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# Social Responsibility Cognition, Attitudes, and Innovation Behavior among University Students in Ningxia: A Social Cognitive Approach

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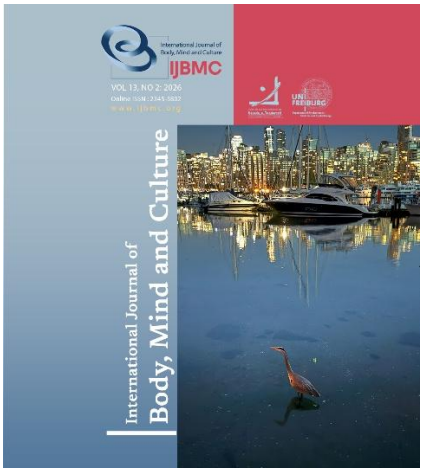


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## ABSTRACT

**Objective:** This study examined how social responsibility cognition relates to social innovation behavior among university students in Ningxia and tested whether social responsibility attitudes mediate this relationship within an integrated Social Cognitive Theory–Theory of Planned Behavior (SCT–TPB) framework.

**Methods and Materials:** A cross-sectional survey was conducted with 1,963 undergraduate students recruited from eight public universities in Ningxia using stratified random sampling by grade level. Social responsibility cognition (12 items) and attitudes (10 items) were adapted and pilot tested; social innovation behavior was measured using an 8-item scale. Construct validity was examined via CFA (AMOS), and group differences were assessed with t tests/ANOVAs with effect sizes and multiple-comparison corrections. Mediation was tested using Hayes' PROCESS (Model 4) in SPSS (5,000 bootstrap samples).

**Findings:** Students reported moderately high levels of cognition, attitudes, and innovation behavior. Cognition, attitudes, and innovation behavior were strongly correlated (r≈.70–.88, p<.001). CFA supported the three-factor measurement model with acceptable fit. Gender and grade differences were statistically significant for cognition and attitudes but small in magnitude, and no meaningful gender×grade interaction effects were observed. Mediation analysis showed that attitudes partially mediated the cognition–innovation behavior link (indirect effect ≈0.52, 95% CI [0.43, 0.60]).

**Conclusion:** Strengthening students' social responsibility cognition may promote social innovation behavior, at least in part by improving social responsibility attitudes. Universities should combine cognitive–attitudinal interventions with opportunities for real-world social innovation practice.

**Keywords:** Social Responsibility Cognition, Social Responsibility Attitude, Social Innovation Behavior, Social Cognitive Theory.

## Introduction

Universities worldwide are expected to cultivate students' sense of social responsibility and capacity for innovation. International frameworks such as the United Nations Sustainable Development Goals (UN SDGs) emphasize the role of education in promoting civic engagement, sustainability, and innovation. In China, national education policies similarly stress talent development for social innovation and rural revitalization. However, much of the empirical research on social responsibility and innovation has focused on urban or eastern regions, with limited attention to western, multi-ethnic areas.

Although existing studies confirm that social responsibility can foster innovative behaviors, few integrate Social Cognitive Theory (SCT) and the Theory of Planned Behavior (TPB) to explain how cognition and attitudes jointly influence students' innovation behavior. Most prior work treats these constructs separately, lacks rigorous mediation testing, or does not account for regional variation. This leaves a critical gap in understanding whether the SCT–TPB pathway holds in less studied settings such as Ningxia.

Ningxia presents a distinctive educational context. As a less economically developed, multi-ethnic region of China, its universities face different institutional constraints and social priorities than those in major metropolitan areas. Students in Ningxia often participate in programs focused on rural development and ethnic community services, offering a unique opportunity to examine how social responsibility translates into innovative behavior under distinct cultural and policy conditions.

This study addresses the above gaps by integrating SCT and TPB into a single mediation model. Specifically, it tests the following hypotheses:

H1. Social responsibility cognition positively predicts social innovation behavior.

H2. Social responsibility attitudes mediate the relationship between cognition and innovation behavior.

H3. Gender and grade level may moderate these relationships, but interaction effects are expected to be small.

By clarifying these pathways in a Western Chinese context, the study aims to inform both theory and practice, offering evidence for policymakers and educators seeking to strengthen students' civic and innovative capacities.

## Literature Review

### *Social Responsibility, Cognition, and Attitudes*

Social responsibility among university students has been widely studied as an essential dimension of civic and moral development (Bringle & Steinberg, 2010; Zhou et al., 2020). Cognition refers to students' understanding of social issues, while attitudes capture their evaluative dispositions toward acting on these issues. Prior research in China has shown moderately high levels of social responsibility but has rarely linked cognition and attitudes to concrete innovation outcomes. Western studies on civic engagement similarly emphasize knowledge and values but suggest that contextual factors (e.g., institutional climate, peer norms) can amplify or dampen students' action tendencies (Brundiers et al., 2021).

### *Social Innovation Behavior in Higher Education*

Social innovation behavior refers to students' proactive efforts to create, test, or implement solutions to social problems (Phills Jr et al. 2008). Although universities in Europe and North America have integrated innovation labs and service learning to stimulate this behavior, evidence from Chinese universities—especially in less developed regions—remains limited. Most existing work focuses on entrepreneurship or volunteering rather than innovation as a behavioral outcome.

### *Integrating SCT and TPB*

This study draws on two complementary theories. Social Cognitive Theory (SCT) highlights the reciprocal interaction between individual factors, behavior, and environment, emphasizing self-efficacy and observational learning (Bandura, 1986). The Theory of Planned Behavior (TPB) focuses on attitudes, subjective norms, and perceived behavioral control as predictors of behavioral intentions (Ajzen, 1991). Although both frameworks explain behavior change, SCT emphasizes environmental feedback and efficacy beliefs, while TPB stresses planned, intention-based action. Integrating these theories allows for a more comprehensive understanding of how cognition (SCT) and attitudes (TPB) jointly shape innovation behavior.

### *Gaps in Prior Research*

Few studies have directly compared SCT and TPB or tested their combined explanatory power in a non-

Western setting. Most Chinese studies cite these frameworks but do not critique their assumptions or limitations. Western literature, in contrast, often debates whether environmental or attitudinal factors dominate, suggesting possible cultural variation. By explicitly combining SCT and TPB, the present study tests whether attitudes mediate the link between cognition and behavior while controlling for demographic variables.

*Measurement Tools and Adaptation*

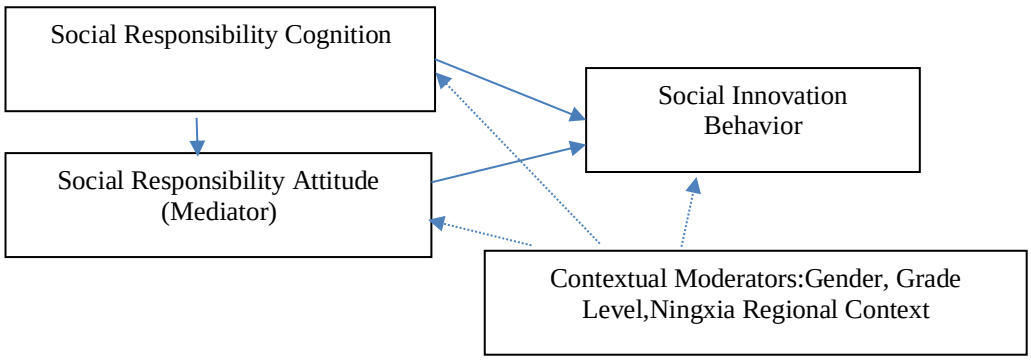
To assess social responsibility cognition and attitudes, we adapted scales developed by Davis et al. (2021) and validated in prior Asian contexts. Items were translated, culturally adjusted, and pilot tested to ensure relevance to Ningxia students. Compared to other instruments, these scales capture both cognitive and affective components of social responsibility, aligning with SCT and TPB constructs. Appendix A lists all item changes and provides evidence of discriminant validity.

*Conceptual Model*

Figure 1 depicts the conceptual framework guiding this study. Cognition is hypothesized to affect innovation behavior both directly and indirectly through attitudes. Gender and grade level are included as potential moderators. This model reflects an integrative SCT–TPB approach adapted to a multi-ethnic Western Chinese context.

**Figure l**

*Conceptual Framework*




Recent cross-cultural studies also suggest that social innovation behaviors may vary depending on institutional and cultural contexts. Bufali et al. (2023) examined school-based mentoring interventions across Europe and found that cross-cultural factors shape the scalability of social innovation. Similarly, Duong (2025) explored social entrepreneurial intentions across different cultural settings and showed how institutional support can moderate the cognition–attitude–behavior pathway. Planells-Aleixandre et al. (2025) benchmarked universities' social innovation engagement in Europe and demonstrated how higher education institutions can systematically integrate innovation with civic responsibility.

## Methods and Materials

*Study Design*

This study employed a cross-sectional survey design to examine relationships among social responsibility cognition, attitudes, and social innovation behavior. Although longitudinal designs are preferable for establishing causality, a cross-sectional approach provides an efficient first test of the hypothesized mediation model across a large, diverse student sample. This design is consistent with prior studies that have tested SCT–TPB models in educational contexts (Ajzen, 1991; Bandura, 2001).

*Sampling and Participants*

Participants were 1,963 undergraduate students recruited from eight public universities in Ningxia, representing teacher training, engineering, medical, and comprehensive institutions. Stratified random sampling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by grade level ensured coverage of first- through fourth-year students. While this approach may introduce some institutional or disciplinary bias, the selected universities encompass the major categories of higher education in Ningxia, increasing the generalizability of findings within the region. Table 1 presents the demographic characteristics of the sample.

*Instruments*

*Social Responsibility, Cognition, and Attitudes.*

We adapted the scales developed by Davis et al. (2021) to measure social responsibility cognition (12 items) and attitudes (10 items). Items were translated into Chinese, culturally adjusted to reflect local norms, and pilot tested with 120 students before the main survey. Changes included rewording examples of civic participation to match common student activities in Ningxia (see Appendix A for a full list of item modifications).

*Social Innovation Behavior.*

Social innovation behavior was measured with eight items adapted from validated student engagement scales (Murray et al., 2010). Items emphasized students' initiative in problem-solving, collaboration, and the implementation of social projects.

*Response Format*

All items used a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). Higher scores indicate higher levels of each construct.

*Reliability and Validity*

Internal consistency was assessed using Cronbach's alpha (α), composite reliability (CR), and average variance extracted (AVE). All α values exceeded .80. Discriminant validity was examined using the Fornell–Larcker criterion and the heterotrait–monotrait ratio (HTMT); all HTMT values were below .85. A confirmatory factor analysis (CFA) supported the three-factor structure ($\chi^2/df < 3.0$, CFI = 0.95, TLI = 0.94, RMSEA = 0.045). Marker-variable tests were used to check for common method variance, replacing the outdated Harman single-factor test.

*Statistical Analysis*

Descriptive statistics, independent-samples t tests, and ANOVAs were performed to examine gender and grade differences. Effect sizes (Cohen's d for t tests, $\eta^2$ for ANOVAs) were reported. Bonferroni and false discovery rate (FDR) corrections were applied to control for multiple comparisons. Two-way ANOVAs were used to test the interaction effects of gender and grade.

Mediation was tested using Hayes' PROCESS macro (Model 4) in SPSS 26.0 with 5,000 bootstrap samples. Model 4 was chosen because it provides a direct and indirect effect estimate consistent with our hypothesized single-mediator framework. All continuous variables were mean-centered to reduce multicollinearity. Assumptions of normality, linearity, and homoscedasticity were verified using residual plots and the Kolmogorov–Smirnov test. A post hoc power analysis using G*Power 3.1 indicated over 90% power to detect small-to-moderate effects ($f^2$ = .02) with the present sample size.

## Findings and Results

*Descriptive Statistics and Correlations*

Table 1 displays the means, standard deviations, and intercorrelations of the three main constructs. Students reported moderately high levels of social responsibility cognition (M ≈ 4.1), attitudes (M ≈ 4.2), and innovation behavior (M ≈ 4.0) on a five-point scale. Scores above 4.0 are interpreted as moderately high relative to the theoretical midpoint (3.0) and comparable studies of Chinese undergraduates (Shek & Chai, 2020). Pearson correlations among the constructs were strong ($r$ = .70–.88, $p$ < .01). AVE and Fornell–Larcker tests confirmed discriminant validity, with each construct's AVE exceeding the squared correlations with other constructs.



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**Table 1**

*Means, Standard Deviations, Correlation Coefficients, and AVE² (N = 1,963)*

| Variable | M | SD | 1 | 2 | 3 | AVE² |
|---|---|---|---|---|---|---|
| **1. Social Responsibility Cognition** | 4.144 | .758 | 1 | .876*** | .755*** | .878 |
| **2. Social Responsibility Attitude** | 4.195 | .751 | .876*** | 1 | .776*** | .885 |
| **3. Social Innovation Behavior** | 4.009 | .784 | .755*** | .776*** | 1 | .832 |

*Note:* ***$p < .001$

*Gender Differences*

Independent-samples t tests (Table 2) showed that female students scored significantly higher than male students on cognition ($t$ = 2.44, $p$ = .015, $d$ = 0.15) and attitude ($t$ = 2.50, $p$ = .012, $d$ = 0.15), but not on innovation behavior ($t$ = 1.21, $p$ = .226, $d$ = 0.06). After Bonferroni and false discovery rate (FDR) corrections, significance remained for cognition and attitude but not for behavior. Although statistically significant, these effects are small, indicating limited practical differences.

**Table 2**

*Gender Difference Test Results*

| Variable | Male (n=912) M±SD | Female (n=1051) M±SD | *t*-value | *p*-value | Cohen's d (Effect Size) | Magnitude (Cohen's Criteria) |
|---|---|---|---|---|---|---|
| Social Responsibility Cognition | 4.029±0.784 | 4.143±0.722 | 2.441 | .015 | .153 | Small effect |
| Social Responsibility Attitude | 4.096±0.759 | 4.210±0.735 | 2.503 | .012 | .153 | Small effect |
| Social Innovation Behavior | 3.981±0.792 | 4.024±0.779 | 1.211 | .226 | .055 | Very small effect |

*Grade-Level Differences*

One-way ANOVAs revealed significant grade effects on cognition ($F$ = 4.513, $p$ = .004, $\eta^2$ = .007) and attitude ($F$ = 5.186, $p$ = .002, $\eta^2$ = .008), but not on innovation behavior ($F$ = 1.203, $p$ = .307, $\eta^2$ = .002). Post hoc Bonferroni and FDR comparisons indicated that first-year students and seniors scored higher on cognition and attitude than sophomores and juniors, forming a U-shaped pattern across grade levels. Effect sizes remained small ($\eta^2 < .01$). Details are provided in Table 3.

**Table 3**

*Grade Difference Test Results*

| Variable | Freshmen (n=517) M±SD | Sophomores (n=526) M±SD | Juniors (n=458) M±SD | Seniors (n=462) M±SD | *F*-value | *p*-value | $\eta^2$ (Effect Size) | Effect Size Level |
|---|---|---|---|---|---|---|---|---|
| Social Responsibility Cognition | 4.216±0.725 | 4.081±0.743 | 4.067±0.782 | 4.168±0.779 | 4.513 | .004 | 0.0068 | Small effect |
| Social Responsibility Attitude | 4.284±0.741 | 4.123±0.734 | 4.093±0.772 | 4.280±0.750 | 5.186 | .002 | 0.0078 | Small effect |
| Social Innovation Behavior | 4.035±0.790 | 3.987±0.778 | 3.984±0.774 | 4.040±0.794 | 1.203 | .307 | 0.0018 | Very small effect |

*Interaction of Gender and Grade*

Two-way ANOVAs examined whether grade effects differed by gender. No significant interaction effects were found for any construct (all $p$ > .10), suggesting similar grade patterns across genders. Details are provided in Table 4.

**Table 4**

*Model Fit Results*

| Model Type | $\chi^2$/df | RMSEA | CFI | TLI | SRMR | Fit Quality Judgment |
|---|---|---|---|---|---|---|
| Single-Factor Model | 6.28 | .121 | .652 | .618 | .112 | Very Poor ($\chi^2$/df>3, RMSEA>0.08, CFI/TLI<0.9) |
| Theoretical Model | 2.03 | .046 | .938 | .925 | .058 | Good ($\chi^2$/df<3, RMSEA<0.08, CFI/TLI>0.9) |

*Mediation Analysis*

PROCESS Model 4 tested the hypothesized mediation of attitude between cognition and innovation behavior. Cognition positively predicted attitude ($B$ = .865, $p$ < .001), and attitude positively predicted innovation behavior ($B$ = .598, $p$ < .001). The direct effect of cognition on behavior remained significant ($B$ = .383, $p$ < .001), indicating partial mediation. Bootstrapping (5,000 samples) produced an indirect effect of .517 (95% CI [.433, .599]), accounting for approximately 57% of the total effect. Model fit indices (CFI = 0.962, TLI = 0.954, RMSEA = 0.041) indicated good fit. Details are provided in Table 5.

**Table 5**

*Mediation Effect Analysis Results (Standardized Coefficients)*

| Path | B | SE | *t*-value | *p*-value |
|---|---|---|---|---|
| Total Effect: Cognition → Behavior | .900 | .033 | 27.258 | < .001 |
| Direct Path: Cognition → Attitude | .865 | .016 | 55.257 | < .001 |
| Direct Path: Attitude → Behavior | .598 | .037 | 16.083 | < .001 |
| Direct Effect: Cognition → Behavior | .383 | .034 | 11.230 | < .001 |

*Note: All path coefficients are standardized.*

All three constructs scored moderately high relative to the theoretical midpoint. Gender and grade differences exist mainly in cognition and attitude, but with small effect sizes. Attitude partially mediates the effect of cognition on innovation behavior, confirming the integrated SCT–TPB model. No significant interaction effects of gender and grade were found.

## Discussion and Conclusion

This study integrated Social Cognitive Theory (SCT) and the Theory of Planned Behavior (TPB) to examine how social responsibility cognition and attitudes influence social innovation behavior among university students in Ningxia. Results showed moderately high levels of all three constructs, small but significant gender and grade differences, and a robust partial mediation effect of attitudes. No significant interaction effects emerged between gender and grade.

By testing an integrated SCT–TPB model in a western Chinese, multi-ethnic context, this study extends the external validity of these theories beyond their traditional urban or Western settings. Findings demonstrate that cognition (SCT) and attitudes (TPB) jointly shape social innovation behavior, confirming the relevance of combining environmental and intention-based perspectives. This integrated approach challenges the notion that a single framework can fully explain students' pro-social innovation behaviors and highlights the value of cross-theory models in educational research.

Despite these contributions, several limitations must be acknowledged. First, the cross-sectional design limits causal inference; longitudinal or experimental research is needed to establish temporal precedence. Second, all data were self-reported, raising the possibility of common-method variance and social desirability bias. Although CFA and HTMT tests indicated good discriminant validity, these checks cannot fully eliminate method bias. Third, effect sizes for gender and grade were small, suggesting that subgroup differences may be more symbolic than practically meaningful. Finally, adapting Western-based scales to Ningxia's context may introduce subtle cultural biases despite extensive pilot testing.

Several factors not directly measured here may also influence social innovation behavior. Peer networks, institutional culture, and exposure to innovation-focused curricula could affect students' attitudes and behaviors, potentially confounding the observed mediation pathways. Future studies should adopt multi-level or mixed-method designs to capture these contextual dynamics.

The present data reveal a U-shaped pattern across grades in cognition and attitudes, but no significant interaction effect between gender and grade. This apparent discrepancy can be understood as follows: while grade effects exist, they operate similarly across genders, leading to non-significant interactions. This highlights the importance of reporting effect sizes and interaction tests rather than relying solely on mean differences.

These findings provide actionable insights for universities and policymakers. Programs designed to enhance social responsibility cognition should be paired with initiatives that strengthen attitudes and provide opportunities for hands-on innovation. Grade-specific interventions may help maintain consistent engagement over the undergraduate years, counteracting the U-shaped trend observed in this study.

Our findings align with Chinese education policy priorities, such as the Ministry of Education's Implementation Plan for Promoting Education Power during the 14th Five-Year Plan (Ministry of Education of the People's Republic of China, 2021) and the Outline for Constructing an Education Power (2024–2035) (Ministry of Education of the People's Republic of China, 2025). At the same time, they resonate with cross-cultural evidence on social innovation and civic engagement from Europe and Southeast Asia (Bufali et al., 2023; Duong, 2025; Planells-Aleixandre et al., 2025). This suggests that while contextual differences matter, core pathways between cognition, attitudes, and innovation behavior may be relatively robust across cultures.

Future research should replicate this integrated SCT–TPB model in other understudied regions, conduct longitudinal or quasi-experimental studies to test causality, and incorporate objective behavioral measures or peer reports to mitigate self-report bias. Cross-cultural comparisons would further clarify the generalizability of these findings and identify contextual moderators of the cognition–attitude–behavior pathway.

This study explored how social responsibility cognition and attitudes relate to social innovation behavior among university students in Ningxia using an integrated SCT–TPB framework. The findings revealed moderately high levels of all three constructs and confirmed that attitudes partially mediate the link between cognition and innovation behavior. Although gender and grade differences were statistically significant, their effect sizes were small, and no interactions between gender and grade emerged.

By situating SCT and TPB within Ningxia's unique educational and cultural environment, this study provides context-specific evidence for the cognition–attitude–behavior pathway. Rather than assuming universal applicability, it demonstrates how behavioral theories can be adapted to multi-ethnic and less developed regions, thereby enriching the global literature on student civic engagement and innovation. This work thus refines—not merely extends—existing models by revealing how contextual factors shape theoretical pathways.

For policymakers and university leaders, the results highlight the importance of integrating cognitive and attitudinal interventions with experiential learning opportunities. Programs that combine classroom learning with real-world problem-solving and community engagement may better translate students' sense of responsibility into innovative action. Grade-specific initiatives could help sustain engagement throughout the undergraduate years and reduce the mid-year drop in participation observed in this study.

Nonetheless, the cross-sectional, self-report design and the adaptation of Western scales limit the generalizability of the findings. Future research should replicate this model in other regions, employ longitudinal or quasi-experimental designs, and include behavioral or peer-report measures to triangulate outcomes. Comparative cross-cultural studies could further clarify which aspects of SCT and TPB are robust across contexts and which require local tailoring.

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## Declaration of Interest

The authors of this article declared no conflict of interest.

## Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants. Ethical considerations in this study included the fact that participation was entirely optional.

## Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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## Authors' Contributions

All authors equally contribute to this study.

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