association, whereas the country-mean coefficient represents a contextual between-country association. This decomposition reduces the risk of conflating individual educational differences with differences between national samples.

The precision of contextual estimates is constrained primarily by the number of higher-level units rather than by the total number of respondents. Comparative multilevel research indicates that country-level parameters may remain imprecisely estimated even when individual-level samples are large [44]. Bayesian multilevel estimation provides a framework for regularizing uncertainty under such conditions, and simulation evidence suggests that Bayesian estimation can provide more stable inference than conventional maximum-likelihood approaches in some settings with relatively few level-2 units [22].

2.5. Conceptual and Inferential Framework

The conceptual framework integrates the measurement structure of moral-civic orientation with the hierarchical structure of the cross-national data. At the measurement level, the six domains—prosocial values, achievement-responsibility, public-harm rejection, institutional confidence, gender-equitable education, and social trust—jointly constitute a formative moral-civic profile. The domains are not assumed to reflect a single latent trait. Consequently, the aggregate profile is interpreted

alongside domain-specific estimates so that heterogeneous relationships among its constituent components remain identifiable.

At the inferential level, the framework distinguishes individual variation within country samples from contextual variation between country samples. Respondent deviations from country-sample predictor means constitute the primary within-country estimands, whereas country-sample means represent contextual associations. The country random intercept captures residual clustering among country samples after adjustment for modeled predictors. It does not identify a specific cultural, political, institutional, or national mechanism because unobserved country-level heterogeneity may arise from multiple sources that are not directly measured in the analysis.

Figure 1 summarizes the integration of these two analytical levels. The measurement component specifies how the six moral-civic domains constitute the formative profile, while the inferential component specifies how associations are separated into within-country and contextual components. This structure aligns construct definition with statistical interpretation and limits ecological or individualistic misinterpretation of cross-national associations.

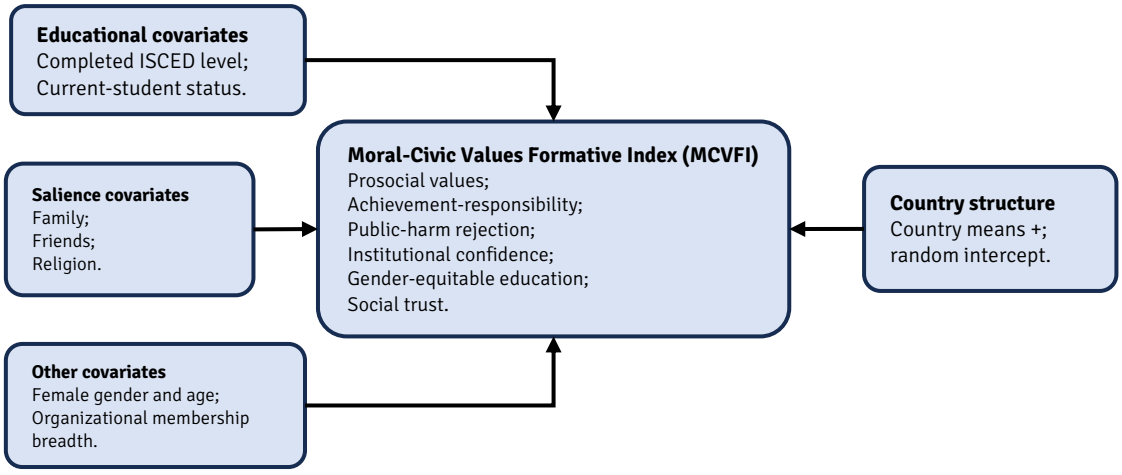

Figure 1. Conceptual and inferential framework for the moral-civic value profile

3. MATERIALS AND METHODS

3.1. Study Design and Data Sources

We conducted a quantitative cross-sectional secondary analysis using the World Values Survey (WVS) Wave 7 Country-Pooled Datafile, final version 6.0, comprising 66 national or territorial samples fielded during 2017-2022 [34]. Eligibility was restricted to respondents aged 18-30 years who had completed International Standard Classification of Education (ISCED) levels 5-8. ISCED was treated as an internationally harmonized classification of completed educational attainment rather than as a direct measure of institutional quality, instructional exposure, programmed intensity, or learning processes [45]. Reporting followed applicable STROBE principles for cross-sectional observational studies and Bayesian reporting guidance [46], [47].

The primary inferential target was the conditional within-country association between each respondent-level predictor and a standardized six-domain moral-civic value profile among complete cases. The primary Bayesian model was unweighted; therefore, its coefficients describe associations in the analytical sample rather than national population quantities, global population quantities, temporal effects, or causal effects. We used WVS-weighted ordinary least squares (OLS) with country-clustered standard errors as a design-based sensitivity analysis. It was not treated as equivalent to a fully survey-weighted multilevel model because the pooled data provide a respondent-level analysis weight rather than separate within-country and between-country weights [48], [49].

3.2. Participant and Pre-processing

WVS special codes (-5) through (-1) were converted to missing before scoring. Selection proceeded sequentially from the full pooled file to the age-restricted sample, the tertiary-educated eligible sample, respondents with sufficient profile-domain coverage, and the final complete-case model sample. The primary analysis required all six profile domains and all model predictors. We retained a five-of-six profile only for sensitivity analysis. Figure 2 shows the resulting analytical sequence, and Supplementary Table S1 reproduces it numerically.

We evaluated missingness at the domain and predictor levels after recoding. We further assessed complete-case retention by comparing retained and excluded respondents and by using stabilized inverse-probability-of-retention weighting [50]. The retention model used age, completed ISCED level, female gender, current-student status, family salience, friend salience, religious salience, organizational membership breadth, valid-domain count, model-variable and domain

missingness indicators, and country indicators. For the retention model only, missing predictors were filled with country medians, with separate missingness indicators retained. We examined stabilized weights before and after truncation at the empirical 1st and 99th percentiles. These procedures assess sensitivity to selection associated with observed information and do not identify selection on unobserved variables. Supplementary Tables S2, S15, and S16 report detailed missingness and retention outputs.

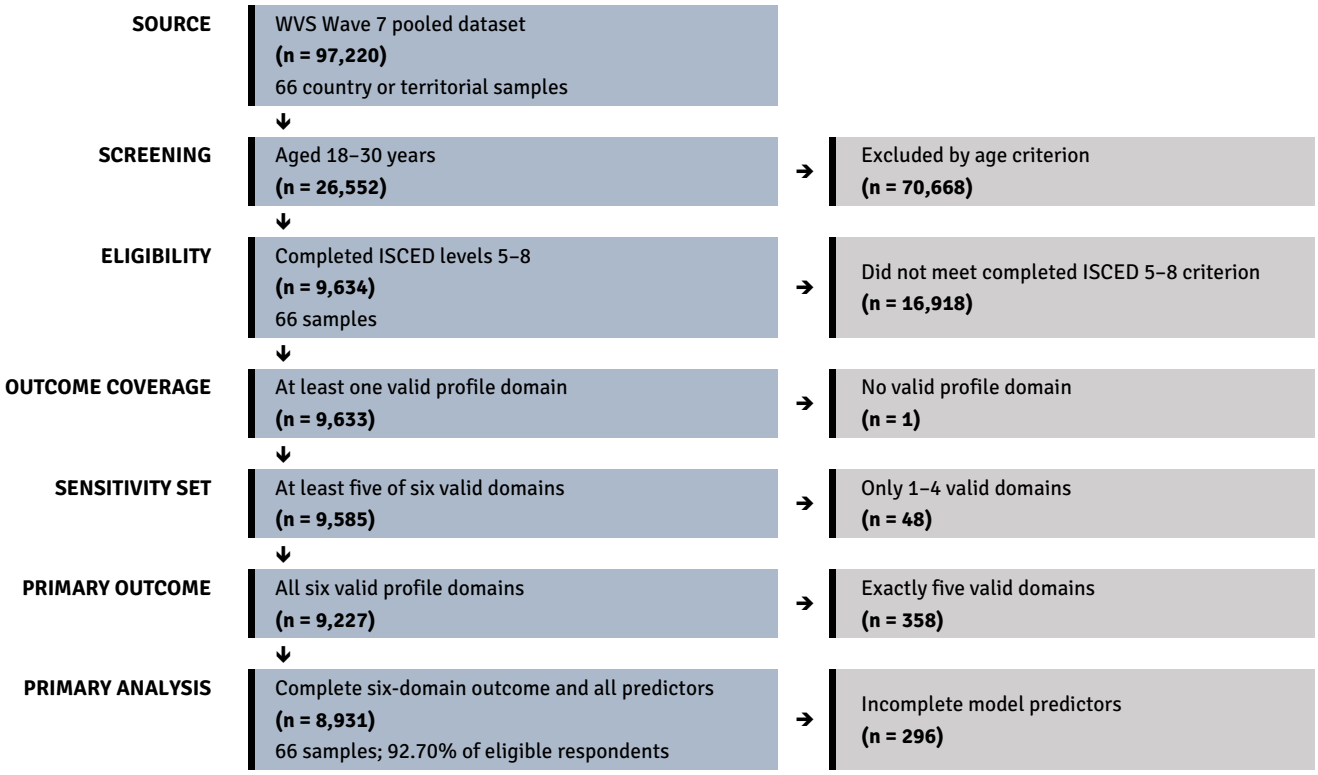

Figure 2. Participant selection and derivation of the primary analytical sample.

3.3. Construction & Formative Measurement

We retained the acronym MCVFI for continuity with the source manuscript, but interpreted the outcome as a cross-sectional moral-civic value profile composite rather than evidence of value formation. The six domains were specified as non-interchangeable formative contributors, not as reflective indicators of a single latent trait [19], [51], [52]. Consequently, we evaluated internal consistency only for coherent multi-item subdomains and did not use it as a validation criterion for the complete six-domain composite [53].

Table 1. Construction and analytical boundaries of the six-domain profile.

Domain	WVS item	Source scale	Scoring rule	Analytical boundary
Prosocial values	Q7, Q10, Q12, Q16, Q17	1 mentioned; 2 not mentioned	1 -> 1; 2 -> 0; item mean	Interpersonal consideration and respect
Achievement-responsibility	Q8, Q9, Q14	1 mentioned; 2 not mentioned	1 -> 1; 2 -> 0; item mean	Agency, persistence, and responsibility
Integrity/corruption rejection	Q177-Q181	1 never to 10 always justifiable	11 - x; at least 4 of 5 items	Required public-harm subdomain
Interpersonal-violence rejection	Q189-Q191	1 never to 10 always justifiable	11 - x; at least 2 of 3 items	Required public-harm subdomain
Public-harm rejection	Two required subdomain means	Subdomain means	Equal mean of integrity/corruption and interpersonal-violence rejection	Identical primary content across all 66 samples
Institutional confidence	Q65, Q69-Q71, Q73-Q75	1 great deal to 4 none	5 - x; item mean	Confidence in formal institutions
Gender-equitable education	Q30	1 strongly agree to 4 strongly disagree	Retained; higher = more equitable	Education-specific equality attitude
Social trust	Q57	1 trust; 2 careful	1 -> 1; 2 -> 0	Generalized trust

Each domain was standardized using the pooled eligible-sample mean and standard deviation. For respondents with all six standardized domains, the primary profile was the equal-weight mean of the six-domain z-scores. The resulting complete-six profile was then standardized to mean 0 and standard deviation 1 within the final analytical sample for modelling. Alternative pooled five-of-six, country-balanced, within-country, bounded 0-1, and inverse-VIF-weighted definitions were evaluated as sensitivity analyses. Supplementary Tables S3-S6 provide measurement-content, redundancy, and subdomain-reliability audits.

To construct the primary composite outcome, we first standardized the six moral-civic domains so differences in their original measurement scales would not determine their relative contribution to the index. Each standardized domain was then assigned an equal weight, reflecting the formative specification in which all six domains contribute equally to the overall moral-civic value profile. The primary MCVFI score was calculated only for respondents with complete observations across all six standardized domains, as expressed in Equation (1).

$$MCVFI_i = \frac{1}{6}\sum_{k=1}^{6} Z_{ik} \quad (1)$$

In Equation (1), $MCVFI_i$ represents the composite score for respondent i, while Z_{ik} denotes the standardized score for domain k. The six domains are equally weighted, with each contributing 1/6 of the composite score. The MCVFI is calculated only for respondents with complete data on all six domains and is subsequently standardized to a mean of 0 and a standard deviation of 1 for the primary analysis.

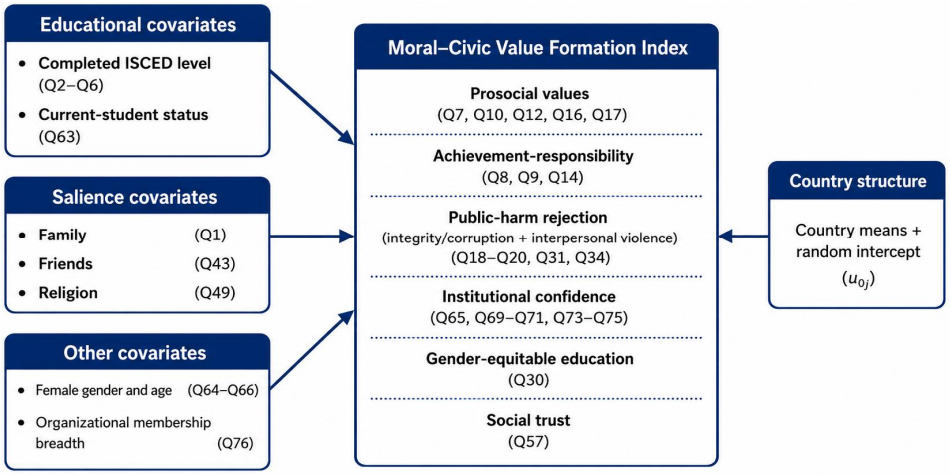

Figure 3. Formative construction of the six-domain moral-civic profile.

3.4. Predictors and Coding

To ensure consistent model specification and facilitate interpretation of the estimated coefficients, we defined and coded all individual-level predictors before the decomposition analysis. Continuous and ordinal predictors were standardized in the pooled eligible sample where appropriate, whereas binary indicators retained their original 0/1 coding. Table 2 summarizes each predictor's operational definition, the corresponding WVS item(s), the coding procedure applied before decomposition, and the scale used to interpret the primary regression coefficients.

Table 2. Predictor definitions, coding, and primary coefficient scales.

Predictor	WVS item(s)	Coding before decomposition	Primary coefficient interpretation
Female indicator	Q260	Female = 1; male = 0; not standardized	Adjusted female-versus-male contrast
Age	Q262	Years; pooled z-score	Per 1-SD difference
Completed education	Q275	ISCED 5-8; pooled z-score	Per 1-SD difference; categories checked separately
Current student	Q279	Derived from employment status; 1/0; not standardized	Adjusted current-student-versus-non-current contrast
Family salience	Q1	5 - x; pooled z score	Per 1-SD difference
Friend salience	Q2	5 - x; pooled z score	Per 1-SD difference
Religious salience	Q6	5 - x; pooled z score	Per 1-SD difference

Predictor	WVS item(s)	Coding before decomposition	Primary coefficient interpretation
Organizational membership breadth	Q94, Q96, Q99, Q100	Count of organization types with active or inactive membership (0-4); pooled z-score	Per 1-SD difference; breadth, not participation quality

Female and current-student indicators remained on their 0/1 scales. We standardized age, completed education, the three salience variables, and organizational membership breadth in the pooled eligible sample. Category-specific models were fitted for the ordinal predictors to assess whether one linear standardized term adequately summarized the observed category pattern.

3.5. Multilevel Mundlak Specification & Level-Specific

Respondents were nested within countries or territories. Each predictor was decomposed into the respondent's deviation from the corresponding country-sample mean and the country-sample mean itself. This correlated-random-effects, or Mundlak, parameterization separates within-country and contextual between-country components and reduces conflation that can arise when an undifferentiated level-1 predictor is used [26], [28].

To distinguish individual-level associations from country-level differences, we applied a multilevel Mundlak specification. Each predictor was decomposed into within-country and between-country components, and country-specific random intercepts were included to account for the hierarchical structure of respondents nested within countries. The formula is expressed as follows:

$$Y_{ic} = \alpha + \sum_q \beta_{Wq}\left(X_{icq} - \overline{X_{cq}}\right) + \sum_q \beta_{Bq}\overline{X_{cq}} + u_c + \varepsilon_{ic} \quad (2)$$

$$u_c \sim \mathcal{N}(0, \tau^2), \qquad \varepsilon_{ic} \sim \mathcal{N}(0, \sigma^2) \quad (3)$$

$$ICC = \frac{\tau^2}{\tau^2 + \sigma^2} \quad (4)$$

In this formula, Y_{ic} represents the standardized $MCVFI_i$ score for respondent i in country c and α is the intercept. X_{icq}; $\overline{X_{cq}}$ represents the respondent-level deviation from the country mean, with β_{Bq} estimating the within-country association. The country means $\overline{X_{cq}}$ with coefficient β_{Bq} represents the between-country or contextual association. The terms u_c and ε_{ic} denote country-level and individual-level residual variation, with variances τ^2 and σ^2, respectively. The ICC represents the proportion of total residual variance attributable to differences between countries.

3.6. Bayesian Estimation, Diagnostics and Posterior-Predictive Assessment

The primary unweighted normal hierarchical model was estimated with four conjugate Gibbs chains. The intercept prior was Normal (0, 1), each slope prior was Normal (0, 0.5²), and the country and residual variances each used an inverse-gamma prior with shape 2 and scale 0.05. Each chain used 1,500 warmup iterations and 7,000 retained iterations, yielding 28,000 retained draws. Chain seeds were 20260804, 20261804, 20262804, and 20263804. Initial values comprised ridge-stabilized OLS coefficients, zero country effects, the residual sample variance, and τ^2 = 0.15. Alternative variance priors were used to assess prior sensitivity [54].

Convergence and Monte Carlo precision were evaluated using rank-normalized R-hat, bulk and tail effective sample sizes (ESS), Monte Carlo standard errors (MCSE), trace plots, rank plots, and autocorrelation plots [56]. Prior-predictive and posterior-predictive checks were used to assess whether the model reproduced relevant features of the standardized outcome [46], [57]. Posterior-predictive checks included the mean, standard deviation, central and tail quantiles, residuals, country means, within-country variance, between-country variance, and predictive ICC. Posterior means and 95% credible intervals (CrI) were treated as continuous descriptions of magnitude and uncertainty. An independently fitted maximum-likelihood mixed model with the same fixed-effect structure was used as an implementation check. Supplementary Tables S8-S10 and Figures S1-S3 report parameter-level diagnostics, the independent implementation check, and posterior-predictive figures.

3.7. Sensitivity and Exploratory Analyses

Sensitivity analyses were organized according to the assumption under examination. Measurement sensitivity compared the common-content public-harm definition with the extended three-subdomain definition; complete-six with five-of-six scoring; pooled, country-balanced, within-country, and bounded standardization; and equal with inverse-VIF weighting. Estimator sensitivity compared the Bayesian Mundlak estimates with unweighted and WVS-weighted OLS using country-clustered standard errors [48], [49]. Coding sensitivity replaced the linear ordinal specifications with category indicators. Missing-data sensitivity used stabilized retention weights before and after truncation. Prior sensitivity varied the inverse-gamma variance priors. Separate maximum-likelihood random-slope models evaluated heterogeneity in the education, religious-salience, and organizational-membership-breadth slopes. Detailed outputs are reported in Supplementary Tables S10-S12 and S14-S17 and Supplementary Figures S4-S6.

Six domain-specific models were designated exploratory. The analysis family contained 48 predictor-by-domain tests, corresponding to eight predictors across six standardized domains. Benjamini-Hochberg false-

discovery-rate control was applied to the complete 48-test family [35]. Results with q ≤ 0.05 were classified as FDR-supported. Estimates whose unadjusted 95% confidence intervals excluded zero but whose q-values exceeded 0.05 were classified as directionally suggestive rather than multiplicity-adjusted findings. VIFs, inverse-VIF weights, and the first principal component were treated as formative redundancy and structure diagnostics, not as evidence that the profile was unidimensional or psychometrically validated [58], [59].

Table 3. Analytical hierarchy and permitted interpretation.

Analysis tier	Target	Specification	Permitted interpretation
Primary	Eight respondent-level within-country associations	Complete-six common-content profile; unweighted Bayesian Mundlak model; N = 8,931	Conditional cross-sectional associations in the analytical sample
Secondary descriptive	Clustering, country-sample means, pooled correlations, and measurement diagnostics	Null and adjusted ICCs; contextual means; alpha only for coherent item groups; VIF/PCA diagnostics	Description of variance structure, sample composition, and score properties; no national mechanisms
Sensitivity	Dependence on measurement, coding, weighting, estimator, missingness, priors, and slope homogeneity	Alternative score definitions; categorical terms; unweighted/weighted OLS; retention weights; prior changes; random slopes	Stability or instability of direction and uncertainty under stated alternatives
Exploratory	Forty-eight predictor-by-domain associations	Six domain models with Benjamini-Hochberg adjustment over the complete 48-test family	Domain-specific pattern detection requiring replication; no confirmatory or causal claim

4. RESULTS

4.1. Sample Derivation, Completeness and Analytical

The eligibility criteria identified 9,634 tertiary-educated respondents aged 18-30 years across 66 national or territorial samples. One respondent had no valid profile domain; 9,585 respondents had at least five valid domains, and 9,227 had all six. Requiring complete predictor data yielded 8,931 respondents for the primary analysis, corresponding to 92.70% of the eligible sample. Domain coverage was therefore high: 95.78% of eligible respondents had all six domains and a further 3.72% had exactly five. Only 0.51% had fewer than five valid domains. The largest predictor-level missingness was 2.00% for organizational membership breadth; age and completed ISCED had no missing values within the eligibility-defined sample [34], [45], [47], [60]. Supplementary Tables S1-S2 provide the full audit.

Table 4. Descriptive statistics for the complete-six, complete-case analytical sample (N = 8,931).

Variables	N	Mean	SD	Min	Max
MCVFI, complete-six scores	8,931	0.000	0.413	-1.743	1.490
Prosocial values	8,931	0.535	0.212	0.000	1.000
Achievement-responsibility	8,931	0.471	0.290	0.000	1.000
Public-harm rejection	8,931	8.548	1.526	1.000	10.000
Institutional confidence	8,931	2.532	0.682	1.000	4.000
Gender-equitable education	8,931	3.166	0.860	1.000	4.000
Social trust	8,931	0.258	0.437	0.000	1.000
Organizational membership breadth	8,931	1.085	1.270	0.000	4.000
Active membership breadth	8,931	0.529	0.861	0.000	4.000
Inactive membership breadth	8,931	0.555	0.906	0.000	4.000
Family salience	8,931	3.874	0.370	1.000	4.000
Friend salience	8,931	3.395	0.688	1.000	4.000
Religious salience	8,931	2.860	1.113	1.000	4.000
Current student	8,931	0.196	0.397	0.000	1.000
Female	8,931	0.537	0.499	0.000	1.000
Age, years	8,931	25.113	3.364	18.000	30.000
Completed education, ISCED	8,931	5.947	0.675	5.000	8.000

The analytical sample had a mean age of 25.11 years (SD 3.36), 53.7% were female, and 19.6% were classified as current students. Mean completed education was ISCED 5.95 (SD 0.68). Family salience was high and comparatively compressed (mean 3.87 on the recoded 1-4 scale), whereas friend salience and religious salience showed greater dispersion. The final complete-six composite had a mean of 0.000 and an SD of 0.413 before final standardization for regression. These descriptive values characterize the analytical sample and are not population-weighted estimates.

Retention diagnostics did not indicate substantial observed-data selection into the complete-case sample. The largest absolute standardized mean difference between retained and excluded respondents was 0.155, and the stabilized retention weights were concentrated extremely close to 1.00. This pattern supports limited sensitivity to the specified observed-data retention model, while leaving unobserved or nonignorable missingness unresolved [50] (Supplementary Tables S15-S16).

4.2. Profile Structure and Measurement Diagnostics

Internal consistency was adequate within the coherent multi-item groups: α = 0.804 for integrity/corruption rejection, 0.751 for interpersonal-violence rejection, 0.814 for political-violence/terrorism rejection, and 0.870 for institutional confidence [53]. These coefficients support coherence within those item sets but do not imply that the six-domain profile constitutes a reflective scale [19], [51], [52]. The formative-domain VIFs were tightly clustered near 1 (1.027-1.063), with normalized inverse-VIF weights of 0.164-0.170 [59]. The first principal component explained only 22.7% of domain variance and had mixed loading directions [58]. Collectively, these diagnostics indicate low linear redundancy and substantial multidimensionality, consistent with retaining domain-specific interpretation rather than treating the profile as a single homogeneous latent trait. Full values are reported in Supplementary Tables S4-S6.

Pooled descriptive correlations with the standardized profile were positive for female gender (r = 0.089), completed education (r = 0.122), family salience (r = 0.073), and friend salience (r = 0.147), and negative for religious salience (r = -0.197) and membership breadth (r = -0.077). These pooled correlations combine within-country and between-country variation and were therefore not used for the primary level-specific inference (Supplementary Table S7).

4.3. Country-level Clustering

The intercept-only Bayesian model estimated a null ICC of 0.210 (95% CrI, 0.160 to 0.280), indicating that about one-fifth of the observed variance in the standardized profile was between-country before predictors were entered. After respondent-deviation and country-mean terms were included, the residual random-intercept ICC was 0.150 (95% CrI, 0.110 to 0.200). The posterior mean therefore declined by 0.060, but nontrivial clustering remained after adjustment. These quantities describe statistical clustering and do not identify culture, policy, educational systems, or any other national mechanism [26].

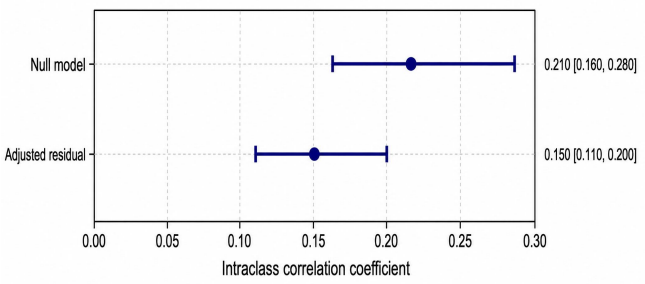

Figure 4. Country-level clustering before and after covariate adjustment.

4.4. Primary Within Country Associations

The respondent-deviation coefficients provide the primary results. The largest positive adjusted contrast was observed for female gender: female respondents scored 0.160 standardized MCVFI units higher than male respondents with the other model terms held constant (95.00% CrI, 0.120 to 0.200). Current-student status was associated with a 0.079-SD higher profile score (95% CrI, 0.027 to 0.130). Because both predictors are binary, these estimates are adjusted category contrasts rather than effects per standard deviation [26], [28], [61].

Table 5. Primary within-country coefficients from the Bayesian Mundlak model.

Predictor	Scale	Mean	95% CrI	R-hat	Bulk ESS	Tail ESS	MCSE
Female	Female vs male	0.160	[0.120, 0.200]	1.000	28,000	28,000	0.00011
Age	Per SD	0.017	[-0.004, 0.038]	1.000	28,000	28,000	0.00006
Completed education	Per SD	0.061	[0.040, 0.082]	1.000	26,000	27,000	0.00006
Current student	Current vs non-current	0.079	[0.027, 0.130]	1.000	28,000	28,000	0.00016
Family salience	Per SD	0.073	[0.054, 0.092]	1.000	28,000	27,000	0.00006
Friend salience	Per SD	0.075	[0.055, 0.094]	1.000	28,000	27,000	0.00006
Religious salience	Per SD	-0.074	[-0.098, -0.050]	1.000	28,000	27,000	0.00007
Membership breadth	Per SD	-0.028	[-0.048, -0.007]	1.000	29,000	28,000	0.00006

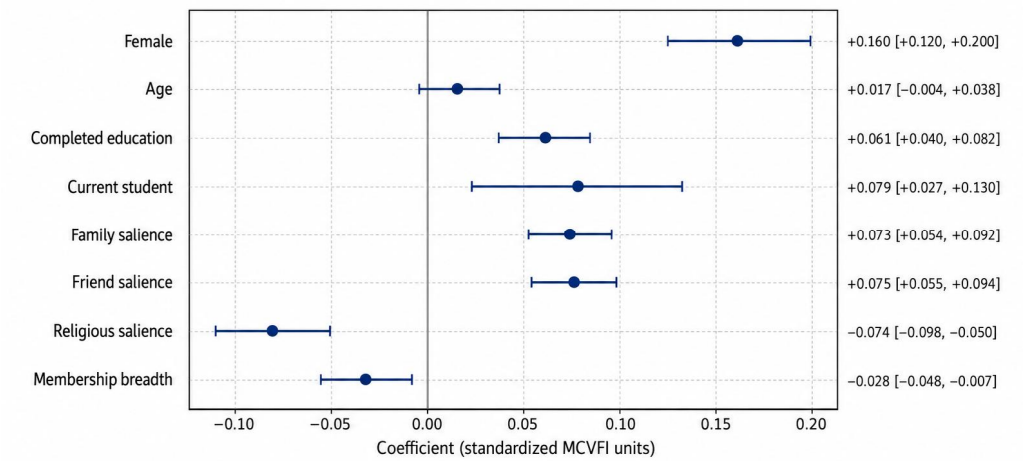

Figure 5. Primary within-country coefficients from the Bayesian Mundlak model.

Completed education showed a smaller but precisely estimated positive within-country association. A one-SD difference in completed ISCED level corresponded to a 0.061-SD difference in MCVFI (95% CrI, 0.040 to 0.082). Family salience (0.073; 95% CrI, 0.054 to 0.092) and friend salience (0.075; 95% CrI, 0.055 to 0.094) had similarly sized positive associations. Religious salience had an association of comparable magnitude in the opposite direction (-0.074; 95% CrI, -0.098 to -0.050). Age remained uncertain because its interval crossed zero (0.017; 95% CrI, -0.004 to 0.038). Membership breadth was negative in the Bayesian model (-0.028; 95% CrI, -0.048 to -0.007), but later estimator and scoring checks showed that this was not a stable general association.

The linear-model contrast between ISCED 8 and ISCED 5 was 0.271 standardized outcome units (95% CrI, 0.178 to 0.364). This value is a transformation of the standardized linear education coefficient; it differs from the category-specific ISCED 8-versus-5 sensitivity estimate because the categorical model does not impose equal spacing across ISCED levels.

4.5. Contextual Country-sample Associations

Country-mean coefficients were substantially less precise than the respondent-level within-country coefficients, as expected with only 66 country clusters. The intervals for mean friend salience (0.440; 95% CrI, 0.091 to 0.790) and mean religious salience (-0.330; 95% CrI, -0.490 to -0.150) excluded zero. The intervals for mean education, female proportion, mean age, current-student proportion, family salience, and membership breadth included zero and were wide. These terms describe associations among country-sample compositions; they do not identify national mechanisms or permit national causal interpretation [26], [28], [61].

Table 6. Country-mean coefficients from the Bayesian Mundlak model.

Country-sample mean	Mean	95% CrI	R-hat	Bulk ESS	Tail ESS	MCSE
Female proportion	0.059	[-0.640, 0.750]	1.000	1,500	2,800	0.00910
Age, SD units	-0.150	[-0.510, 0.200]	1.000	650	1,400	0.00720
Completed education, SD units	0.071	[-0.120, 0.260]	1.000	730	1,200	0.00360
Current-student proportion	0.310	[-0.420, 1.000]	1.000	1,300	2,500	0.01000
Family salience, SD units	0.190	[-0.290, 0.670]	1.000	620	1,200	0.00980
Friend salience, SD units	0.440	[0.091, 0.790]	1.000	710	1,000	0.00660
Religious salience, SD units	-0.330	[-0.490, -0.150]	1.000	880	1,600	0.00290
Membership breadth, SD units	-0.014	[-0.230, 0.200]	1.000	710	1,300	0.00410

4.6. Model Diagnostics and Posterior Predictive

All reported R-hat values were 1.000. Across the full coefficient set, the minimum bulk ESS was 620, the minimum tail ESS was 1,000, and the largest MCSE for a posterior mean was 0.0100. For the eight primary within-country coefficients, bulk and tail ESS values were approximately 26,000-29,000 and 27,000-28,000, respectively, with MCSE values of 0.00006-0.00016. These diagnostics indicate adequate chain mixing and high Monte Carlo precision for the primary coefficients. The independent maximum-likelihood mixed model reproduced every principal within-country coefficient to three decimal places and yielded an adjusted ICC of 0.134, supporting implementation consistency across estimation approaches [46], [56] (see Supplementary Tables S7-S9).

Posterior-predictive checks closely reproduced the central location, scale, and country-level variance structure. The observed outcome mean and SD were 0.000 and 1.000, compared with replicated means of 0.001 and 1.001. Observed and replicated within-country variances were 0.771 and 0.773, and between-country variances based on country means were 0.219 and 0.223. The observed predictive ICC was 0.221 and the replicated mean was 0.224 (95% replicated interval, 0.202 to 0.246). This predictive ICC includes fixed compositional and country-mean variation and is therefore not expected to equal the adjusted residual ICC of 0.150 [46], [57].

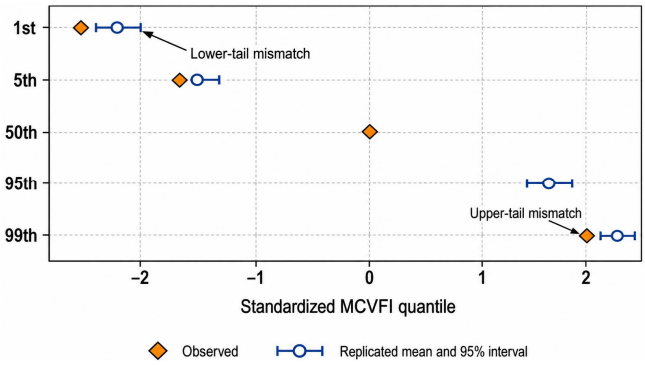

Figure 6. Observed & posterior-predictive outcome quantiles.

The main limitation of Gaussian predictive adequacy occurred in the extreme tails. The observed 1st percentile (-2.474) was more negative than the 95% replicated interval (-2.365 to -2.198), whereas the observed 99th percentile (2.159) was less positive than the corresponding replicated interval (2.277 to 2.452). Central quantiles were reproduced closely. The model therefore captures the central distribution and country-level variance well but does not fully reproduce the most extreme observations. This tail mismatch limits claims of complete distributional adequacy but does not, by itself, determine the direction or magnitude of coefficient bias. Additional distribution, residual, and country-mean checks are shown in Supplementary Figures S1-S3.

4.7. Robustness to Estimator, Profile Definition and Ordinal Coding

The principal directions for female gender, education, current-student status, family salience, friend salience, and religious salience were preserved across the Bayesian Mundlak model, unweighted country-clustered OLS, and WVS-weighted country-clustered OLS. Age remained interval-uncertain in all three approaches. Membership breadth was the principal exception: although its Bayesian interval excluded zero, both country-clustered OLS intervals included zero. We therefore classified the membership result as estimator-sensitive rather than a stable composite-level association [48], [49].

Table 7. Cross-estimator comparison of the primary within-country coefficients.

Predictor	Bayesian Mundlak	Unweighted OLS	WVS-weighted OLS
Female	0.160 [0.120, 0.200]	0.161 [0.091, 0.231]	0.145 [0.093, 0.198]
Age, per SD	0.017 [-0.004, 0.038]	0.017 [-0.010, 0.043]	0.012 [-0.018, 0.042]
Education, per SD	0.061 [0.040, 0.082]	0.061 [0.030, 0.092]	0.051 [0.018, 0.084]
Current student	0.079 [0.027, 0.130]	0.079 [0.005, 0.153]	0.078 [0.005, 0.151]
Family salience, per SD	0.073 [0.054, 0.092]	0.073 [0.048, 0.098]	0.072 [0.045, 0.099]
Friend salience, per SD	0.075 [0.055, 0.094]	0.075 [0.042, 0.108]	0.075 [0.045, 0.104]
Religious salience, per SD	-0.074 [-0.098, -0.050]	-0.074 [-0.138, -0.010]	-0.061 [-0.110, -0.011]
Membership breadth, per SD	-0.028 [-0.048, -0.007]	-0.027 [-0.075, 0.020]	-0.020 [-0.059, 0.020]

Profile-score sensitivity further distinguished stable from unstable results. Across pooled complete-six, pooled five-of-six, country-balanced, within-country-standardized, bounded, and inverse-VIF specifications, the education estimates ranged from 0.061 to 0.066, family salience from 0.048 to 0.081, friend salience from 0.070 to 0.088, and religious salience from -0.088 to -0.068. These four predictors retained their directions across all score definitions. Membership-breadth estimates ranged from -0.029 to 0.011, changed sign under bounded scoring, and remained interval-uncertain in every country-clustered OLS sensitivity model. Equal and inverse-VIF weighting changed the selected coefficients by at most 0.002. The extended public-harm definition used 8,581 complete cases from 65 samples and preserved the principal education and salience directions. Full outputs and coefficient plots are provided in Supplementary Table S12 and Figure S5.

Category-specific analyses showed that the linear ordinal coefficients were not equally adequate for all predictors. Education retained an ordered positive pattern, but the equal-spacing assumption was rejected at p = 0.020; the category-specific ISCED 8-versus-5 contrast was 0.349 (95% CI, 0.151 to 0.548). Family salience increased across categories without strong evidence of departure from equal spacing (p = 0.079), friend salience showed a broadly increasing pattern with borderline departure (p = 0.054), and religious salience followed an approximately ordered negative pattern (p = 0.657). Organizational membership breadth was non-monotonic

(p = 0.019), reinforcing the conclusion that a single linear membership coefficient is an inadequate summary. Supplementary Table S13 reports the category-specific estimates.

4.8. Domain Specific Heterogeneity After FDR Control

The 48 predictor-by-domain analyses showed marked heterogeneity in sign and magnitude after family-wide Benjamini-Hochberg correction. This pattern is substantively relevant because the composite was defined formatively: a stable aggregate association need not appear uniformly across each constituent domain, and opposing domain-specific associations can offset one another in the composite [19], [35], [51], [52].

Education was FDR-supported for achievement-responsibility (0.030; q = 0.028) and gender-equitable education (0.037; q = 0.049), but not for prosocial values, public-harm rejection, or institutional confidence; its positive social-trust estimate was suggestive rather than FDR-supported. Thus, the positive composite-level education association was selective rather than uniform across domains. Female gender showed positive associations with prosocial values, public-harm rejection, and gender-equitable education, but a negative association with achievement-responsibility. Current-student status was FDR-supported only for institutional confidence, indicating that the positive composite contrast should not be interpreted as a general shift across all domains.

The salience variables displayed particularly clear domain divergence. Family salience was positively associated with prosocial values, achievement-responsibility, public-harm rejection, and institutional confidence, but negatively associated with social trust. Friend salience was positively associated with public-harm rejection, institutional confidence, and social trust, while showing no FDR-supported association with prosocial values or achievement-responsibility. Religious salience was positively associated with institutional confidence but negatively associated with achievement-responsibility and gender-equitable education. Membership breadth was positively associated with institutional confidence and social trust, but negatively associated with public-harm rejection and gender-equitable education. These opposing signs explain why composite-level conclusions, especially for religion and membership, require domain-specific qualification.

Table 8. FDR-supported exploratory within-country domain associations.

Domain	FDR-supported positive associations	FDR-supported negative associations
Prosocial values	Female 0.058 (q = 0.027); family 0.047 (q < 0.001)	None
Achievement-responsibility	Education 0.030 (q = 0.028); family 0.039 (q = 0.001)	Female -0.079 (q = 0.013); religion -0.106 (q < 0.001)
Public-harm rejection	Female 0.150; age 0.043; family 0.057; friends 0.051 (all q <= 0.010)	Membership -0.164 (q < 0.001)
Institutional confidence	Current student 0.070 (q = 0.040); family 0.043; friends 0.043; religion 0.109; membership 0.082 (q <= 0.010 except current student)	None
Gender-equitable education	Female 0.327 (q < 0.001); education 0.037 (q = 0.049)	Religion -0.116 (q < 0.001); membership -0.064 (q = 0.027)
Social trust	Friends 0.063 (q < 0.001); membership 0.075 (q < 0.001)	Family -0.032 (q = 0.016)

Note. The complete 48-test table is provided in Supplementary Table S14.

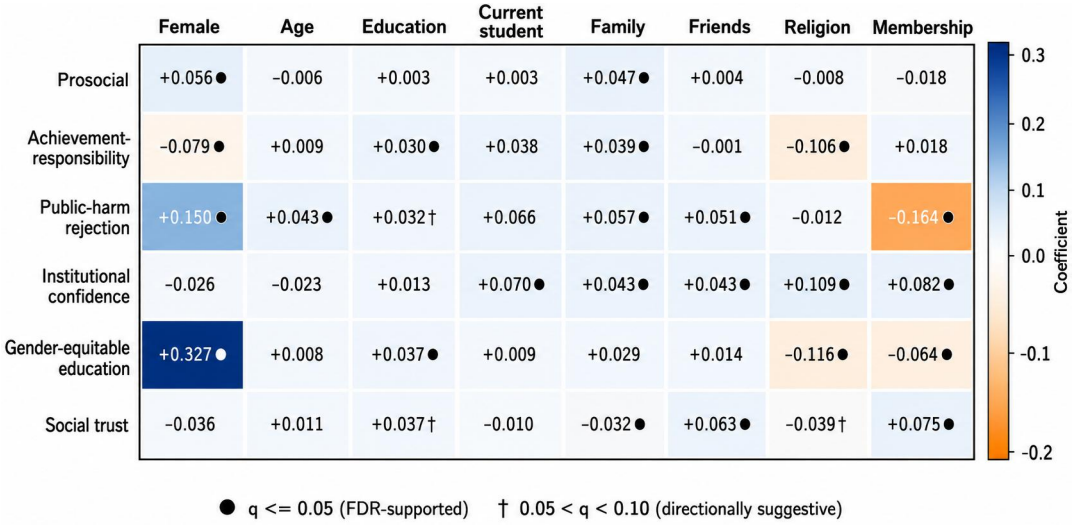

Figure 7. Exploratory domain-specific within-country coefficients.

4.9. Missing-Data, Prior, Random-Slope, and Sample-Composition Sensitivity Analyses

Stabilized retention weights were tightly concentrated around one. Before truncation, the minimum, median, mean, 99th percentile, and maximum were 0.9949, 0.9992, 1.0000, 1.0100, and 1.0266, respectively; the coefficient of variation was 0.0029 and the effective weighted sample size was 8,930.9. No weight exceeded 5 or 10. Truncation at the 1st and 99th percentiles left the principal weighted estimates unchanged. These results indicate minimal sensitivity to the specified observed-data retention model, though they do not rule out bias from unobserved missingness processes [50]. (Supplementary Tables S14-S15).

Alternative variance priors reproduced the selected within-country coefficients to three decimal places, while the adjusted ICC ranged from 0.150 to 0.170. This indicates that the tested variance-prior specifications did not materially drive the primary coefficient conclusions. Separate maximum-likelihood random-slope diagnostics converged. The estimated slope SD was 0.058 for education (approximate 95% interval, 0.000 to 0.085), 0.106 for religious salience (0.050 to 0.142), and 0.095 for membership breadth (0.055 to 0.122). The education interval reached the zero boundary, whereas religious salience and membership breadth showed clearer evidence of cross-country slope heterogeneity. These are diagnostic frequentist sensitivity models and do not provide country-specific causal effects (Supplementary Table S17).

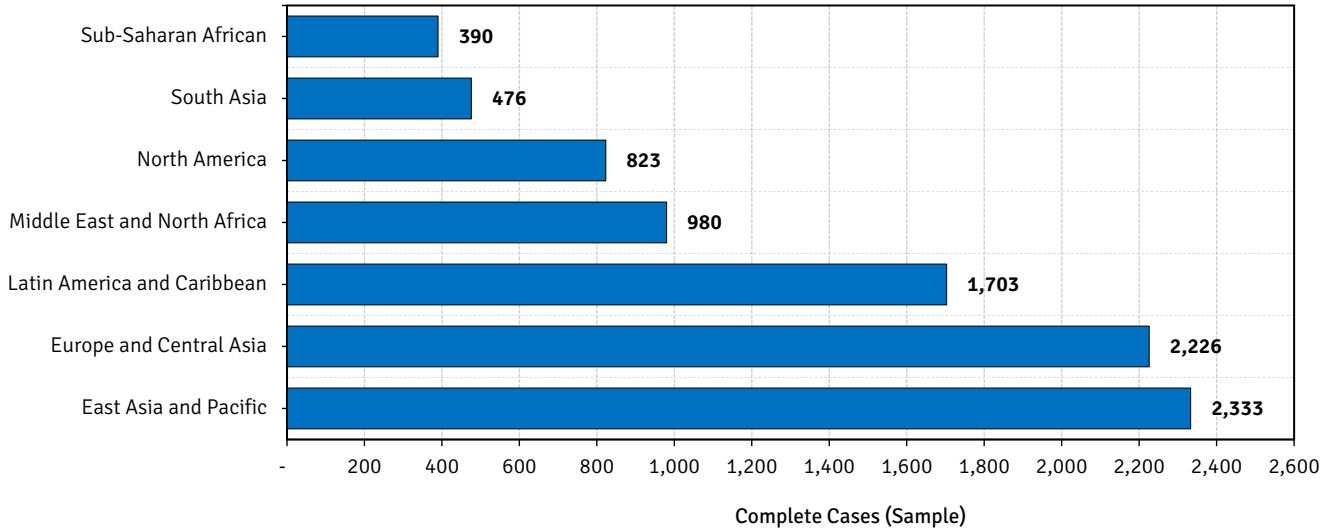

Figure 8. Regional composition of the primary analytical sample.

Regional composition was broad but unequal. East Asia and Pacific contributed 26.12% of the complete-case sample and Europe and Central Asia 24.92%; together they accounted for 51.04%. Latin America and the Caribbean contributed 19.07%, the Middle East and North Africa 10.97%, North America 9.22%, South Asia 5.33%, and Sub-Saharan Africa 4.37%. These proportions describe sample composition only. They neither equalize country contributions nor estimate regional mechanisms (Supplementary Table S18).

4.10. Integrated Interpretation & Calibrated Evidence Statements

Taken together, the results separate four relatively stable composite-level patterns from findings that require stronger qualification. Completed education, current-student status, family salience, and friend salience retained positive directions across the principal estimator checks, while religious salience retained a negative direction. Female gender also showed a stable positive adjusted composite contrast across estimators, although the domain-level signs differed substantially. Age remained composite-level uncertain. Organizational membership breadth was the least stable predictor because its negative Bayesian estimate was not reproduced as interval-excluding-zero in either OLS estimator, changed sign under bounded scoring, showed a non-monotonic categorical pattern, and had opposing domain-specific directions.

The education finding is best interpreted as a small, directionally stable within-country association in the observed analytical sample rather than an educational effect. Its magnitude was modest at the composite level, the categorical pattern was not equally spaced across ISCED levels, and FDR-supported domain evidence was concentrated in achievement-responsibility and gender-equitable education. Similar calibration applies to the salience variables: their aggregate directions were comparatively robust, but domain decomposition showed that each aggregate coefficient summarized a heterogeneous profile rather than a uniform moral-civic shift.

Table 9. Evidence stability and calibrated reporting status for the eight primary predictors.

Predictor	Primary result	Corroborating evidence	Material qualification	Calibrated reporting status
Female	0.160 [0.120, 0.200]	Positive in both unweighted and WVS-weighted OLS	Domain signs differ; the largest coefficient concerns gender-equitable education	Stable adjusted sample contrast across estimators; not a causal gender effect
Age	0.017 [-0.004, 0.038]	Both OLS intervals include zero	Positive only for public-harm rejection after FDR control	Composite-level association remains uncertain
Education	0.061 [0.040, 0.082]	Positive across both OLS estimators and all six score definitions	Categorical pattern departs from equal spacing ($p = 0.020$); domain support is selective	Small, directionally stable within-country association; no evidence of an educational effect
Current student	0.079 [0.027, 0.130]	Positive in both OLS estimators	FDR support appears only for institutional confidence; status is a coarse employment-derived indicator	Stable adjusted category contrast across estimators; exposure interpretation is limited
Family salience	0.073 [0.054, 0.092]	Positive across estimators and score definitions; categories broadly increase	Social-trust domain is negative after FDR control	Stable positive composite association with domain heterogeneity
Friend salience	0.075 [0.055, 0.094]	Positive across estimators and score definitions; categories broadly increase	No FDR-supported association for prosocial or achievement domains	Stable positive composite association with selective domain support
Religious salience	-0.074 [-0.098, -0.050]	Negative across estimators and score definitions; categories are ordered	Positive for institutional confidence but negative for achievement and gender-equitable education	Stable negative composite association with opposing domain-specific directions
Membership breadth	-0.028 [-0.048, -0.007]	Point estimate is negative in all three estimators	Both OLS intervals include zero; bounded score changes sign; categories are non-monotonic; domain signs conflict	Estimator- and measurement-sensitive; no stable general membership conclusion

5. DISCUSSION

Moral-civic orientation among tertiary-educated young adults is better conceptualized as a configuration of interrelated domains than as a homogeneous disposition. Education, current-student status, female gender, and family and friend salience were positively associated with the standardized Moral-Civic Values Formative Index (MCVFI). Conversely, religious salience was negatively associated with the composite index, whereas the associations of age and organizational-membership breadth were less certain. Importantly, several predictors demonstrated opposing associations across prosocial values, achievement-responsibility, public-harm rejection, institutional confidence, gender-equitable education, and generalized social trust. This multidimensional pattern is consistent with formative measurement theory, in which indicators collectively constitute an index rather than function as interchangeable manifestations of a single latent construct [62]. Consequently, similar MCVFI scores may represent substantively different profiles and should not be interpreted as rankings of individuals' moral worth.

Completed education exhibited a small but robust within-country association with MCVFI ($\beta = 0.061$, 95% CrI [0.040, 0.082]), primarily supported by achievement-responsibility and gender-equitable education. The domain selectivity challenges the assumption that higher education generates comprehensive moral-civic transformation. Attitudinal changes during higher education tend to be modest and outcome-specific [63]. Moreover, educational gradients in political trust may partly reflect cultural congruence, institutional familiarity, and communication styles [64]. Field of study can predict political attitudes as strongly as educational attainment, although its associations with political efficacy and participation remain limited [65]. Therefore, the observed education coefficient may combine curricular socialization, disciplinary composition, credential effects, and pre-existing selection rather than represent a causal educational effect.

Current-student status was positively associated with MCVFI ($\beta = 0.079$, 95% CrI [0.027, 0.130]), but only institutional confidence remained significant following false-discovery-rate correction. This suggests that current enrollment may primarily capture institutional embeddedness rather than generalized value change. Teaching quality, open classroom climates, civic knowledge, and political interest may constitute more proximal mechanisms than enrollment itself [66]. Institutional trust and expected civic participation also display distinct cross-national relationships [67], whereas experimentally designed civic-education programs can strengthen democratic knowledge and values [68]. Future studies should therefore directly measure educational content, deliberative practices, perceived institutional fairness, and field of study.

The female–male contrast was the largest observed composite association ($\beta = 0.160$, 95% CrI [0.120, 0.200]).

Female respondents scored higher in prosocial values, public-harm rejection, and gender-equitable education but lower in achievement-responsibility. Because gender equity constitutes one MCVFI domain, the composite contrast partly reflects alignment between group position and construct content. Women may also report lower internal political efficacy despite displaying other pro-democratic orientations [69]. The result should therefore be interpreted as evidence of a gender-differentiated moral-civic profile rather than uniformly stronger moral-civic values among women.

Family and friend salience contributed positively to the composite index through different pathways. Family salience was positively associated with four domains but negatively associated with generalized social trust. Friend salience, meanwhile, was positively associated with public-harm rejection, institutional confidence, and social trust. These results align with the distinction between bonding and bridging relationships: strong attachment to close others does not necessarily extend trust to unfamiliar social groups. Generalized trust and trust in familiar individuals are empirically distinct constructs [70]. Educational institutions can facilitate friendships across worldview differences [71], but exposure to diversity alone may be insufficient. Evidence from Kenyan schools indicates that interethnic friendship, rather than diversity per se, mediates trust and tolerance [72]. Future research should distinguish relationship salience from network diversity, interaction frequency, relationship quality, and social closure.

Religious salience was negatively associated with the composite index ($\beta = -0.074$, 95% CrI [−0.098, −0.050]) but positively associated with institutional confidence and negatively associated with achievement-responsibility and gender-equitable education. This heterogeneity precludes a uniformly adverse interpretation of religion. Acceptance of social diversity varies jointly with religiosity and interreligious contact [73], while relationships between religious attendance and gender attitudes vary according to national inequality and socioeconomic development [74]. Religious tradition, doctrinal orientation, institutional participation, and interreligious networks should consequently be modeled separately from subjective religious importance.

Organizational-membership breadth produced the least stable association. Although its Bayesian estimate was negative ($\beta = -0.028$, 95% CrI [−0.048, −0.007]), the OLS interval included zero, bounded scoring reversed the sign, and categorical estimates were non-monotonic. Membership breadth was positively associated with institutional confidence and social trust but negatively associated with public-harm rejection and gender-equitable education. Simple membership counts conflate organizational type, ideology, participation intensity, duration, leadership roles, and internal diversity. Similarly, informal-club membership in Mali was associated with greater trustworthiness but not higher generalized trust [75]. Organizational membership should therefore be understood as an opportunity for social exposure rather than an automatic source of social capital.

6. CONTEXT, ROBUSTNESS, LIMITATIONS & IMPLICATIONS

Approximately 21% of the initial variance occurred between countries, while a residual intraclass correlation of approximately 15% remained after covariate adjustment. Moral-civic profiles are thus substantially structured by national context. State impartiality, corruption, inequality, and institutional performance represent plausible mechanisms shaping trust and civic attitudes [76]; however, these mechanisms were not directly tested. Unequal regional coverage, imprecisely estimated country means, and potentially heterogeneous slopes further limit universal interpretation.

Agreement across Bayesian estimates, weighted and unweighted OLS models, alternative scoring procedures, convergence diagnostics, high retention, and posterior-predictive checks supports numerical robustness, but not causal inference. The cross-sectional design, restricted tertiary-educated sample, coarse self-reported indicators, residual confounding, and modest predictive tail mismatch remain important limitations. Measurement non-invariance may additionally distort cross-country value comparisons [23], [77]. Future research should test domain-level equivalence, employ longitudinal or quasi-experimental designs, estimate cross-level interactions, and directly measure educational experiences, network characteristics, religious contexts, organizational intensity, and institutional performance.

The study's principal contribution is both theoretical and methodological. It demonstrates that educational and social positions correspond to heterogeneous moral-civic configurations whose constituent domains may reinforce, offset, or reverse one another. Accordingly, interventions should prioritize high-quality civic education, fair and trustworthy institutions, and sustained bridging relationships rather than assume that educational enrollment, religious importance, close relationships, or organizational membership automatically generate generalized moral-civic development.

7. CONCLUSION

This study shows that moral-civic orientation among tertiary-educated young adults is multidimensional and context-dependent. Within countries, female gender, completed education, current-student status, family salience, and friend salience were positively associated with the composite profile, whereas religious salience showed a negative association; age remained uncertain and organizational membership breadth was not consistently robust. Domain-specific analyses further

demonstrated that these relationships were not uniform across prosocial values, achievement-responsibility, public-harm rejection, institutional confidence, gender-equitable education, and social trust.

Residual between-country clustering remained after covariate adjustment, indicating that the modeled individual- and country-sample predictors did not account for all between-sample variation. The study therefore supports a formative, multilevel, and domain-specific interpretation of moral-civic values rather than a single generalized moral gradient. Future research should employ longitudinal designs and richer measures of educational, relational, religious, and organizational experiences to clarify the mechanisms underlying these associations and their variation across national contexts.

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CONFLICTS OF INTEREST

The authors declare that no conflicts of interest are associated with this study. All aspects of the research were conducted with the utmost integrity and transparency.

DATA AVAILABILITY

The data used in this study are publicly available from the World Values Survey Association repository: World Values Survey Wave 7 Country-Pooled Datafile Version 6.0.0 (https://doi.org/10.14281/18241.24)

ETHICAL STATEMENTS

Not applicable. This study did not involve any human participants or animals, and no personal or sensitive data were collected, used, or analyzed at any stage of the research.

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SUPPLEMENTARY

Table S1. Profile-domain coverage and analytical sample derivation.

Number of valid domains	Respondents	Percent of eligible sample
0	1	0.01
1	0	0.00
2	1	0.01
3	4	0.04
4	43	0.45
5	358	3.72
6	9,227	95.78

Note. Percentages may not sum exactly to 100 because of rounding. The five-of-six sensitivity regression used N = 9,242 after its own predictor-completeness restriction.

Table S2. Overall domain and predictor missingness in the eligible sample (N = 9,634).

Domain or predictor	Missing (n)	Missing (%)
Prosocial values	18	0.19
Achievement-responsibility	69	0.72
Public-harm rejection	118	1.22
Institutional confidence	20	0.21
Gender-equitable education	90	0.93
Social trust	151	1.57
Female	3	0.03
Age	0	0.00
Completed education	0	0.00
Current student	94	0.98
Family salience	6	0.06
Friend salience	9	0.09
Religious salience	76	0.79
Organizational membership breadth	193	2.00

Table S3. Sequential sample-flow audit.

Stage	Respondents	Countries
Full WVS Wave 7 file	97,220	66
Age 18-30	26,552	66
Eligible: age 18-30 and ISCED 5-8	9,634	66
At least one valid MCVFI domain	9,633	66
At least five of six valid domains	9,585	66
All six valid domains	9,227	66
Primary complete-case model	8,931	66

Table S4. Public-harm content audit.

Subdomain	WVS items	Role in primary public-harm	Content boundary
Integrity/corruption rejection	Q177-Q181	Required	Benefit fraud, fare evasion, theft, tax cheating, bribery
Interpersonal-violence rejection	Q189-Q191	Required	Violence against spouse, children, and other people
Political violence/terrorism rejection	Q192, Q194	Extended sensitivity only	Political violence and terrorism; both items required in the extended definition

Subdomain	WVS items	Role in primary public-harm	Content boundary
Suicide	Q187	Excluded	Self-directed conduct; not grouped with public harm

Table S5. Internal consistency of coherent multi-item groups.

Item group	Items	k	Complete N	Cronbach alpha
Integrity/corruption rejection	Q177 - Q181	5	9,166	0.804
Interpersonal-violence rejection	Q189 - Q191	3	9,309	0.751
Political-violence/terrorism rejection	Q192, Q194	2	9,150	0.814
Institutional confidence	Q65, Q69 - Q71, Q73 - Q75	7	8,890	0.870

Table S6. Formative-domain redundancy diagnostics and inverse-VIF weights.

Domain	Unique content contribution	VIF	Normalized inverse-VIF weight
Prosocial values	Interpersonal consideration and respect	1.059	0.165
Achievement-responsibility	Agency, persistence, and responsibility	1.052	0.166
Public-harm rejection	Common-content rejection of corruption and interpersonal violence	1.027	0.170
Institutional confidence	Confidence in formal institutions	1.063	0.164
Gender-equitable education	Education-specific equality attitude	1.041	0.168
Social trust	Generalized expectation of trust	1.051	0.166

Table S7. Pooled descriptive correlations with the standardized MCVFI.

Predictor	Pearson r with standardized MCVFI
Female	0.089
Age	0.023
Completed education	0.122
Current student	0.025
Family salience	0.073
Friend salience	0.147
Religious salience	-0.197
Organizational membership breadth	-0.077

Table S8. Bayesian sampler, prior, predictive, and variance-component audit.

Diagnostic item	Recorded value
Sampler and implementation	Four-chain conjugate Gibbs sampler; Python/NumPy
Warmup and retained draws	1,500 warmup and 7,000 retained per chain; 28,000 retained draws
Chain seeds	20260804, 20261804, 20262804, 20263804
Coefficient priors	Intercept Normal(0, 1); slopes Normal(0, 0.5^2)
Variance priors	Country and residual variances: inverse-gamma(shape = 2, scale = 0.05)
Prior-predictive 95% interval	[-3.178, 3.322] standardized outcome units
Maximum R-hat	1.000 across reported parameters
Minimum bulk ESS	620; family-salience country-mean coefficient
Minimum tail ESS	1,000; friend-salience country-mean coefficient
Largest MCSE for posterior mean	0.0100; current-student country-mean coefficient
Null ICC	0.210 [0.160, 0.280]
Adjusted residual ICC	0.150 [0.110, 0.200]
Prior sensitivity	Selected within-country coefficients unchanged to three decimals; adjusted ICC 0.150-0.170
Independent implementation	Maximum-likelihood mixed model reproduced all principal within-country coefficients to three decimals; adjusted ICC 0.134

Table S9. Posterior-predictive checks for location, scale, tails, and country variation.

Statistic	Observed	Replicated mean	95% replicated interval
1st percentile	-2.474	-2.278	[-2.365, -2.198]
5th percentile	-1.668	-1.627	[-1.684, -1.573]
Median	-0.007	-0.010	[-0.040, 0.019]
95th percentile	1.664	1.666	[1.619, 1.721]
99th percentile	2.159	2.365	[2.277, 2.452]
Mean	0.000	0.001	[-0.022, 0.023]
SD	1.000	1.001	[0.981, 1.023]
Within-country variance	0.771	0.773	[0.742, 0.807]
Between-country variance of country means	0.219	0.223	[0.197, 0.252]
Posterior-predictive ICC	0.221	0.224	[0.202, 0.246]

Table S10. Independent maximum-likelihood full-model implementation check.

Predictor	Estimate	95% CI
Female	0.161	[0.124, 0.198]
Age	0.017	[-0.005, 0.038]
Education	0.061	[0.040, 0.082]
Current Student	0.079	[0.026, 0.132]
Family Salience	0.073	[0.054, 0.092]
Friend Salience	0.075	[0.055, 0.094]
Religious Salience	-0.074	[-0.098, -0.050]
Organizational Membership Breadth	-0.027	[-0.048, -0.007]

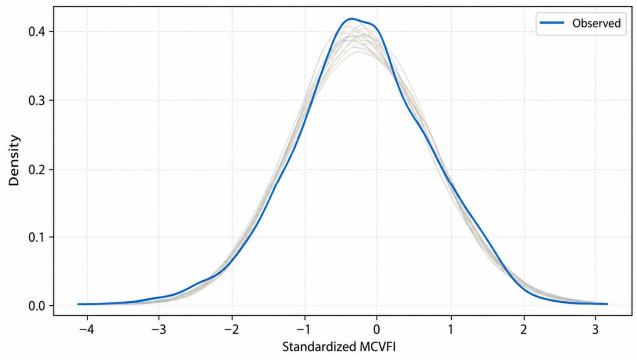

Figure S1. Observed and posterior-predictive outcome distributions.

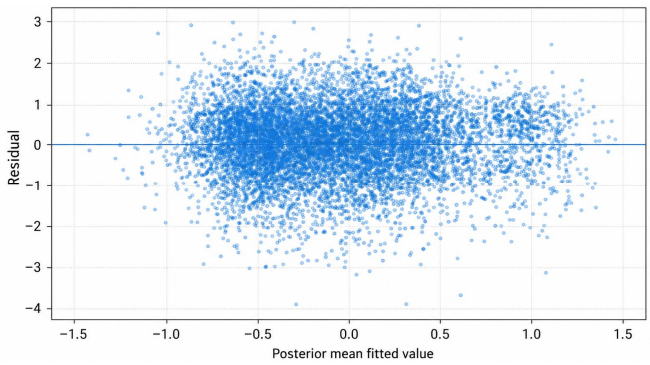

Figure S2. Posterior-predictive residual assessment.

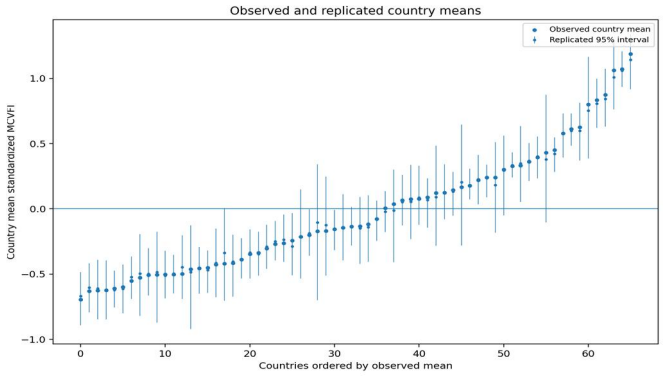

Figure S3. Observed and replicated country means.

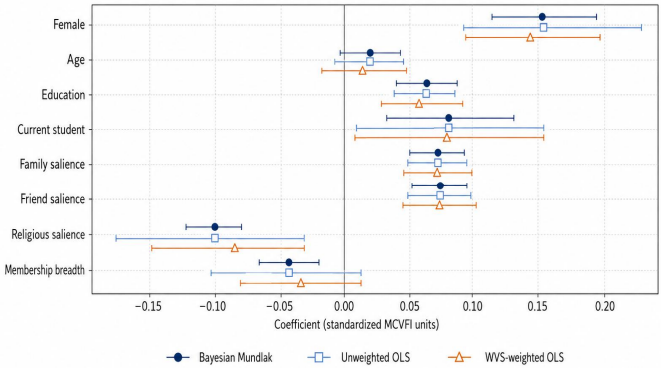

Figure S4. Cross-estimator comparison of the primary within-country coefficients.

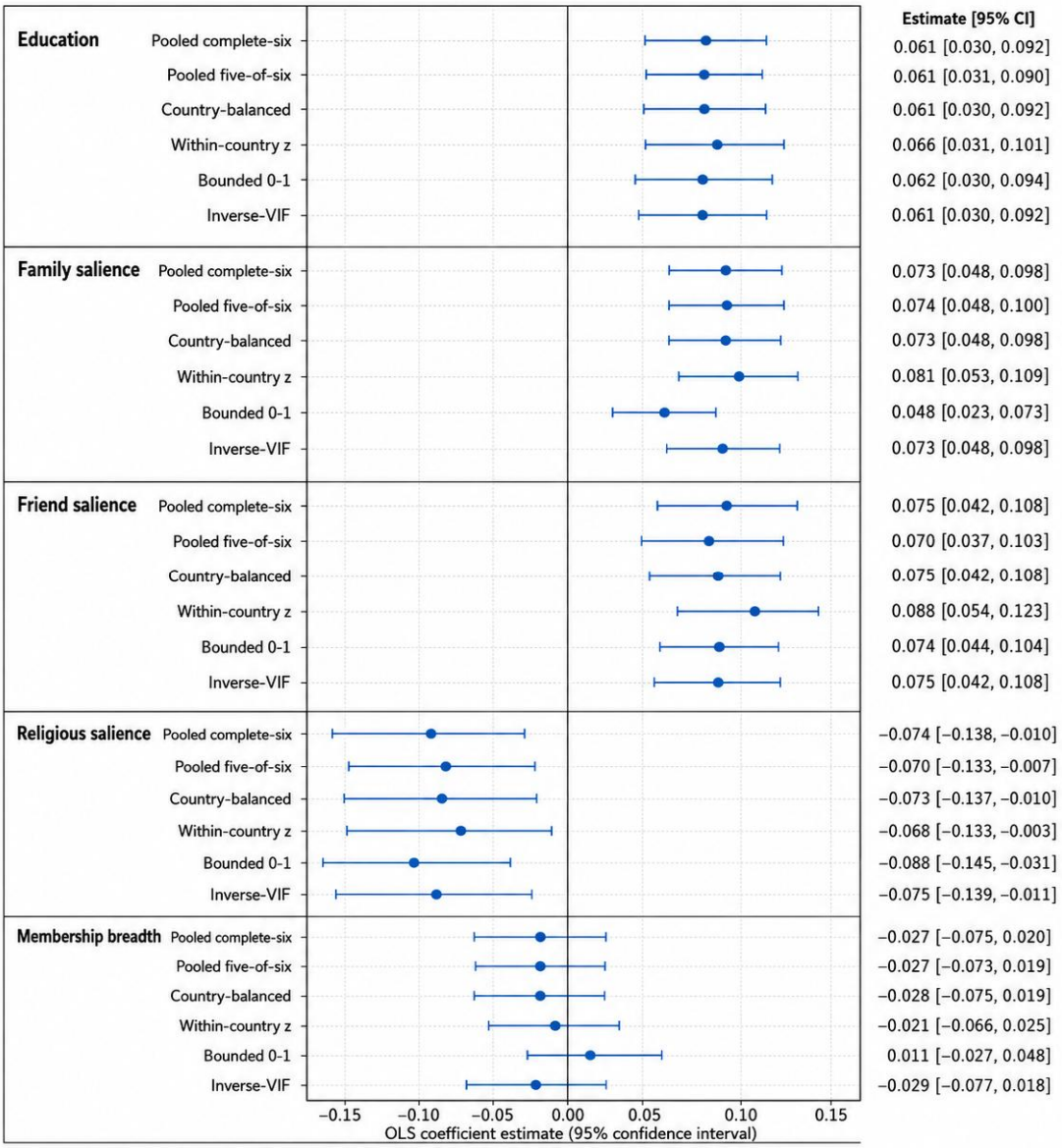

Figure S5. Sensitivity of selected coefficients to alternative profile-score definitions.

Table S11. Cross-estimator comparison of primary within-country coefficients.

Predictor	Bayesian Mundlak	Unweighted OLS	WVS-weighted OLS
Female	0.160 [0.120, 0.200]	0.161 [0.091, 0.231]	0.145 [0.093, 0.198]
Age, per SD	0.017 [-0.004, 0.038]	0.017 [-0.010, 0.043]	0.012 [-0.018, 0.042]
Education, per SD	0.061 [0.040, 0.082]	0.061 [0.030, 0.092]	0.051 [0.018, 0.084]
Current student	0.079 [0.027, 0.130]	0.079 [0.005, 0.153]	0.078 [0.005, 0.151]
Family salience, per SD	0.073 [0.054, 0.092]	0.073 [0.048, 0.098]	0.072 [0.045, 0.099]
Friend salience, per SD	0.075 [0.055, 0.094]	0.075 [0.042, 0.108]	0.075 [0.045, 0.104]
Religious salience, per SD	-0.074 [-0.098, -0.050]	-0.074 [-0.138, -0.010]	-0.061 [-0.110, -0.011]
Membership breadth, per SD	-0.028 [-0.048, -0.007]	-0.027 [-0.075, 0.020]	-0.020 [-0.059, 0.020]

Table S12. Profile definition, standardization, and weighting sensitivity.

Profile-score definition	N	Education	Family	Friends	Religion	Membership Breadth
Pooled z, complete six	8,931	0.061 [0.030, 0.092]	0.073 [0.048, 0.098]	0.075 [0.042, 0.108]	-0.074 [-0.138, -0.010]	-0.027 [-0.075, 0.020]
Pooled z, five of six	9,242	0.061	0.074	0.070	-0.070	-0.027

Profile-score definition	N	Education	Family	Friends	Religion	Membership Breadth
		[0.031, 0.090]	[0.048, 0.100]	[0.037, 0.103]	[-0.133, -0.007]	[-0.073, 0.019]
Country-balanced z, complete six	8,931	0.061	0.073	0.075	-0.073	-0.028
		[0.030, 0.092]	[0.048, 0.098]	[0.042, 0.108]	[-0.137, -0.010]	[-0.075, 0.019]
Within-country z, complete six	8,931	0.066	0.081	0.088	-0.068	-0.021
		[0.031, 0.101]	[0.053, 0.109]	[0.054, 0.123]	[-0.133, -0.003]	[-0.066, 0.025]
Bounded 0-1, complete six	8,931	0.062	0.048	0.074	-0.088	0.011
		[0.030, 0.094]	[0.023, 0.073]	[0.044, 0.104]	[-0.145, -0.031]	[-0.027, 0.048]
Inverse-VIF, complete six	8,931	0.061	0.073	0.075	-0.075	-0.029
		[0.030, 0.092]	[0.048, 0.098]	[0.042, 0.108]	[-0.139, -0.011]	[-0.077, 0.018]

Table S13. Category-specific ordinal sensitivity analyses.

Variable (reference)	Category contrasts versus reference	Departure (p)	Interpretation
Education (ISCED 5)	ISCED 6: 0.124 [0.069, 0.179]; ISCED 7: 0.142 [0.051, 0.233]; ISCED 8: 0.349 [0.151, 0.548]	0.020	Ordered positive pattern; steps not equally spaced
Family salience (1)	2: 0.700 [0.250, 1.150]; 3: 0.780 [0.344, 1.217]; 4: 0.968 [0.542, 1.393]	0.079	Increasing pattern; linear term retained with caution
Friend salience (1)	2: 0.219 [-0.113, 0.552]; 3: 0.383 [0.053, 0.713]; 4: 0.455 [0.105, 0.805]	0.054	Broadly increasing; borderline departure
Religious salience (1)	2: -0.097 [-0.197, 0.003]; 3: -0.139 [-0.292, 0.014]; 4: -0.214 [-0.385, -0.043]	0.657	Approximately ordered negative pattern
Membership breadth (0)	1: 0.059 [0.009, 0.110]; 2: 0.054 [-0.008, 0.117]; 3: 0.061 [-0.031, 0.152]; 4: -0.179 [-0.370, 0.013]	0.019	Non-monotonic; linear estimate is inadequate as a complete summary

Table S14. Complete exploratory predictor-by-domain results with family-wide FDR control.

Domain	Predictor	Estimate	95% CI	FDR q	Classification
Prosocial	Female	0.058	[0.013, 0.103]	0.027	FDR-supported +
Prosocial	Age	-0.006	[-0.028, 0.017]	0.718	Uncertain
Prosocial	Education	0.003	[-0.022, 0.028]	0.853	Uncertain
Prosocial	Current student	0.003	[-0.072, 0.078]	0.940	Uncertain
Prosocial	Family salience	0.047	[0.024, 0.070]	<0.001	FDR-supported +
Prosocial	Friend salience	0.004	[-0.026, 0.033]	0.853	Uncertain
Prosocial	Religious salience	-0.008	[-0.038, 0.021]	0.694	Uncertain
Prosocial	Membership breadth	-0.018	[-0.048, 0.012]	0.355	Uncertain
Achievement-responsibility	Female	-0.079	[-0.133, -0.024]	0.013	FDR-supported -
Achievement-responsibility	Age	0.009	[-0.021, 0.038]	0.690	Uncertain
Achievement-responsibility	Education	0.030	[0.006, 0.053]	0.028	FDR-supported +
Achievement-responsibility	Current student	0.038	[-0.026, 0.103]	0.355	Uncertain
Achievement-responsibility	Family salience	0.039	[0.018, 0.060]	0.001	FDR-supported +
Achievement-responsibility	Friend salience	-0.001	[-0.024, 0.022]	0.935	Uncertain
Achievement-responsibility	Religious salience	-0.106	[-0.135, -0.078]	<0.001	FDR-supported -
Achievement-responsibility	Membership breadth	0.018	[-0.015, 0.051]	0.407	Uncertain
Public-harm rejection	Female	0.150	[0.076, 0.224]	<0.001	FDR-supported +
Public-harm rejection	Age	0.043	[0.015, 0.072]	0.010	FDR-supported +
Public-harm rejection	Education	0.032	[-0.000, 0.064]	0.095	Uncertain
Public-harm rejection	Current student	0.066	[-0.004, 0.137]	0.115	Uncertain
Public-harm rejection	Family salience	0.057	[0.034, 0.080]	<0.001	FDR-supported +
Public-harm rejection	Friend salience	0.051	[0.025, 0.077]	<0.001	FDR-supported +
Public-harm rejection	Religious salience	-0.012	[-0.071, 0.046]	0.776	Uncertain
Public-harm rejection	Membership breadth	-0.164	[-0.223, -0.105]	<0.001	FDR-supported -

Domain	Predictor	Estimate	95% CI	FDR q	Classification
Institutional confidence	Female	-0.026	[-0.064, 0.013]	0.304	Uncertain
Institutional confidence	Age	-0.023	[-0.048, 0.003]	0.137	Uncertain
Institutional confidence	Education	0.013	[-0.014, 0.041]	0.440	Uncertain
Institutional confidence	Current student	0.070	[0.012, 0.127]	0.040	FDR-supported +
Institutional confidence	Family salience	0.043	[0.026, 0.060]	<0.001	FDR-supported +
Institutional confidence	Friend salience	0.043	[0.014, 0.071]	0.010	FDR-supported +
Institutional confidence	Religious salience	0.109	[0.068, 0.150]	<0.001	FDR-supported +
Institutional confidence	Membership breadth	0.082	[0.050, 0.113]	<0.001	FDR-supported +
Gender-equitable education	Female	0.327	[0.262, 0.392]	<0.001	FDR-supported +
Gender-equitable education	Age	0.008	[-0.013, 0.030]	0.569	Uncertain
Gender-equitable education	Education	0.037	[0.005, 0.068]	0.049	FDR-supported +
Gender-equitable education	Current student	0.009	[-0.053, 0.070]	0.853	Uncertain
Gender-equitable education	Family salience	0.029	[-0.007, 0.065]	0.178	Uncertain
Gender-equitable education	Friend salience	0.014	[-0.014, 0.042]	0.439	Uncertain
Gender-equitable education	Religious salience	-0.116	[-0.162, -0.071]	<0.001	FDR-supported -
Gender-equitable education	Membership breadth	-0.064	[-0.113, -0.015]	0.027	FDR-supported -
Social trust	Female	-0.036	[-0.076, 0.003]	0.126	Uncertain
Social trust	Age	0.011	[-0.012, 0.034]	0.439	Uncertain
Social trust	Education	0.037	[0.004, 0.070]	0.058	Suggestive only
Social trust	Current student	-0.010	[-0.068, 0.049]	0.828	Uncertain
Social trust	Family salience	-0.032	[-0.055, -0.009]	0.016	FDR-supported -
Social trust	Friend salience	0.063	[0.041, 0.085]	<0.001	FDR-supported +
Social trust	Religious salience	-0.039	[-0.075, -0.002]	0.070	Suggestive only
Social trust	Membership breadth	0.075	[0.049, 0.101]	<0.001	FDR-supported +

Note. The 95% intervals are unadjusted frequentist confidence intervals; q values apply Benjamini-Hochberg control to the full 48-test family. 'Suggestive only' denotes an interval excluding zero with q > 0.05.

Table S15. Distribution and information diagnostics for stabilized retention weights.

Weight version	Min	P1	Median	Mean	P95	P99	Max	CV	Effective	Prop. >5	Prop. >10
Stabilized untrimmed	0.9949	0.9959	0.9992	1.0000	1.0058	1.0100	1.0266	0.0029	8,930.9	0.000	0.000
Stabilized truncated 1st - 99th	0.9959	0.9959	0.9992	1.0000	1.0059	1.0100	1.0100	0.0028	8,930.9	0.000	0.000

Table S16. Retention-weighted within-country sensitivity estimates.

Weight version	Predictor	Estimate	CI lower	CI upper
untrimmed	female	0.161	0.091	0.230
untrimmed	age	0.017	-0.010	0.043
untrimmed	education	0.061	0.030	0.092
untrimmed	current student	0.079	0.005	0.153
untrimmed	family salience	0.073	0.048	0.098
untrimmed	friend salience	0.075	0.042	0.108
untrimmed	religious salience	-0.074	-0.137	-0.010
untrimmed	organizational membership breadth	-0.027	-0.074	0.020
truncated 1st 99th	female	0.161	0.091	0.230
truncated 1st 99th	age	0.017	-0.010	0.043
truncated 1st 99th	education	0.061	0.030	0.092
truncated 1st 99th	current student	0.079	0.005	0.153
truncated 1st 99th	family salience	0.073	0.048	0.098

Weight version	Predictor	Estimate	CI lower	CI upper
truncated 1st 99th	friend salience	0.075	0.042	0.108
truncated 1st 99th	religious salience	-0.074	-0.137	-0.010
truncated 1st 99th	organizational membership breadth	-0.027	-0.074	0.020

Table S17. Maximum-likelihood random-slope diagnostic sensitivity analyses.

Random slope	Converged	Slope variance	Slope SD	Approx. 95% CI for SD	Interpretation
Education	Yes	0.0033	0.058	[0.000, 0.085]	Small-to-moderate diagnostic heterogeneity; interval includes the boundary
Religious salience	Yes	0.0113	0.106	[0.050, 0.142]	Small-to-moderate diagnostic heterogeneity
Membership breadth	Yes	0.0090	0.095	[0.055, 0.122]	Small-to-moderate diagnostic heterogeneity

Table S18. Regional composition of the primary analytical sample.

Regions	Countries	Complete cases	Share of N (%)	Country codes
East Asia and Pacific	16	2,333	26.12	AUS, CHN, HKG, IDN, JPN, KOR, MAC, MMR, MNG, MYS, NZL, PHL, SGP, THA, TWN, VNM
Europe and Central Asia	19	2,226	24.92	AND, ARM, CYP, CZE, DEU, GBR, GRC, KAZ, KGZ, NIR, NLD, ROU, RUS, SRB, SVK, TJK, TUR, UKR, UZB
Latin America and Caribbean	13	1,703	19.07	ARG, BOL, BRA, CHL, COL, ECU, GTM, MEX, NIC, PER, PRI, URY, VEN
Middle East and North Africa	8	980	10.97	EGY, IRN, IRQ, JOR, LBN, LBY, MAR, TUN
North America	2	823	9.22	CAN, USA
South Asia	4	476	5.33	BGD, IND, MDV, PAK
Sub-Saharan Africa	4	390	4.37	ETH, KEN, NGA, ZWE