

Examining the Impact of Spirituality, Environmental Values, and Pro-Environmental Social Identities on Female Student Well-Being and Pro-Environmental Behavior

Abstract

This study examines how environmental values and pro-environmental social identity influence pro-environmental behavior (PEB) among university students, testing the mediating role of well-being and the moderating role of spirituality. Integrating Value-Belief-Norm and Social Identity theories, a cross-sectional survey was administered to university students in China ($N=334$). Data were analyzed using PROCESS macro (Model 14). Results revealed that pro-environmental social identity and biospheric values positively predicted PEB, whereas egoistic values exhibited a negative association. Student well-being significantly mediated the positive effects of social identity and biospheric values on PEB, highlighting an affective-motivational pathway to ecological action. However, the moderating role of spirituality across these indirect paths was statistically non-significant, indicating that the well-being mechanism functions independently of individual spiritual orientation in this population. By incorporating subjective well-being into value-identity frameworks, this research refines traditional cognitive-normative models and demonstrates that personal flourishing is integral to student environmental engagement. These insights offer valuable implications for designing university-based sustainability initiatives that foster well-being alongside shared ecological identities.

Keywords

Spirituality, Environmental Values, Pro-Environmental Social Identity, Student Well-Being, Pro-environmental Behavior, Moderated Mediation

1. Introduction

Climate change represents one of the most critical challenges of the 21st century, demanding coordinated responses across political, institutional, community, and individual levels. While governmental policies are vital in mitigating environmental degradation, individual behaviors—particularly among younger generations—are increasingly acknowledged as essential for transitioning toward a sustainable future. University students, as emerging citizens and future leaders, play a pivotal role in combating climate change by adopting sustainable lifestyles and pro-environmental behaviors (PEBs). Students' pro-environmental choices—including waste reduction, energy conservation, and sustainable consumption—are driven by a distinct interplay of intrinsic value orientations, subjective norms, and perceived behavioral control within campus environments. However, empirical studies indicate that PEB engagement among students, especially undergraduates, remains moderate despite high levels of environmental awareness (Dewi 2018). This underscores the need to better understand motivational drivers and barriers within this demographic.

Pro-environmental social identity—the extent to which individuals internalize environmentalism as part of their self-concept and group belonging—is considered a key predictor of PEB. Previous research has consistently demonstrated students who identify with groups endorsing pro-environmental norms are more likely to adopt corresponding behaviors (Fritsche et al. 2018). Such social identification strengthens personal commitment and fosters collective engagement through shared values and responsibilities (Masson and Fritsche 2014).

To capture the multifaceted motives underlying ecological decisions, this study adopts the tripartite classification of environmental values—biospheric, altruistic, and egoistic (Steg, Perlaviciute, et al. 2014). Unlike unidimensional frameworks (such as the New Ecological Paradigm) or broad, non-domain-specific models (such as Schwartz's universal value inventory), this three-factor typology is selected because it explicitly isolates distinct

motivational targets—concern for ecosystems, other human beings, and personal self-interest. Disentangling these three orientations is critical because while biospheric and altruistic values typically foster PEBs, egoistic values can either inhibit green actions or promote them when personal incentives align, thereby offering superior explanatory precision for complex environmental tradeoffs (Pereira and Forster 2015).

The dual role of egoistic values can be explained through the lens of VBN and Goal-Framing theories (Lindenberg and Steg 2007). Under standard conditions, egoistic values diminish environmental motivation due to perceived personal costs (e.g., time, comfort, or expenditure). However, when PEBs are structured to deliver personal utility or ‘gain frames’—such as monetary savings, health enhancements, or positive impression management—individuals perceive direct self-relevant consequences. Under this alignment of self-interest and ecological utility, egoistic motivations actively propel sustainable behaviors rather than suppressing them (Kis et al. 2020). The VBN theory (Steg, Bolderdijk, et al. 2014) formalizes this relationship, positing that values shape beliefs about environmental consequences, which activate personal norms and behaviors (Arya and Kumar 2023).

The link between campus environmental conditions and students’ subjective well-being (SWB)—conceptualized as life satisfaction and positive emotional functioning—has gained increasing attention in environmental psychology. Research emphasizes that students’ SWB is strongly conditioned by cognitive evaluations of, and satisfaction with, their physical and social surroundings (Devlin 2025; Diener et al. 1999). Students who feel connected to and supported by their environment tend to report higher levels of well-being (WB), which may promote engagement in PEBs. Ramkissoon and Mavondo (2017) found that environmental participation strengthens place attachment and WB, suggesting a reinforcing feedback loop between personal and ecological flourishing.

Spirituality has increasingly been recognized as an important factor in environmental research: recent studies document positive associations between spiritual orientations and pro-environmental attitudes and behaviors across cultures (Billet and Baimel 2026; Saroglou et al. 2025). However, the psychological mechanisms through which spirituality operates—particularly its moderating role in the value–behavior link and its interplay with WB—remain insufficiently understood. It provides a moral and existential framework fostering interconnectedness with nature, promoting compassion, humility, and ecological responsibility. For instance, transformational spirituality—characterized by awe, gratitude, and faith—correlates with increased prosocial and environmental action among students (Sohail et al. 2025). It refers to a form of spirituality in which experiences of the sacred—such as awe, gratitude, and living from one’s faith—produce enduring changes in a person’s values, self-understanding, and moral orientation. Rather than being limited to private belief or ritual practice, it translates into an altered way of relating to others and to nature, and is therefore empirically linked to prosocial and pro-environmental outcomes. Spiritual values can complement secular environmentalism by instilling a sense of sacred duty to protect the planet (Büssing 2021).

Together, spirituality, environmental values, and pro-environmental social identities constitute a multidimensional framework for understanding student PEBs. Rather than functioning merely as an antecedent, student WB is conceptualized as an ultimate outcome of pro-environmental engagement, wherein sustainable campus behaviors and contact with nature enhance students’ psychological and subjective WB (Venhoeven et al. 2013). This study examines the interplay among these factors in shaping WB and PEBs. By elucidating these pathways, this study advances knowledge on the motivational drivers of ecological responsibility and provides empirical support for individual–environment congruence—defined here as the alignment between students’ internal value orientations (e.g., biospheric, altruistic, and egoistic values)

and the environmental opportunities and behavioral expectations present within their university setting (Steg, Bolderdijk, et al. 2014). Despite growing scholarship on PEB, several critical theoretical and empirical gaps remain. First, prior research has largely examined personal value orientations (e.g., biospheric vs. egoistic values) and psychological WB in isolation, leaving the mediating and moderating mechanisms linking these constructs insufficiently understood within higher education settings (Steg et al., 2014; Venhoeven et al., 2013). Second, while the influence of religious and spiritual dimensions on ecological responsibility is gaining empirical attention, experiential facets—such as transformational spirituality, awe, and gratitude—remain underrepresented in campus sustainability models (Saroglou et al., 2025; Sohail et al., 2025). Finally, existing campus interventions frequently treat environmental behaviors as purely regulatory or normative obligations, overlooking how individual–environment congruence can simultaneously foster sustainability and personal WB.

To address these gaps, the present study investigates the structural pathways connecting student value orientations, transformational spirituality, and WB to active pro-environmental engagement. In doing so, our findings can inform university interventions, targeted policies, and institutional curricula that simultaneously promote campus sustainability and student WB, thereby nurturing active, responsible, and ecologically conscious citizens.

2. Literature Review

This study integrates VBN theory and Social Identity Theory (SIT; Tajfel & Turner, 1979) to examine drivers of PEB. VBN emphasizes the role of values—biospheric, altruistic, and egoistic—in shaping environmental actions. SIT highlights how identifying with pro-environmental groups reinforces sustainable norms. The model proposes student WB as a mediator and positions spirituality as a moderator—acting as a catalytic boundary condition that

amplifies the translation of personal values into pro-environmental actions—thereby providing a nuanced, multi-level framework of the psychological mechanisms driving PEB.

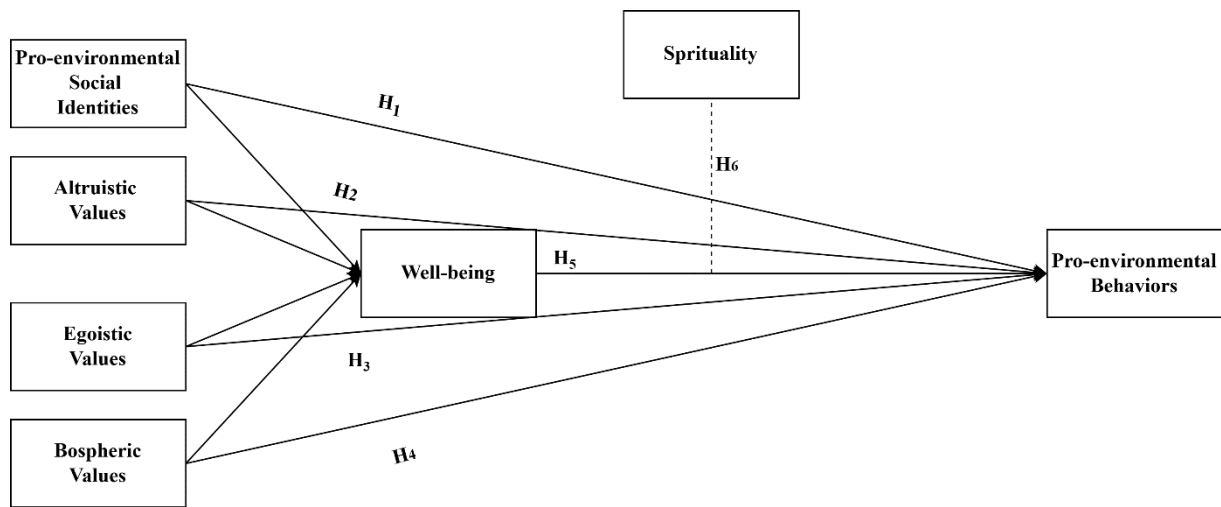


Figure 1. Conceptual framework of the study

2.1 Pro-Environmental Social Identities

Pro-environmental social identities refer to the extent to which individuals incorporate environmental group membership into their self-concept, aligning their beliefs and behaviors with group norms and goals. According to SIT, individuals derive self-worth and behavioral guidance from groups they identify with. When those groups espouse environmental values, members are more likely to adopt sustainable behaviors consistent with the group ethos (Fritzsche et al. 2018). Studies show that affiliation with environmentally supportive communities or institutions enhances both individual and collective pro-environmental actions. Recent evidence from Chinese university settings reinforces this claim: a study of 431 students at a Chinese university found that social and subjective norms—the perception that one’s campus community expects and models sustainable conduct—were the strongest predictors of PEB, explaining nearly 79% of its variance and underscoring the collectivist, socially embedded nature of student environmental engagement (Chen and Erfanian 2026). Similarly, Gan et al. (2025) demonstrated that subjective norms and green self-efficacy mediate the link between

institutional environmental support and students' sustainable actions, while Yang et al. (2024) confirmed that environmental values translate into behavior more readily when embedded within supportive belief and normative structures. Together, these findings suggest that campus contexts do not merely enable PEB; they actively shape the normative climate through which individual values become collective ecological action (Clayton and Opatow 2003).

2.2 Altruistic Values

Altruistic values, rooted in Schwartz's Theory of Basic Human Values (1992) and foundational to the Norm Activation Model (1977), emphasize concern for the welfare of others and motivate individuals to act in ways that benefit society, often at personal cost. These values influence environmental decision-making by prompting people to consider how their behaviors impact others and future generations (Gatersleben et al. 2014). Accumulating evidence indicates that altruistic values are positively associated with a range of sustainable practices, including eco-friendly consumption, energy conservation, and support for environmental policies (Obeng and Aguilar 2018). Among university students, altruism can be a particularly strong motivator, encouraging decisions that prioritize social and ecological WB over convenience (Mansoor and Paul 2022). Accordingly, this study posits that altruistic values act as a critical antecedent in the proposed model, providing the motivational foundation necessary to translate environmental concern into tangible PEBs, while simultaneously contributing to the psychological fulfillment associated with student WB.

2.3 Egoistic Values

Egoistic values—often categorized as self-enhancement values—reflect concern for personal benefit, including goals related to power, wealth, and achievement (Schley 2021). Individuals with strong egoistic orientations _ tend to evaluate behavioral choices based on personal cost-benefit outcomes (Birch et al. 2018) and are generally less inclined to engage in sustainable

behaviors (De Groot & Steg, 2010). The adoption of green practices frequently encounters resistance when individuals perceive high personal burdens, making behavioral uptake heavily reliant on extrinsic incentives such as economic benefits or social approval (Gatersleben et al. 2014). Moreover, egoistic values may weaken the influence of pro-environmental attitudes, functioning as a negative moderator in the values-behavior link (Tamar et al. 2021). Within the Value-Belief-Norm (VBN) theory and Social Value Orientation (SVO) frameworks, egoistic values are predominantly viewed as barriers to environmental responsibility because they prioritize self-interest over collective WB. However, scholars have noted critical exceptions: egoistic motivations can foster PEBs when green choices directly align with personal gains. For instance, self-interested individuals are more likely to adopt sustainable practices when they yield tangible financial savings (e.g., energy conservation to lower utility expenses), personal health benefits (e.g., consuming organic food), or enhanced social status through conspicuous green consumption (De Groot & Steg, 2010).

2.4 Biospheric Values

Biospheric values reflect intrinsic concern for the biosphere and are central to the VBN, which holds that values shape beliefs and norms that lead to behavioral intentions (Stern et al. 1999). These values foster a deep sense of ethical responsibility toward the planet, compelling individuals to evaluate their daily choices through ecological consequences rather than mere personal or social utility. Recent empirical investigations corroborate this dynamic; for instance, longitudinal and cross-cultural studies demonstrate that intrinsic biospheric and ecocentric value orientations directly enhance PEB and green consumption, consistently overriding self-serving or immediate economic motivations (Martin and Czellar 2017; Bouman et al. 2023). Furthermore, contemporary behavioral models show that prioritizing biospheric values over egoistic ones leads to greater willingness to accept sustainable policy interventions and personal trade-offs (Ruepert et al. 2016).

Individuals high in biospheric values are more likely to engage in pollution prevention, nature conservation, and sustainable consumption (Chua et al. 2023). Empirical research demonstrates that biospheric values are distinct from altruistic and egoistic orientations and are particularly potent predictors of PEBs (Shin et al. 2017).

2.5 Well-being

While student WB represents a multifaceted construct encompassing psychological, emotional, and social dimensions. Conceptualized as such, student life satisfaction is hypothesized to mediate the relationship between environmental values, environmental identity, and sustainable behavior (Diener et al. 1985), may mediate between environmental values, identity, and sustainable behavior. Those with higher WB and place attachment show greater engagement in PEBs (Ramkissoon and Mavondo 2017). VBN theory suggests environmental threats to WB can motivate action, and students deriving satisfaction from nature often report more PEBs (Lukman et al. 2024). However, this relationship is nuanced—low-effort behaviors correlate more strongly with WB than high-effort actions, which depend on identity and resources (Krumm 2024).

Theoretically, living in congruence with internalized biospheric values and an ecological identity satisfies basic psychological needs (such as autonomy and relatedness), thereby enhancing overall WB (Ryan and Deci 2000). In turn, enhanced psychological WB fosters positive affect and intrinsic motivation, providing the emotional and cognitive energy required to undertake effortful, prosocial actions (Venhoeven et al. 2013). Rather than being merely a passive outcome, WB serves as an active psychological mechanism: when values are translated into positive self-evaluations and life satisfaction, individuals are further empowered to sustain environmentally responsible behaviors. WB thus functions as a mediating psychological bridge linking core values to overt behavior.

2.6 Spirituality

Spirituality, defined as belief in the interconnectedness and unity of all life forms and the pursuit of harmony with nature (Garfield et al. 2014), may moderate the pathways through which values influence behavior. Unlike religion, which is often tied to specific doctrines and institutions, spirituality offers a universal framework that transcends cultural boundaries and emphasizes oneness with the natural world (Büssing et al. 2021). Spiritual beliefs related to awe, gratitude, and moral responsibility have been linked to empathy and altruism (Sohail et al. 2025) and can strengthen both environmental attitudes and behaviors (Afsar et al. 2016). Spirituality may also enhance WB by reinforcing meaning and purpose, particularly in ecological contexts. It is proposed that spirituality interacts with environmental values and norms by deepening emotional and moral engagement, thereby amplifying the positive influence of student WB on behavior.

In summary, the literature underscores that environmental values and ecological identity do not operate in a psychological vacuum; rather, their translation into action is closely tied to the cognitive and emotional functioning of the individual. When students align their values with their identity, they experience elevated WB, which in turn acts as a motivational catalyst that fosters and sustains pro-environmental conduct. Thus, WB serves as an explanatory mechanism linking fundamental value orientations to actionable ecological behaviors. Based on these theoretical foundations, we advance the following hypotheses:

- H1.** Pro-environmental social identities will positively influence general PEBs.
- H2.** Altruistic values will positively influence general PEBs.
- H3.** Egoistic values will negatively influence general PEBs.
- H4.** Biospheric values will positively influence general PEBs.
- H5.** Student WB will mediate the relationship between environmental values, pro-environmental social identities, and PEBs.
- H6.** Spirituality moderates the mediated relationship of pro-environmental social identity, egoistic, altruistic, and biospheric values with general PEBs through student WB.

3. Methods

3.1 Participants and Procedure

This cross-sectional survey investigated predictors of PEB among female university students in Guangdong Province, China. Guangdong was selected as the study site because it offers a theoretically distinctive context in which environmental values are shaped by two powerful and contrasting forces: it is China's most populous and economically productive province—characterized by rapid industrialization, dense urbanization, and correspondingly acute environmental pressures—while simultaneously serving as a national pioneer in environmental governance. Notably, Guangdong's Carbon Peak Implementation Plan (2022) commits the province to peaking carbon emissions before 2030, mandating that all new urban buildings meet green standards by 2025, and achieving a non-fossil energy share of at least 32% by 2025 (Government of Guangdong Province, 2022). In such a context—where pro-environmental norms are actively promoted through policy, education, and market mechanisms while unsustainable consumption remains highly accessible—understanding the individual-level psychological drivers of students' PEB becomes both theoretically rich and practically consequential. Findings from this setting can inform whether value- and identity-based interventions can channel heightened environmental awareness into behavioral engagement among young women, a demographic increasingly recognized as a key agent in household and community sustainability transitions.

A sample of 400 students was targeted to meet statistical power requirements for structural equation modeling. Of the 400 distributed questionnaires, a total of 344 were returned, yielding a response rate of 86.0% (Table 1). The questionnaire was refined through pilot testing with students to ensure clarity and cultural appropriateness. Both online and paper-based surveys were administered following ethical standards, including informed consent and confidentiality.

Table 1. Demographic Characteristics (N = 334).

Variable	Category	n (%)	Mean PEB Score (SD)	Test	p
Age Major	M = 19.35, SD = 1.45	—	—	—	—
	Social Sciences	120 (35.9%)	5.32 (0.98)	F(3, 330) = 3.89	.009**
	Natural Sciences	90 (26.9%)	5.01 (1.03)		
	Engineering/Technology	80 (23.9%)	4.91 (1.09)		
	Arts and Humanities	44 (13.2%)	4.93 (1.01)		
Income Level	Low (<3000 RMB)	102 (30.5%)	4.92 (1.06)	F(2, 331) = 4.12	.017*
	Medium (3000–6000 RMB)	152 (45.5%)	5.03 (1.01)		
	High (>6000 RMB)	80 (24.0%)	5.28 (1.00)		
Marital Status	Single	322 (96.4%)	5.09 (1.03)	F(1, 332) = 1.04	.309
	Married	12 (3.6%)	5.00 (1.11)		
Locality	Urban	192 (57.5%)	5.15 (1.00)	t(332) = 1.98	.049*
	Rural	142 (42.5%)	4.96 (1.09)		

3.2 Measures

PEB was assessed using a 9-item scale adapted from Kaiser et al. (1998). Item included actions such as “*I buy organic products,*”.” Responses were measured on a 7-point Likert scale (1 = never, 7 = very often). In this study, the scale showed high internal consistency ($\alpha = .88$). Previous studies using similar items among university students reported comparable reliability; for example, Kaiser et al. (1999) reported $\alpha = .87$, and Whitmarsh and O’Neill (2010) found their shortened versions suitable for youth and student populations with α ranging from .80 to .85.

Pro-environmental social identity was measured with a 5-item scale adapted from Fielding et al. (2008). A sample item was: “*Being environmentally friendly is an important part of who I am*”. The scale used a 7-point Likert format (1 = strongly disagree, 7 = strongly agree). In the

current sample, the scale demonstrated strong internal consistency ($\alpha = .84$). Fielding et al. (2008) originally validated this scale among Australian university students and reported a Cronbach's α of .85. More recently, Kim and Kim (2024) reported $\alpha = .83$ in a university student sample in South Korea.

Environmental values were measured using the Environmental Concern Inventory (Snelgar 2006), comprising 15 items—five each for altruistic, egoistic, and biospheric value orientations. Each item was rated on a 7-point Likert scale. Subscale reliabilities in this study were acceptable: altruistic ($\alpha = .81$), egoistic ($\alpha = .78$), and biospheric ($\alpha = .85$). These findings align with Snelgar's (2006) original validation among UK undergraduate students and Schultz et al.'s (2005) cross-cultural university student studies, where Cronbach's alphas ranged between .75 and .88.

WB was measured using the Satisfaction with Life Scale (SWLS) developed by Diener et al. (1985), which consists of 5 items rated on a 7-point Likert scale. A sample item is: "*In most ways my life is close to my ideal*". The internal consistency in the current sample was high ($\alpha = .86$). The SWLS has demonstrated strong reliability across university samples globally. For instance, in the original validation with University of Illinois students, Diener et al. (1985) reported $\alpha = .87$ and test–retest reliability of .82. In a recent psychometric study among Pakistani university students, the scale also showed excellent reliability ($\alpha = .90$) and factorial validity (Hafeez and Mahmood 2021).

Spirituality was measured using the 21-item Franciscan-inspired Spirituality Questionnaire (FraSpir) (Büssing 2017). This multidimensional tool assesses three domains: relationship with the transcendent, interpersonal peace and respect, and commitment to the disadvantaged and creation. Participants rated items on a 5-point Likert scale (0 = "does not apply at all" to 5 =

“applies very much”). The scale has shown strong reliability in prior research, with Cronbach’s alpha values between .81 and .97 (Büssing et al. 2021).

3.4 Data Analysis

Data were analyzed using IBM SPSS Statistics (Version 24.0) and IBM SPSS AMOS (Version 24.0) to perform Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), respectively, establishing construct validity and measurement model fit. Hypotheses were subsequently tested using the PROCESS macro for SPSS (Version 4.2; Hayes 2022) with 10,000 bootstrap resamples. Specifically, Model 4 was utilized to estimate the simple mediation effects, and Model 14 was applied to test the moderated mediation framework—evaluating whether the indirect effects of values and identity on pro-environmental behavior via WB were contingent upon levels of spirituality. All direct, indirect, and conditional indirect effects were evaluated using 95% bias-corrected and accelerated confidence intervals (BCa CIs).

4. Results

First, this study checked the structure and quality of our survey measures using exploratory factor analysis (EFA) and CFA. After confirming the measurement model, we tested the relationships between variables using the PROCESS macro in SPSS (Hayes and Preacher 2013), as suggested by Preacher et al. (2007). To test both mediation and moderated mediation effects, we used 10,000 bootstrap samples and 95% bias-corrected confidence intervals. The Sobel test was also used to check the significance of indirect paths.

4.1 Measurement model characteristics

To examine the underlying latent structure and dimensionality of the survey items, an Exploratory Factor Analysis (EFA) was conducted using Principal Axis Factoring (PAF) with Promax oblique rotation, as latent psychological constructs in environmental and behavioral research are theoretically expected to correlate (Fabrigar et al. 1999). Sampling adequacy was

substantiated by a Kaiser–Meyer–Olkin (KMO) index of 0.943, far surpassing the recommended threshold of 0.80, and Bartlett’s test of sphericity confirmed sufficient inter-item correlation ($\chi^2=12449.751$, $p<0.001$). Factor retention was guided by eigenvalues ($\lambda>1.0$) and Cattell’s scree plot inspection. Item reduction followed standard psychometric criteria: items exhibiting factor loadings below 0.50 on their target construct or significant cross-loadings (difference between primary and secondary loadings <0.20) were iteratively eliminated (Hair Jr et al. 2018). The final factor solution demonstrated sound construct clarity, adequate communalities, and satisfactory cumulative variance, providing a robust empirical baseline prior to Confirmatory Factor Analysis (CFA).

After the exploratory analysis, we used CFA to test the seven-factor model’s fit. The results showed a good fit with values such as $\chi^2/df = 3$, GFI = 0.912, CFI = 0.89, TLI = 0.931, NFI = 0.882, RMSEA = 0.072, and RMR = 0.055. We also checked whether the model was valid and reliable: the AVE for each factor was above 0.50, confirming that the items measured what they were supposed to (convergent validity). Additionally, as shown in Table 2, the square roots of AVEs were higher than the correlations between factors, demonstrating that each factor was distinct from the others, thus confirming discriminant validity. The reliability of the measures was good, with construct reliability (CR) scores ranging from 0.70 to 0.90.

Table 2. Measurement Model Properties.

No.	Factor	AVE	CR	$\sqrt{\text{AVEs}}$	1	2	3	4	5	6	7
1	PEB	.53	.85	.73	1						
2	PESI	.53	.77	.73	.25	1					
3	AV	.54	.70	.73	.30	.36	1				
4	EV	.57	.80	.75	.35	.32	.44	1			
5	BV	.58	.81	.76	.36	.28	.39	.43	1		
6	WB	.64	.90	.80	.32	.25	.33	.36	.42	1	
7	Spirituality	.52	.74	.72	.38	.27	.35	.38	.41	.36	1

Notes. Pro Environmental Behavior=PEB, Pro Environmental Social Identity = PESI, Altruistic value = AV, Egoistic value = EV, Biosphere value = BV, Well-being = WB, Spirituality = SP, Average variance extracted = AVE, Construct reliability = CR. Items off the diagonal are squared correlations between dimensions and are significant at $p<0.05$.

4.2 Common method variance and bias

Because all data were collected through a single-informant, cross-sectional, self-reported survey, common method variance (CMV) was a potential methodological concern that could artificially inflate observed relationships among values, identity, WB, spirituality, and pro-environmental behavior (Podsakoff et al., 2003, 2012). To evaluate the potential presence of common method bias, both procedural remedies and statistical controls were applied.

Statistically, a Common Latent Factor (CLF) approach was modeled in IBM SPSS AMOS following established guidelines (Eichhorn 2014). First, standardized factor loadings from the baseline measurement model were compared against the model including the CLF. The differences in standardized loadings across all indicators were well below the widely accepted threshold of 0.20, demonstrating that no single factor accounted for substantial shared variance. Second, using the AMOS plugin by Gaskin and Lim (2017), a chi-square difference test was performed comparing the unconstrained CLF model with a model where all CLF factor loadings were constrained to zero. The difference test was non-significant. Together, these diagnostics confirmed that common method variance did not pose a significant threat to the validity of the structural findings (Podsakoff et al. 2024).

4.3 Hypothesis testing

Hypotheses were tested by examining direct, indirect, and conditional indirect effects.. The results of direct, indirect and conditional indirect effects are presented in the following sections.

Test of direct and indirect effects. H₁–H₄ of the study state direct relationships. The results indicate that the relationship of pro-environmental social identity with PEB is found to be positive and significant ($\beta = 0.399$, $p < 0.001$). The results also indicate egoistic and altruistic values are positively associated with PEB (altruistic values: $\beta = 0.134$, $p < 0.05$); egoistic values

positively associated with PEV ($\beta = 0.278, p < 0.001$), while biospheric values are positively associated with PEB ($\beta = 0.54, p < 0.05$). these results support H₁, H₂, and H₄.

H₅ of this study represents indirect relationships involving WB as a mediator between pro-environmental social identity, environmental values, and PEB (Table 3). Estimates show that WB positively mediated the relationship between pro-environmental social identity and PEB ($\beta = 0.07, z = 2.70, p = 0.007$). The bootstrap approach confirmed the results as 95% confidence intervals of the effect did not contain 0 (LLCI: 0.32, ULCI: 0.47). H_{5a} is therefore supported. Results further revealed that WB also positively mediated the relationships of egoistic values ($\beta = 0.24, z = 4.65, p = 0.01 [0.11, 0.42]$) and biospheric values ($\beta = 0.19, z = .04, p = 0.00 [0.041, 0.086]$) with PEB. These results show that H_{5c} and H_{5d} are also supported.

Table 3. Mediating Results of Well-being.

Predictor	Indirect Effect (β)	SE	Sobel Z	P	95% BCa CI [LL, UL]
PESI	.07	.02	2.70	.007	[.18, .32]
AV	.01	.02	1.65	.830	[.02, .24]
EV	.24	.04	4.66	<.001	[.32, .48]
BV	.19	.04	3.38	<.001	[.21, .35]

Note. Pro Environmental Social Identity = PESI, Altruistic value = AV, Egoistic value = EV, Biosphere value = BV, Well-being = WB, Spirituality = SP, N = 334. Lower Limit = LL; Confidence Interval = CI; Upper Limit = UL.

4.4 Test of conditional indirect effects

Results are presented in Tables 4–7. Table 4 reveals that the indirect effect of pro-environmental social identity on PEB through student WB is significant across all levels of spirituality, although the moderation effect (X_{MV}) was not statistically significant ($p = .211$), indicating no meaningful variation across levels of the moderator. Thus, while mediation is supported, moderation is not, and H_{6a} is partially supported. Table 5 presents the conditional indirect effects for altruistic values. The indirect paths through WB were small and statistically non-significant at all levels of spirituality (e.g., $\beta = 0.014$, Boot SE = 0.021, CI $[-0.024, 0.058]$ at $-1SD$),

suggesting that altruistic values do not significantly predict PEB through WB, nor does spirituality moderate this relationship. Therefore, H_{6b} was not supported.

Table 6 reports the results for egoistic values. The mediated relationship through WB was significant and strong at all levels of spirituality, with bootstrapped indirect effects of $\beta = 0.275$ (95% CI [0.213, 0.361]) at low spirituality, $\beta = 0.273$ (CI [0.220, 0.354]) at the mean, and $\beta = 0.272$ (CI [0.206, 0.364]) at high spirituality. Although the moderation term was marginally significant ($p = .06$), the stable mediation effects across levels confirm a robust indirect relationship, thus supporting H_{6c}. Finally, Table 7 shows that biospheric values are significantly associated with PEB through WB, and this relationship is moderated by spirituality. The indirect effect increases from $\beta = 0.02$ (CI [0.01, 0.31]) at $-1SD$ to $\beta = 0.03$ (CI [0.01, 0.05]) at $+1SD$, indicating a stronger effect at higher levels of spirituality. These results confirm Hypothesis H_{6d}, demonstrating that spirituality strengthens the pathway from biospheric concern to PEB via enhanced WB.

Table 4. Conditional Indirect Effect of Pro-Environmental Social Identity on PEB via WB, Moderated by Spirituality.

Factor	Consequent					
	M (WB)			Y(PEB)		
	β	SE	p	β	SE	ρ
X (PESI)	0.51	.032	<.001	-.12	.042	<.04
M (WB)				.24	.037	<.001
V (SP)				.45	.045	<.001
X*M*V				.025	.028	.211
Constant	-3.34	0.132	<0.001	3.012	.215	<.001
	$R^2=.43$			$R^2=.42$		
	$F(1, 334) = 352.45, p<0.001$			$F(4, 334) = 107.37, p<0.001$		
Conditional indirect effect through student WB at “SP” = M±1SD						
SP level	Boot Indirect Effect	Boot SE	LL 95% CI	UL 95% CI		
-1SD (-1.052)	0.126	.026	.07	.20		
M (0.000)	0.158	.025	.011	.21		
+1SD (1.052)	0.167	.035	.124	.25		

Note. Pro Environmental behavior = PEB, Pro Environmental Social Identity = PESI, Well-being = WB, Spirituality = SP.

Table 5. Conditional Indirect Effect of Altruistic Values on PEB via Well-Being, Moderated by Spirituality.

Factor	Consequent					
	M (WB)			PEB		
	β	SE	P	β	SE	ρ
X (AV)	.12	.07	.08			
M (WB)				.21	0.05	<.001
V (SP)				0.07	0.06	.240
X*M*V				-0.03	0.04	.040
Constant	2.35	.18	<.001	3.92	0.21	<.001
R ² =.13			R ² =			
			.31			
$F(1, 334) = 468.67, p<0.001$			$F(4, 334) = 119.48, p<0.001$			
Conditional indirect effect through student WB at “SP” = M±1SD						
SP level	Boot	Boot	LL	UL		
	Indirect	SE	95%	95%		
	Effect		CI	CI		
-1SD	0.014	0.021	-0.024	0.058		
(-1.052)						
M (0.000)	0.025	0.018	-0.006	0.071		
+1SD (1.052)	0.020	0.019	-0.017	0.063		

Note. Pro Environmental behavior = PEB, Altruistic value = AV, Egoistic value = EV, Well-being = WB, Spirituality = SP.

Table 6. Conditional Indirect Effect of Egoistic Values on PEB via WB, Moderated by Spirituality.

Factor	Consequent					
	M (WB)			PEB		
	β	SE	p	β	SE	ρ
X (EV)	0.52	0.22	<0.001	−0.27	0.04	<0.001
M (WB)				0.46	0.03	<0.001
V (SP)				0.63	0.04	<0.001
X*M*V				−0.003	0.02	0.06
Constant	−3.264	0.123	<0.001	5.41	0.31	<0.001
R ² =60			R ² =54			
<i>F</i> (1, 334) = 631.54, <i>p</i> <0.001			<i>F</i> (4, 334) = 150.05, <i>p</i> <0.001			
Conditional indirect effect through student WB at “spirituality” = M±1SD						
SP level	Boot Indirect Effect	Boot SE	LL 95% CI	UL 95% CI		
−1SD (−1.052)	0.275	0.028	0.213	0.361		
M (0.000)	0.273	0.024	0.220	0.354		
+1SD (1.052)	0.272	0.031	0.206	0.364		

Note. Pro Environmental Social Identity = PESI, Egoistic value = EV, Well-being = WB, Spirituality = SP

Table 7. Conditional Indirect Effect of Biospheric Values on PEB via WB, Moderated by Spirituality.

Factor	Consequent	
	M (WB)	PEB

	β	SE	p	β	SE	ρ
X (BV)	0.08	.02	<0.001	0.047	0.017	<0.05
M (WB)				0.25	0.05	<0.001
V (SP)				0.47	0.04	<0.001
X*M*V				0.06	0.03	<0.05
Constant	-0.35	0.12	<0.05	4.13	0.08	<0.001
	$R^2=0.162$			$R^2=0.715$		
	$F(1, 334) = 12.22, p<0.001$			$F(4, 334) = 123.84, p<0.001$		
Conditional indirect effect through student WB at “spirituality” = M±1SD						
SP level	Boot Indirect Effect	Boot SE	LL 95% CI	UL 95% CI		
-1SD (-1.052)	0.02	0.01	0.01	0.31		
M (0.000)	0.02	0.01	0.01	0.04		
+1SD (1.052)	0.03	0.01	0.01	0.05		

Note. Pro Environmental Social Identity = PESI, Egoistic value = EV, Biosphere value = BV, Well-being = WB, Spirituality = SP.

5. Discussion

This study expands our understanding of PEB by showing that environmental values and social identities influence PEB both directly and indirectly through student WB, with spirituality further moderating some of these pathways. These findings are consistent with previous research and theoretical frameworks.

Consistent with VBN theory, biospheric values positively predicted PEB indirectly through student WB. This mediation suggests that prioritizing the intrinsic value of the natural environment (biospheric values) fosters a greater sense of personal WB. This enhanced WB, in turn, likely motivates individuals to engage in behaviors that align with their environmental values, such as choosing eco-friendly transportation, as previously demonstrated by Ives et al. (2017). This aligns with the VBN framework’s assertion that values influence beliefs and norms, which then shape behavior, with WB acting as a crucial affective pathway in this process.

Conversely, the negative indirect relationship observed between egoistic values and PEB via WB suggests that a focus on self-interest may detract from or be unrelated to WB derived from pro-environmental actions. When individuals primarily prioritize personal gain (egoistic

values), they may experience less psychological benefit from engaging in behaviors that primarily serve the collective or the environment, and thus be less motivated to perform them. This echoes findings by Onwezen et al. (2013), confirming that self-interest can reduce motivation for behaviors that benefit the collective but offer limited immediate personal gain, by not fostering the positive affective states that drive PEB.

The finding that altruistic values did not significantly predict PEB contrasts with some earlier studies (Binder and Blankenberg 2016) but aligns with De Groot and Steg's (2010) suggestion that the specific PEBs examined—like personal vehicle use—may not be perceived as socially altruistic actions. This highlights the importance of contextualizing value-behavior relationships and is consistent with the notion that temporary personal circumstances can alter the motivation for environmental behaviors.

Consistent with SIT (Tajfel and Turner 1979), the positive effect of pro-environmental social identity on PEB mediated by WB aligns with prior research (Maki et al. 2019) showing that strong identification with environmental groups enhances both emotional and behavioral commitment to sustainability. However, the lack of a moderating effect of spirituality on this pathway suggests the need for further exploration in this area.

Importantly, spirituality moderated the indirect relationships between environmental values, WB, and PEB in nuanced ways. The strengthening effect of spirituality on the biospheric values–PEB relationship supports findings by Gatersleben et al. (2014) and White and Billet (2024), which emphasize spirituality's role in deepening ecological concern. The partial moderation by spirituality for egoistic values suggests a complex interaction similar to what Prinzing (2023) described regarding spiritual beliefs and self-interest. The absence of moderation for altruistic values also aligns with Das et al.'s (2025) view that highly spiritual

individuals may perceive environmental action through a holistic, interconnected worldview that reduces the emphasis on social altruism.

Overall, these findings provide preliminary empirical support for the mediating role of WB in linking environmental values and identity to pro-environmental behavior among university students. Integrating VBN and Social Identity Theory (SIT) perspectives offers a valuable framework for understanding how internalized values and social identity correspond with sustainable actions during this key developmental stage (Ives et al., 2017). Although the hypothesized moderating role of spirituality was not statistically supported in the current sample, the observed associations suggest that campus-based sustainability initiatives may benefit from fostering student WB alongside shared environmental identity and value alignment..

6. Implications

By identifying subjective WB as a key mediating mechanism linking environmental identity and biospheric values to pro-environmental behavior, this study clarifies the affective pathways underlying student ecological action. This core finding generates important implications for both theoretical development and environmental education practice.. Theoretically, this study advances the integration of Value-Belief-Norm (VBN) theory and Social Identity Theory (SIT) by addressing two key theoretical assumptions regarding how values and social identities translate into behavior.

First, classical VBN theory primarily conceptualizes the progression from general values to pro-environmental action as a rational, cognitive-normative sequence mediated by awareness of consequences and personal moral obligation. Our findings refine this assumption by demonstrating that subjective WB operates as a parallel affective-motivational bridge: biospheric values and pro-environmental social identity foster ecological action partly because

living congruently with these orientations enhances personal flourishing. Conversely, egoistic values failed to promote sustainable action through this channel, highlighting that the psychological vitality derived from environmental engagement is value-specific rather than universal.

Second, while SIT emphasizes social identification and normative compliance as direct precursors of group-congruent action, our results suggest that the behavioral expression of pro-environmental social identity is reinforced through the internal psychological benefits (WB) experienced by group members. Finally, by testing spirituality as a boundary condition, this study refines existing assumptions regarding spiritual connectedness as an automatic booster of pro-environmental behavior: the non-significant moderation indicates that the affective benefits of WB on behavior operate independently of spiritual framing in this student population, pointing to the need for future models to treat spiritual orientation as a distinct, culturally bounded construct rather than an assumed universal catalyst. Practically, fostering sustainable behavior among youth can be achieved by strengthening their biospheric values, nurturing environmental identity, and enhancing WB through nature exposure and community engagement. Incorporating spiritual reflections on nature could also motivate those with less ecological values.

7. Limitations and Future Directions

This study has several limitations. First, WB was assessed solely with the Satisfaction with Life Scale, which captures cognitive life satisfaction but not its emotional or social dimensions. Second, the cross-sectional design does not permit causal inference; longitudinal or experimental designs are needed to confirm the proposed mediation and moderation. Third, while integrating VBN, SIT, and WB, alternative frameworks like Theory of Planned Behavior (TPB) or Self-Determination Theory (SDT) could offer further explanatory power. Finally, the

sample was limited to university students from a single Chinese province, restricting generalizability. Future studies should employ multidimensional WB measures, establish causality, test alternative models, and recruit more diverse populations across different regions and demographics.

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