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The Influence of Spiritual Behavior in Sustainable Performance: A Confirmatory Factor Analysis

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Abstract

This study addresses a significant gap in the academic literature by directly examining the relationship between spirituality and sustainable behaviors. While existing research has explored these topics individually, a review of databases like Web of Science and Scopus revealed a unique absence of studies that directly connect them. The primary purpose of this research is to bridge this gap and identify the influence that spirituality has on sustainable behavior, thus potentially reshaping our understanding of these two interconnected concepts. To achieve this, the study used the ASPIRES scale, a validated instrument for measuring spirituality and religious beliefs across various countries and faiths. For the sustainability component, we adapted and statistically validated an entrepreneurial intention instrument to create the 'Instrument of Intention in Sustainability' (IIS), designed to assess leaders' motivations for implementing corporate sustainability initiatives. The study's findings involved comparing two confirmatory factor analysis models and two structural models to analyze the relationship between spirituality and sustainability. The results show that both instruments have acceptable psychometric properties; however, the direct relationship between spirituality and sustainability was found to be weak. Despite this weak direct link, our research provides valuable practical implications. The findings can help managers identify other factors that more effectively motivate sustainability-related behaviors. This insight can be instrumental in enhancing human resource strategies within organizations focused on sustainability. Ultimately, this research provides a new framework for sustainability-focused organizations within the specific cultural contexts of Colombia and Latin America. Implementing this framework could prove beneficial for a range of companies, from local and regional to multinational, that operate in areas with similar cultural characteristics.

Keywords: sustainability; spirituality; factor analysis; structural equations; ASPIRES

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1. Introduction

Organizational sustainability is not merely a technical matter; it reflects the ways in which individuals construct meaning, purpose, and moral obligation toward others and toward nature. Although ethical considerations are central to sustainability, the direct relationship between spirituality and the intention to engage in sustainable behavior has been rarely examined empirically, particularly through robust psychometric frameworks. This gap is even more evident in Latin America, where spirituality often takes syncretic and community-based forms that may shape moral action in organizational contexts [1–5].

Previous research has associated workplace spirituality with organizational performance and managerial practices. However, less attention has been devoted to how spirituality influences sustainability-oriented behaviors. This omission is especially relevant in societies where spiritual traditions intertwine Catholic religiosity, Indigenous worldviews, and collective values—factors that may condition individual and collective approaches to sustainability. Addressing this gap requires empirical evidence that links specific spiritual dimensions with intentions to act sustainably.

The present study addresses this gap by examining sustainable behavior as the dependent variable, operationalized through the Sustainability Intention Instrument (SII). This instrument integrates four indicators: entrepreneurial orientation, personal relevance, attitudes toward sustainability, and sustainability leadership. Within this framework, leadership is not treated as an independent construct but rather as an internal dimension of sustainability intentions, capturing concrete actions, while the other indicators reflect beliefs and attitudes [6].

As explanatory variables, the study employs the Assessment of Spirituality and Religious Sentiments (ASPIRES), which evaluates four key dimensions of spirituality: religiosity, crisis, prayer, and universality [7,8]. The relationship between these dimensions and sustainability intentions is tested using confirmatory factor analysis (CFA) and structural equation modeling (SEM), consistent with the Theory of Planned Behavior, which posits that intentions mediate the relationship between values and observable actions [9,10].

The sample comprises undergraduate and graduate business administration students in Colombia, representing a transitional collective that embodies potential behaviors and anticipates future organizational practices in the region [11]. By focusing on this population, the study examines how future professionals conceive and implement sustainability in ways that may later impact organizations.

From a Southern epistemology perspective, Latin American spirituality—situated, communal, and hybrid—may differentially shape sustainability intentions. The purpose of this study, therefore, is not to universalize findings but to explain their contextual variation and to generate evidence that is culturally relevant for organizations operating in this developmental context [4,5].

Thus, the research is not limited to instrument validation or the computation of statistical correlations. More profoundly, it interrogates how spiritual dispositions shape sustainable intentions and how these, in turn, impact organizations. In this sense, the findings will enrich both theory, as applied to the Latin American context, and practice, by offering companies tools to align their sustainability programs with the cultural and spiritual values of their members. Furthermore, it provides academia with an opportunity to broaden the understanding of sustainability beyond economic or regulatory metrics.

In summary, the contribution of this research is twofold. Theoretically, it enriches the understanding of how spiritual dispositions influence sustainability intentions, expanding the scope of sustainability studies beyond economic and regulatory metrics. Practically, it provides organizations with evidence to align sustainability programs with the cultural and spiritual values of their members, thereby enhancing the effectiveness of sustainability initiatives in Colombia and potentially across Latin America.

2. Theoretical Approach

This section presents an approach to literature that encompasses the key concepts of sustainability and spirituality, along with the foundational instruments that support this research, including the primary concepts and sources utilized.

2.1. Sustainability

There is no single definition of sustainability from a business perspective; it can be defined by a company's interaction with future ecosystems, society, and environments [12]. Other authors and companies have been integrating social strategies and environmental aspects into their daily operations and practices [13–15], which suggests a tendency to include the environment as an element of sustainable organizational development.

In a complementary way, sustainable development, or eco-development, seeks to satisfy the needs of the present without compromising the ability of future generations to meet their own needs [16]; this concept arises from the transformations that, after the Industrial Revolution and world wars, took place in terms of development in the world. Eco-development led to a shift in organizational mentality, reorienting environmental problems as structural elements when considering them.

Due to the above, addressing environmental problems becomes a priority. Based on the Brundtland Commission [16], the concept of sustainability refers to the use of the planet's natural resources in a manner that does not compromise the resources of future generations. Maintaining dialogue between social change agendas, sustainability, and public policies is necessary to achieve a desirable and lasting social change [17].

Some authors, called ecological economists, have characterized the economy as an open subsystem related to and part of a broader and more complex system: the natural ecosystem, which addresses growth, efficiency, and sustainability as elements that society faces and simultaneously are inseparable mixtures of values and scientific aspects [18,19].

Sustainability has a political and historical context that transcends the environment and its conflict with development until it reaches the social interactions constituted by institutions, such as democracy, capitalism, and science and modern cultural values, including progress, consumption, human rights, and individual freedom [17]; this reflects contrasts and philosophical complementarities in the contemporary concept of sustainability.

2.2. Instrument of Intention in Sustainability

The Instrument of Entrepreneurial Intention has been adapted to assess sustainable behavior and implement corporate sustainability, known as the "Instrument of Intention in Sustainability" (IIS). This tool evaluates key parameters related to entrepreneurship, personal importance, attitudes toward sustainability, and leadership in sustainability. The attributes used to measure leaders' intentions to implement corporate sustainability are detailed in Table 1.

In predicting entrepreneurial behavior, intentions serve as the most reliable predictor [20]. Generally, the stronger the intention, the higher the likelihood of engaging in entrepreneurship [9]. Moreover, various factors such as values, needs, habits, and beliefs can influence intention, thereby regulating individual behavior [21,22].

To support the hypotheses proposed, we have adopted the Theory of Planned Behavior [20] as our theoretical framework. The author proposes that human behavior is the result of intention, which is mediated by attitudes, subjective norms, and perceived behavioral control, also known as self-efficacy. For this research, we consider that the dimensions of spirituality—transcendence, crisis, prayer, and religiosity—have a direct influence on three fundamental elements: attitude, subjective norm, and perceived behavioral control, also known as self-efficacy.

Attitudes are formed by an individual's beliefs and perceptions regarding the benefits of a specific action. These attitudes relate to individuals' expectations about the effects of their behavior on themselves [23]. In this sense, spiritual beliefs can shape positive personal values related to caring for the environment and collective well-being.

Table 1. Attributes evaluated for the intention to implement corporate sustainability.

Parameter	Attribute
Relationship with entrepreneurship	The following attributes are definitive for entrepreneurship: • Innovation • Technology • Sustainability • Cost-effectiveness
Personal relevance	You work to be known as a person who: • Contributes significantly to society • Cares about environmental issues • Is economically and financially successful
Attitude towards sustainability	Do you consider the issue of sustainability in today's world? • It is part of a trend that will eventually be superseded • Allows companies to gain competitiveness and improve performance • It is an attribute that must be implemented in all human activities
Leadership towards sustainability	In your day-to-day, your relationship with sustainability is evident because: • You save water and energy, as well as separate recyclable waste at home and work • When you buy products or food, you look for those that give fair treatment to producers/peasants • You choose the site you work for because you consider that it treats people with dignity and equality • You pay your taxes duly, aware that it is a benefit for all

Self-efficacy pertains to an individual's perception of their capabilities and the ease or difficulty associated with performing a specific action [20]. Spirituality can strengthen the perception of moral self-efficacy, increasing confidence to act sustainably. It impacts intention through goal-setting, fosters resilience, and ultimately strengthens intention [24].

Based on the theory of planned behavior by [9], a questionnaire was developed to assess attitudes, subjective norms, and self-efficacy using an 8-point Likert scale, with 8 representing the highest rating.

The purpose of this instrument is to evaluate people's attitudes and their influence on the organization, based on a framework for assessing entrepreneurial intention. This framework served as the foundation for creating the instrument used in this study. Among the four parameters of the adapted instrument, only the parameter labeled "leadership" pertains to concrete actions related to sustainability. The other three parameters focus on practical attitudes and beliefs regarding sustainability.

Additionally, to establish individual comparison frameworks between the instruments, we aimed to adapt an individual evaluation mechanism for entrepreneurial intention. We correlated this with individual evaluations from the ASPIRES instrument and abstracted these relationships to the organizational environment. The attributes evaluated to measure leaders' intention to implement corporate sustainability are presented in Table 1.

2.3. Spirituality

Spirituality requires an intercultural and interdisciplinary perspective that allows for collecting various definitions and recognizing that people with a spiritual motivation have a more holistic definition of success, and therefore, correlate it with the common well-being of society, nature, and future generations [25]. In this sense, the SPES European Forum has adopted this conception, proposing a definition that involves searching for a profound meaning of life that interconnects all living beings and God as the ultimate reality [25].

Other authors consider spirituality as a connection between ideas and emotions, which allows for an understanding of nature beyond what is physically evident or measurable, gathering the meaning and symbolism of nature and its interactions [26]. This perspective opens the possibility of complementarity between ecological and religious perspectives, incorporating elements of sustainability.

Most definitions of spirituality share common elements, including a reconnection with the intimate self, deep empathy for all living beings, a desire to be in contact with the source of life, and values that transcend selfish forces [27]. Multiple instruments have been developed to measure spirituality; some were compiled at the end of the 20th century in the Religiosity Measurement Manual [28]. Most of these instruments have not been applied to the population; therefore, we found measurement scales to assess the degree to which people can be religious in the Latin American context [29]. However, the instrument presented by this author is designed for the Latino population, with a substantial influence from North America.

The Assessment of Spirituality and Religious Sentiments (ASPIRES), described by Piedmont in the Oxford University Manual of Psychology and Spirituality [30], was designed to assess people of different religions and non-religious or agnostic people. It has been validated in different countries with different faiths [31–36]. The instrument was translated into Spanish in Latin America and statistically validated [8].

Within the ASPIRES framework, spirituality is understood as a motivational construct that expresses an individual's effort to create a broader sense of meaning in life, with the status of a relatively stable trait and evidence of independence from the FFM (the idea of a "sixth factor") [37,38]. This meaning-oriented motivation does not depend on adherence to specific doctrines or institutional affiliations; it operates as a teleological direction encompassing design and significance, guiding action [38].

Complementarily, the instrument conceptualizes religiosity as religious sentiments that capture the degree of involvement in rituals and practices, as well as the tensions or conflicts that may emerge in the religious experience; in other words, learned forms of belonging, practice, and evaluation of the sacred in concrete communities [31,39]. Analytically, this preserves the distinction between a motivation for meaning (spirituality) and its sociocultural configurations (religiosity) [38,39].

2.4. Dimensions and Subscales of ASPIRES

The long form of ASPIRES is a 35-item self-administered questionnaire assessing two major dimensions: Spiritual Transcendence (ST) and Religious Sentiments (RSs) [38,39].

2.4.1. Spiritual Transcendence (ST)

ST consists of three subscales:

- **Prayer Fulfillment (PF):** the ability to create a personal space from which one feels connected to a broader reality.
- **Universality (U):** belief in a broader meaning of life beyond the immediately known.
- **Connectedness (C):** a sense of belonging to a transcendent reality that spans groups and generations [37–39].

2.4.2. Religious Sentiments (RS)

RS comprises two domains:

- **Religious Involvement (RI):** active engagement in religious rituals/activities and the importance attributed to them.
- **Religious Crisis (RC):** conflicts with God or the religious community [31,39].

The Spanish adaptation followed international standards (ITC) and demonstrated adequate psychometric properties [8]. The short form (ASPIRES-SF) retains the three ST facets and employs a single religiosity scale for RS (for brevity and stability), with solid confirmatory adjustment and reported convergent validity in Spanish-speaking university populations [40].

From a situated Southern epistemology, distinguishing spirituality (motivation for meaning) from religiosity (practices and belongings) allows for the interpretation of distinct motivational trajectories underlying sustainable behavioral intentions in Latin American contexts.

In terms of organizational psychology, Spiritual Transcendence provides insight into the construction of purpose that guides prosocial decision-making, while Religious Sentiments address habits, bonds, and tensions that mediate the translation of purpose into collective practices. This dual reading strengthens the theoretical coherence of the model and avoids confusing belonging indicators with meaning dispositions when analyzing their association with organizational outcomes [37,38,40].

Studies using ASPIRES have been carried out in the United States through cross-sectional studies that validate, among others, the structure and meaning of age and gender on the scale, such as those by [41], its impact on health, particularly with emotional health, social functioning, and the perception of well-being [42], and its impact on the corporate universe, business models, and economic activities of daily life [36].

2.5. The Relationship Between Sustainability and Spirituality

This article aims to conceptually and operationally articulate the dimensions of spirituality in relation to epistemological frameworks from organizational psychology, leadership ethics, and behavioral theory. The literature reviewed shows a tendency to limit the study of spirituality to the personal or religious sphere, and that of sustainability to environmental or economic actions. However, authors such as Bouckaert and Zsolna [27] and Vogt and Weber [26] have advanced an integrative conception in which spirituality represents an ethical force that can translate into sustainable pro-environmental, social, and economic behaviors, an approach that this article takes. Nevertheless, most of the studies identified in the review lack empirical application in Latin American business contexts, especially with culturally validated instruments.

On the other hand, findings such as those of Preston and Shin [43] show divergent effects. While religiosity can reinforce conservation norms, it can also inhibit sustainable behaviors when mediated by dogmatic views. This tension raises relevant questions about the mechanisms of influence, which the present study seeks to elucidate.

Several recent studies have yielded inconsistent results regarding the relationship between spirituality and sustainability. For example, the studies by Rodriguez-Rad and Ramos-Hidalgo [44] highlight the mediation of moral identity in this relationship, which is not always measured in correlational studies; Muñoz-García and Villena-Martínez [45] found a positive, albeit weak, association between religious practices and sustainability in Spanish students; while the study by Preston and Shin [43] found that fundamentalist religiosity may correlate negatively with ecological attitudes.

These inconsistencies suggest that the effects of spirituality on sustainability are not unambiguous but rather depend on the cultural context, the type of spirituality, and the

way in which it is operationalized. Therefore, studies situated in the Latin American context, such as this one, are relevant for evaluating these contradictions.

Other research has shown a correlation between spiritual practices and sustainable behaviors, including ethical consumption and attitudes toward environmental responsibility [44]. Additional studies have linked spirituality in the workplace to employees' sustainable actions, environmental values, and the overall prosperity of their organizations [46]. Based on these findings, the following hypothesis has been formulated for this study.

Hypothesis 1. *Higher levels of spirituality, as measured by the ASPIRES dimensions, are positively associated with sustainable behavior intentions, as measured by the Sustainability Intention Instrument (SII), among business students in Colombia.*

While spiritual practices are personal, it is essential to acknowledge that individual behaviors have a significant impact on organizational behavior, particularly in the context of business performance. Therefore, establishing correlations, like those explored in this study, is crucial to understanding the degree and intensity with which individual actions influence organizational practices. For this study, religiosity is defined as the activities and rituals associated with the religious practices of individuals referenced in ASPIRES. In this regard, it is essential to describe the relationship between these rituals and the factors outlined in the Instrument of Intention in Sustainability, specifically through Hypotheses 2–5.

Hypothesis 2. *Religiosity is positively associated with a person's entrepreneurial intention.*

Hypothesis 3. *Religiosity is positively associated with the importance attributed to sustainability.*

Hypothesis 4. *Religiosity is positively associated with attitudes toward sustainability.*

Hypothesis 5. *Religiosity is positively associated with individual leadership for sustainability.*

These correlations between spirituality and connection with nature, the struggle for social good, care for future generations, finding solutions to ecological problems, struggles for social justice, and innovative behavior at work have also been studied in the literature [47–49]. The ASPIRES instrument's concept of crisis recognizes this variable as the relationship between its concept of God and the problems faced by this and the following generations. Hypotheses 6–9 of this study seek to identify the relationship between this concept of crisis and the behavioral variables toward sustainability described in the applied instrument.

Hypothesis 6. *Crises is positively associated with a person's entrepreneurial intention.*

Hypothesis 7. *Crises is positively associated with the importance attributed to sustainability.*

Hypothesis 8. *Crises is positively associated with attitudes toward sustainability.*

Hypothesis 9. *Crises is positively associated with individual leadership for sustainability.*

Some researchers have explored the connection between spirituality and various aspects of sustainability, including social, emotional, economic, and environmental dimensions. This influence appears to be present regardless of individuals' religious or spiritual beliefs [45,50,51]. ASPIRES gathers three scales related to the concept of spiritual

transcendence. Among these, prayer is seen as a means of connecting with a deeper reality. This connection may affect individuals' behaviors regarding sustainability, leading to the formulation of Hypotheses 10–13.

Hypothesis 10. *Prayer is positively associated with a person's entrepreneurial intention.*

Hypothesis 11. *Prayer is positively associated with the importance attributed to sustainability.*

Hypothesis 12. *Prayer is positively associated with attitudes toward sustainability.*

Hypothesis 13. *Prayer is positively associated with individual leadership for sustainability.*

On the other hand, studies such as those developed by [25,43,52] have identified the relationship between spirituality and management elements, including leadership, economics, and management models. The elements of spirituality related to life's purpose are assessed in ASPIRES through the universality scale; in this study, Hypotheses 14–17 seek to determine the influence of these elements on attitudes toward sustainability.

Hypothesis 14. *Universality is positively associated with a person's entrepreneurial intention.*

Hypothesis 15. *Universality is positively associated with the importance attributed to sustainability.*

Hypothesis 16. *Universality is positively associated with attitudes toward sustainability.*

Hypothesis 17. *Universality is positively associated with individual leadership for sustainability.*

3. Materials and Methods

Our study is a pioneering effort to explore spirituality-related sustainability in Latin America. While our methodology shares similarities with that of [43], who focus on a different theoretical framework, our unique emphasis on Latin America distinguishes us.

In this article, we sampled 219 participants, taking into account the population's characteristics. Due to the difficulty in accessing information, we did not conduct random sampling; instead, we used a convenience sampling method to select graduate and undergraduate students enrolled in business administration programs at Colombian universities. The researchers obtained permission from university directors to administer the instruments to their students. After cleaning and preprocessing the data, we secured 213 valid observations, with 52.11% of participants identifying as men and 47.89% as women. Among the participants, 20.66% were final-semester undergraduate students, while 79.34% were graduate students. Additionally, 35.68% of the participants were between 15 and 25 years old, 42.25% were between 26 and 35 years old, 16.90% were between 36 and 45 years old, and 5.16% were over 46 years old. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of Colegio de Estudios Superiores de Administración (protocol code: Acta No 002, date: September 1, 2020) for studies involving humans.

Data collection relied on valid questionnaires that had been translated into Spanish. Participants completed the instruments at different times and on different days during class hours. The principal investigator administered the questionnaires and was present in the classroom to address participant inquiries, thereby minimizing potential confounding variables that could lead to uncontrolled statistical variance [44].

Our research was conducted with the utmost consideration for ethics. Participants were thoroughly informed about the research goals, and their consent for data analysis

was obtained. The study was approved by the ethics committee of the authors' institution, ensuring participant anonymity throughout the data analysis process.

We have documented supplemental material to ensure data transparency and reproducibility of results, adhering to standards for reproducible research [53,54]. We employed the Instrument of Intention in Sustainability (IIS) and the ASPIRES as data collection techniques. The IIS comprises 14 items and typically takes between 3 and 7 min to complete (https://github.com/rodzarate/Sustainability-Spirituality/blob/main/Instrument%20in%20Intention%20in%20Sustainability%20-%20Spanish.xlsx) Accessed on 1 July 2022. The questions are organized into four conceptual dimensions: the first is 'Relation with Entrepreneurship' (Entrepreneur), the second is 'Personal Importance' (Personal), the third is 'Attitude toward Sustainability' (Attitude), and the fourth is 'Leader to Sustainability' (Leader). Responses are collected on a Likert scale from 1 to 8, where 1 represents the strongest disagreement and 8 represents the most vigorous agreement. The version used was evaluated in a pilot sample with adequate results for internal consistency ($\alpha = 0.82$ overall) and construct validity through confirmatory factor analysis.

The ASPIRES consists of 35 questions (https://github.com/rodzarate/Sustainability-Spirituality/blob/main/ASPIRES%20Spanish.xlsx), accessed on 1 July 2022, distributed across five dimensions: 'Religiosity,' 'In Crisis,' 'Prayer,' 'Universality,' and 'Connectivity,' the latter of which we consider irrelevant to organizational environments. Participants' responses were compiled into a standard dataset, which we used as computational input for statistical analyses. The Spanish version was validated by Simkin [8], showing good psychometric properties: $\alpha > 0.80$ in most subscales, adequate convergent validity, and replication of the factorial structure in the Latin American context.

We used the software Ωnyx [55] to specify and identify structural equation models on the spirituality–sustainability relationship. The syntaxes produced by Ωnyx were then exported and statistically tested in RStudio (Version 2023.06) with the help of the lavaan package. We used a Sustainability instrument and ASPIRES as data collection techniques.

This paper employs a combination of traditional confirmatory factor analyses, as originally proposed by Bollen [56] and conducted with the aid of the lavaan R package (Version 2023.06) [57], along with bivariate correlation analyses enabled by the R package `psych` [58]. It is important to consider that a conventional approach for psychometric validation typically involves conducting an exploratory factor analysis first, to assess whether the empirical structure aligns with the theoretical structure, followed by a confirmatory factor analysis as the final empirical test. This conventional method is relevant only when the psychometric structure of the questionnaires or tests is still being established. When the psychometric structure is pre-established, an initial exploratory factor analysis may not be necessary. Bollen states, "*in confirmatory factor analysis, a model is constructed in advance, and the number of latent variables is set by the analyst*" [56] (p. 228).

We identified structural equation models related to the sustainability-spirituality link using the program Ωnyx [55]. Subsequently, the syntax generated by Ωnyx was exported to RStudio for statistical testing. Additionally, we employed the R package (semTable) [59] to facilitate the presentation of results using reproducible LaTeX documentation [60]. Confirmatory factor analysis (CFA) was performed for each variable to validate the data obtained in Colombia, conducted prior to structural equation modeling (SEM), which confirmed the proposed hypothesis.

4. Results

The well-being of society and nature can be linked to social and environmental sustainability, particularly among individuals with spiritual motivation [61]. The interconnection between living beings and the idea of God, described by this same author, is similar to that

proposed by the Catholic Church, headed by Pope Francis, in the encyclical "Laudato Si", in which a relationship is established between the spirit of this church and environmental sustainability since the ecological challenge impacts all of creation [62]. Likewise, Vogt and Weber [26] refer to a high risk of ethical superficiality in sustainability unrelated to faith, particularly the belief in creation.

We begin the analysis by describing the univariate distributions of each conceptual dimension for the sustainability instrument (entrepreneurship, personal, attitude, and leadership) and ASPIRES (religiosity, crisis, prayer, and universality). We note that both tools follow the Bernoulli distribution. The observed distributions are discrete, and their parametric properties deviate from those of a Gaussian distribution. This deviation is evaluated through Spearman's correlation as shown in Figure 1.

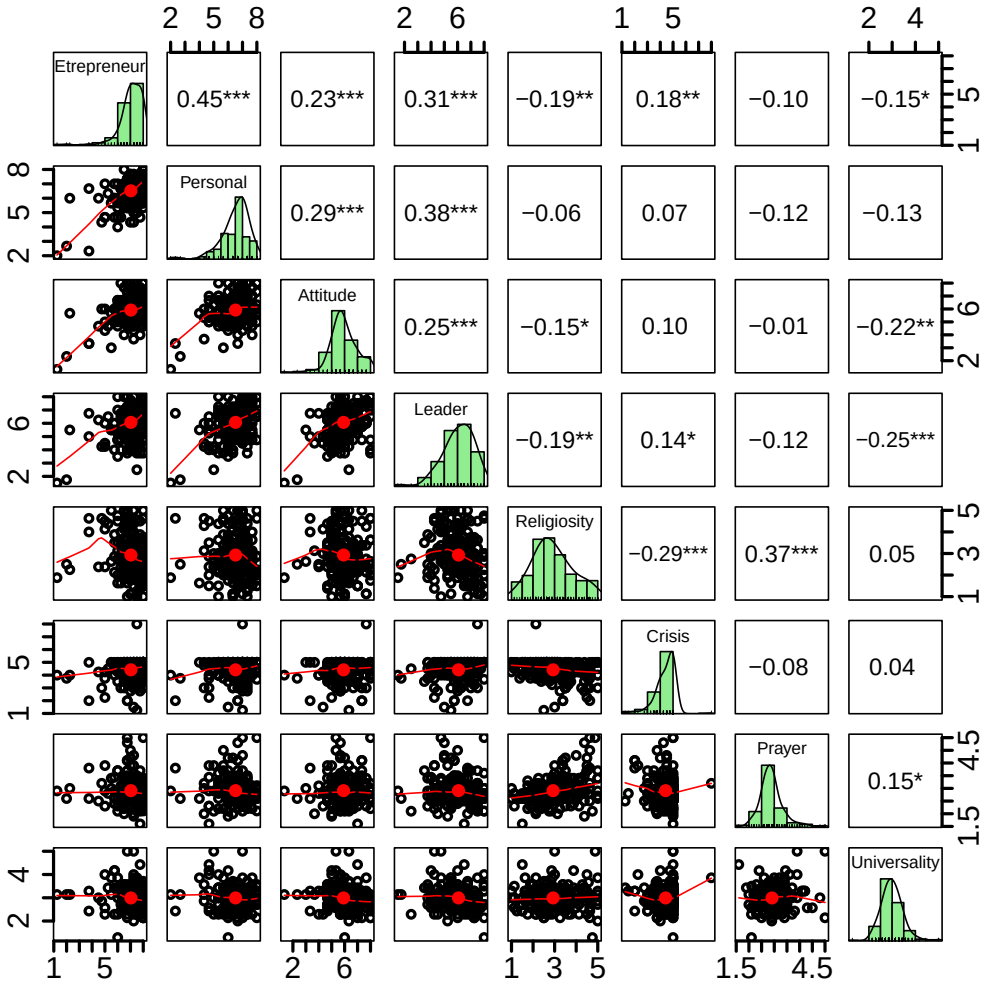


Figure 1. Spearman correlation matrix plot for the four subscales of sustainability and the four subscales of spirituality. *Note.* * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). *** Correlation is significant at the 0.001 level (2-tailed).

The analysis of the correlation matrix indicates that all correlations between the sustainability factors are statistically significant ($0.23 \geq \rho \leq 0.45$, p-value < 0.01). On the contrary, among the elements that make up the ASPIRES, although their correlations are statistically significant ($-0.29 \geq \rho \leq 0.37$, p-value < 0.01), not all the factors are correlated with each other. Crisis does not correlate with prayer or universality, nor does religiosity correlate with universality.

The correlations in Figure 1 reveal exciting findings. Correlations are found between certain sustainability factors and specific domains of spirituality. Correlation analysis is

conducted from a spiritual perspective, revealing how each field influences or impacts sustainability factors. The Religiosity domain exhibits a low negative correlation with the Entrepreneurship factor of sustainability, indicating that as the religiosity score decreases, participants consider sustainability an increasingly essential attribute of entrepreneurship. In other words, the more a person is religious, the more they consider sustainability a critical attribute of entrepreneurship, as indicated by the Likert scale punctuation for the ASPIRES, where the lowest score is given to the highest level of religiosity. Religiosity also exhibits a low negative correlation with the attitude factor of sustainability, indicating that the greater the religiosity, the more people view sustainability as an essential attribute. The last correlation observed in the religiosity domain is with the factor 'Leader of sustainability', which is low and negative, indicating that the greater the religiosity, the more evident the relationship between people and sustainability. The crisis domain of spirituality correlates poorly with the entrepreneur factor of sustainability. It suggests that individuals who feel closer to God consider sustainability an essential attribute in their entrepreneurial endeavors. The other correlation found for the crisis domain is with the leader factor, where a low positive correlation is observed; that is, individuals who feel the least distance from God tend to exhibit a more significant daily relationship with sustainability. This response addresses concerns regarding sustainability by offering innovative opportunities and proposing a shift from the brown economy to an environmentally sustainable green economy [63–65]. No correlation was found between crisis and the importance of sustainability for the individual, nor between the crisis domain and attitude toward sustainability, rejecting Hypotheses 7 and 8 proposed in the study.

Prayer does not evidence any influence on a person's relationship to entrepreneurship, the importance of sustainability to the person, attitude toward sustainability, or individual leadership for sustainability. The results obtained in this study reject the Hypotheses 10–13. The ASPIRES prayer domain shows no correlation with the sustainability factors, while the universality domain shows a correlation with three of them.

The first correlation of the universality domain is a low, negative correlation with the sustainability entrepreneurial factor, indicating that the greater the connectivity with people around us, the less consideration is given to sustainability as an attribute of entrepreneurship. This result rejects Hypothesis 14 proposed in the study. Universality also correlates negatively with the sustainability attitude factor, which means that the greater the connectivity, the greater the consideration of the importance of sustainability. The findings in the study contradict the proposal in Hypothesis 16 and, therefore, reject it. Moreover, universality presents a negative correlation with the sustainability leader factor, indicating that the greater the connectedness with people and the world, the less the daily manifestation of the relationship with sustainability, rejecting Hypothesis 17. In addition, Hypothesis 15 of the study is rejected because no relationship was found between universality and the importance of sustainability for the individual.

We now present the results of our confirmatory factor analyses, which aim to evaluate our central hypothesis: spirituality is a statistically significant predictor of sustainable behavior.

4.1. Confirmatory Factor Analyses

The ASPIRES instrument was translated into Spanish and statistically validated [8]. Their results confirmed the proposed theoretical structure. Table 2 shows the results regarding the goodness-of-fit indices, including $\chi^2(df)$, GFI (Goodness of Fit Index), NNFI (Non-Normed Fit Index), CFI (Comparative Fit Index), and RMSEA (Root Mean Square Error of Approximation), following previous recommendations [66,67]. The results demonstrate a good fit between the empirical data and the theoretical model [68,69]. The data

obtained in the validation were $\chi^2(df)$ = 7067.541, NNFI = 0.94, CFI = 0.95, IFI = 0.95, and RMSEA = 0.69.

Table 2 presents two statistical parameter estimates that we derived from the data gathered for this study. The spirituality self-report evaluation is the subject of the first confirmatory factor analysis (CFA). The Full Information Maximum Likelihood (FIML) estimation method was used to estimate the parameters of model 1. This method is more limited because it assumes that the observable indicators follow a multivariate, normally distributed continuous distribution. As a less constrained estimation technique, the Diagonally Weighted Least Squares approach (DWLS) was used to estimate the parameters in model 2 [70]. Both models were assessed using the `lavaan` R package [57].

Table 2. Statistical estimated parameters for the spirituality CFA.

	Model 1			**Model 2**		
	Estimate (Std. Err.)	**R Square**	***p***	**Estimate (Std. Err.)**	**R Square**	***p***
			Factor Loadings			
Spirituality						
Religiosity	0.87(0.21) ***	0.87	0.000	0.76(0.13) ***	0.65	0.000
Universality	0.02(0.04)	0.00	0.549	0.04(0.04)	0.01	0.318
Prayer	0.23(0.06) ***	0.20	0.000	0.26(0.05) ***	0.26	0.000
Crisis	−0.24(0.07) ***	0.10	0.001	−0.27(0.06) ***	0.12	0.000
			Fit Indices			
χ^2(df)	6.71(2) *		0.035	35.86(19) *		0.011
RMSEA	0.11			0.06		
SRMR	0.04			0.06		
CFI	0.92			0.94		
TLI	0.77			0.91		

Fixed parameter. Statistical Significance: * $p < 0.05$, *** $p < 0.001$.

In the initial CFA (Model 1), the results only partially met the recommended cutoff values for SEM fit indices [68,69]. While SRMR and CFI were within acceptable thresholds, RMSEA (0.11) and TLI did not meet the conventional standards, indicating potential limitations in the model specification. Since the ASPIRES items are ordinal Likert-type indicators, the use of Maximum Likelihood estimation in Model 1 may not have been optimal. Therefore, the model was re-estimated using the Diagonally Weighted Least Squares (DWLS) method, which is considered more appropriate for ordinal data and non-normal distributions [70,71].

Model 2 demonstrated acceptable fit across all indices (CFI, TLI, RMSEA, SRMR), supporting the proposed measurement structure for the ASPIRES scale in this sample. Nonetheless, the weaker fit in Model 1 suggests that the factor structure may be sensitive to estimation methods. Consequently, while Model 2 strengthens confidence in the measurement model, the results should be interpreted with some caution, and future studies are encouraged to test alternative models (e.g., bifactor or higher-order structures) to further assess the robustness of the ASPIRES factor structure in Latin American contexts.

Our second set of CFA results relates to sustainability. In Table 2, we proceed in the same way, and the results prove to be satisfactory for the two estimation models, considering, as mentioned before, the traditional suggestions of cutoff criteria for fit indices for structural equation models [68,69].

4.2. Sustainability-Spirituality Structural Analyses

We first validate that our two constructs have a psychometric structure, and then we turn our attention to their structural relationship, which is shown in Figure 2 and described in Table 3. All factor loadings remained statistically significant using both parametric estimating approaches, as shown by Tables 2 and 3, as predicted. However, the personality–leadership structural relationship was found to be weak when utilizing the Diagonally Weighted Least Squares method (DWLS) in Model 2 and moderate when using the FIML estimation method (Est = −0.22, standard error = 0.11, p-value < 0.01, R^2 = 0.05) and moderate, using Model 2, Diagonally Weighted Least Squares method (DWLS) (Est = −0.40, standard error = 0.09, p-value < 0.01, R^2 = 0.14) as shown in Table 3.

Table 3. Statistical estimated parameters for the sustainability CFA.

	Model 1			**Model 2**		
	Estimate (Std. Err.)	**R Square**	***p***	**Estimate (Std. Err.)**	**R Square**	***p***
			Factor Loadings			
Sustainability						
Personal	0.73(0.07) ***	0.57	0.000	0.73(0.07) ***	0.57	0.000
Attitude	0.58(0.08) ***	0.31	0.000	0.58(0.08) ***	0.31	0.000
Leader	0.67(0.08) ***	0.33	0.000	0.67(0.08) ***	0.33	0.000
Etrepreneur	0.75(0.07) ***	0.55	0.000	0.75(0.07) ***	0.55	0.000
			Fit Indices			
χ^2(df)	2.61(2)		0.271	2.61(2)		0.271
RMSEA	0.04			0.04		
SRMR	0.02			0.02		
CFI	1.00			1.00		
TLI	0.99			0.99		

Fixed parameter. Statistical Significance: *** $p < 0.001$.

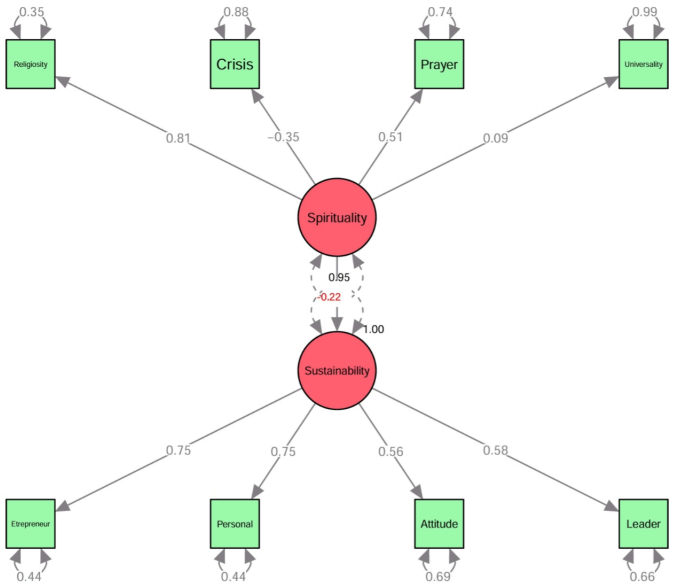


Figure 2. Structural spirituality–sustainability model.

The results (Table 4) demonstrate a good fit of the empirical data to the theoretical model [68,69]. Between Model 1 (FIML) and Model 2 (DWLS), the variation of the results is minimal and occurs in the RMSEA (root mean squared error of approximation), which goes from 0.06 in Model 1 to 0.05 in Model 2, a model that adequately fits the sample [72]. All fit indices are more than adequate to indicate that the model fits the data.

Table 4. Statistical estimated parameters for the spirituality–sustainability structural model.

	Model 1			Model 2		
	Estimate (Std. Err.)	**R Square**	***p***	**Estimate (Std. Err.)**	**R Square**	***p***
			Factor Loadings			
Sustainability						
Entrepreneur	0.73(0.07) ***	0.56	0.000	0.68(0.13) ***	0.52	0.000
Personal	0.70(0.07) ***	0.56	0.000	0.59(0.11) ***	0.44	0.000
Attitude	0.57(0.07) ***	0.31	0.000	0.52(0.11) ***	0.29	0.000
Leader	0.66(0.08) ***	0.34	0.000	0.74(0.13) ***	0.46	0.000
Spirituality						
Religiosity	0.76(0.13) ***	0.65	0.000	0.58(0.10) ***	0.38	0.000
Crisis	−0.27(0.06) ***	0.12	0.000	−0.33(0.07) ***	0.19	0.000
Prayer	0.26(0.05) ***	0.26	0.000	0.21(0.05) ***	0.18	0.000
Universality	0.04(0.04)	0.01	0.318	0.12(0.04) **	0.06	0.003
Sustainability	−0.22(0.11) *	0.05	0.039	−0.40(0.09) ***	0.14	0.000
			Fit Indices			
χ^2(df)	35.86(19) *		0.011	27.95(19)		0.084
RMSEA	0.06			0.05		
SRMR	0.06			0.06		
CFI	0.94			0.93		
TLI	0.91			0.90		

Fixed parameter. Statistical Significance: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The result confirms that certain dimensions of spirituality have a direct influence on people's sustainable behaviors, implying that the expression of spirituality in organizations facilitates the adoption of sustainable behaviors in the business environment.

Nonetheless, Figure 2 shows that the spirituality–sustainability structural relationship proves to be moderate [73–75] under the FIML estimation method (Est = −0.22, standard error = 0.11, *p*-value < 0.05), where the effect size that the spirituality has on sustainability behaviors is about five percent of explained variance (R^2 = 0.05) and with the DWLS estimation method (Est = −0.4, standard error = 0.09, *p*-value < 0.0001), where the effect size that the spirituality has on sustainability behaviors is about fourteen percent of the explained variance (R^2 = 0.14).

H_1: Higher levels of spirituality, as measured by the ASPIRES dimensions, are positively associated with sustainable behavior intentions, as measured by the Sustainability Intention Instrument (SII), among business students in Colombia.

The structural model reveals a moderate, positive relationship between spirituality and sustainable behavior, providing an opportunity for further research.

One of the unexpected findings of the study is the negative (albeit weak) correlation between religiosity and factors such as attitudes toward sustainability and sustainable entrepreneurship. This relationship is also confirmed in the SEM ($\beta = -0.24$; $p < 0.05$). This result is consistent with studies by [43,47], who have found that traditional religiosity can limit the adoption of sustainable behaviors when mediated by dogmatic views or views disconnected from contemporary environmental issues.

However, the results should not be interpreted as a universal effect; they must be analyzed within the framework of cultural contexts. Authors such as [25,27] emphasize that religiosity can promote an ethic of care if it is activated from a deep spirituality, rather than from superficial ritualism. The above indicates that the type of religiosity (fundamentalist vs. ethical, institutional vs. experiential) can mediate the meaning of its influence. It opens the door to future research on forms of belief or specific denominational frameworks.

5. Discussion

Spirituality is a motivational variable that correlates with many aspects of consumerism and economic constructs related to personal perceptions and behaviors [36]. The present study provides recent evidence regarding the modest and sometimes contradictory relationship between spirituality and sustainable behavior, contrasting with prior claims in the literature [44,46]. While the study is situated in the Colombian context, its findings may be relevant for other Latin American cultures with similar socio-spiritual dynamics.

The Oxford University Handbook of Psychology and Spirituality [30] by Piedmont describes the adjusted Assessment of Spirituality and Religious Sentiments (ASPIRES). When combined with the Sustainability Intention Instrument, this generates sixteen possible theoretical relationships between spirituality and sustainable behavior. Of these, only eight were statistically significant, underscoring the complexity of the field and offering fertile ground for generating new theoretical insights.

It was observed that the first dimension of spirituality, religiosity, was related to three sustainability factors: leadership behavior for sustainability, sustainable attitudes, and the relationship between entrepreneurship and sustainability. Prior studies have shown both positive and negative influences of religious perspectives and spirituality on environmental beliefs and pro-environmental behaviors [43,47]. This study confirms such ambivalence, revealing that religiosity is negatively associated with entrepreneurial thinking (Hypothesis 2). These findings suggest that religiosity may function as a normative input, requiring proximal mediators—such as group norms, values, or gender differences—to translate into pro-environmental intentions, especially in urban, secularized university populations.

The second dimension of spirituality also showed associations with leadership for sustainability and entrepreneurial sustainability. This aligns with studies that highlight the link between spirituality and economic or organizational outcomes [25,45,51,52]. Nevertheless, in the present study, religiosity was found to be negatively associated with sustainable leadership (Hypothesis 5), reflecting the mixed nature of the evidence.

The fourth dimension of spirituality—crisis—was related to three sustainability indicators: leadership for sustainability, sustainable attitudes, and entrepreneurship. Although the effects were weak, they indicate that crisis experiences can motivate sustainability-oriented behavior. This is consistent with recent arguments positioning spirituality as central to global leadership for sustainability [76]. Our finding in Hypothesis 9 suggests that crisis, as a spiritual factor, is positively associated with leadership intentions, which may be particularly relevant in organizations seeking to project environmental responsibility and brand legitimacy.

By contrast, the prayer dimension of spirituality showed no significant correlations with sustainable behaviors. In line with prior descriptions by [76], this suggests that prayer does not function as a direct predictor of pro-environmental behavior. This was evident in hypotheses 10 to 13, where no significant associations were found between prayer and sustainability factors. In this sense, religiosity (e.g., practices such as Bible reading) appears more influential than prayer itself in shaping sustainable behaviors.

5.1. Contradictory Evidence in the Literature

The discussion has been expanded to situate these results within broader theoretical debates. Spirituality does not operate uniformly. It can encourage pro-environmental behaviors when combined with attitudes and subjective norms (as proposed by the Theory of Planned Behavior), but it may also undermine the translation of environmental beliefs into policy support or diminish moral emotions, such as environmental guilt, depending on the doctrinal content.

Recent systematic reviews agree that religiosity has no single, uniform effect on pro-environmental behavior; findings vary depending on beliefs, contexts, and metrics [77]. From a situated epistemology (Global South) and complexity thinking, the field should be read as plural and contextual, with four types of evidence: positive/indirect pathways via TPB [78]; negative/moderating effects [79]; conflicting mechanistic evidence [80]; and macro-political evidence [81].

1. Planned Behavior pathways. Religiosity may support pro-environmental behavior indirectly, via subjective norms and perceived control. For example, Karimi et al.[78] found such links in rural Iranian facilitators. This suggests religiosity functions more as a normative mechanism than as a direct predictor.
2. Negative/moderating effects. Religiosity can weaken the predictive power of environmental beliefs on policy support, as shown by [79]. This aligns with our modest coefficients and suggests that religiosity may erode the belief-to-support pathways in secularized populations.
3. Conflicting mechanisms. Opposing religious pathways exist: stewardship beliefs enhance environmental guilt and policy support, while belief in a controlling God reduces them [80]. Since our study did not measure doctrinal content, mixed signals may explain modest net effects.
4. Macro-political evidence. At the national level, more religious societies tend to adopt less strict climate policies [81]. Even if individuals express pro-environmental intentions, weaker institutional frameworks can hinder their translation into action. This suggests the value of multilevel (individual–institution–country) analyses.

5.2. Synthesis

Overall, this analysis supports the interpretation of our findings: the modest direct relationships observed in the Colombian sample do not diminish the importance of the phenomenon. Instead, they underscore the need to identify mediators (norms, control, and guilt) and moderators (doctrinal content and secularization), and to compare across contexts (South–South and South–North) in order to assess variations in how spirituality and religiosity shape sustainability.

6. Conclusions

The empirical results of this study—revealing modest associations between spirituality and sustainability among business students—should be understood as effects mediated by cultural and institutional frameworks. For such diversity to be intelligible and actionable in Latin American organizations, it is necessary to articulate an ecology of knowledge and intercultural translation with the available psychometric evidence (e.g., ASPIRES validations and translations) so that local narratives of meaning (purpose, community, territory) can serve as the foundation for designing contextualized programs and incentive systems [40,82].

In terms of measurement, the model's conceptual distinction between Spiritual Transcendence (ST) and Religious Sentiments (RSs) supports managerial decisions by preventing simplistic or linear inferences about sustainable behavior. Methodologically, ASPIRES was designed to overcome theological biases and deficits of cross-cultural validity through a motivational approach and a universal measurement orientation. This underscores the importance of its Spanish adaptations and the recommendation of comparative applications in diverse cultural contexts [40].

Although this study establishes a positive correlation between spirituality and sustainable behavior, several factors require careful consideration. The use of convenience sampling means that the probability of inclusion for each participant is unknown, which

introduces potential bias and limits the generalizability of the findings. Additionally, the reliance on self-administered instruments implies that results may reflect subjective evaluations influenced by emotions, motivation, personal biases, and social desirability.

Although the analysis of age differences was not included among the study's hypotheses, Spearman correlations were conducted for each age group. The results indicate that, while some differences were observed, they were not statistically significant, and all values remained within the established ranges for interpretation [83–85]. These findings suggest that age does not substantially alter the relationships under study.

Taken together, the study demonstrates that spirituality is associated with sustainable behavior, thus providing empirical support for the proposed hypothesis. Specifically, at least three of the four spirituality dimensions evaluated through ASPIRES were associated with two of the sustainability-related variables. Confirmatory factor analysis further supports the validity of ASPIRES in the Colombian context, suggesting its utility for research with business students and potentially with organizational actors more broadly. However, replication in other Latin American and European contexts is essential to identify both commonalities and differences.

Finally, the CFA of the sustainability instrument also confirmed its validity in the Colombian context, providing evidence that both spirituality and sustainability constructs can be reliably assessed in this population.

6.1. Limitations

This research has several limitations. The observed associations between spirituality and sustainable behavior yielded small effect sizes ($R^2 = 0.05$–0.14), which should be interpreted with caution. As noted by [86], modest effect sizes are typical in psychological research and do not invalidate the relevance of the constructs. Rather, they highlight the need for systematic scrutiny, ideally through longitudinal and cross-cultural designs. Moreover, since this is a cross-sectional study, no causal inferences can be drawn about the relationships between spirituality and sustainability.

From a Southern epistemology perspective, this technical advancement must be complemented with a "craft of practices": the co-design of indicators, validation of local applications, and recognition of culturally acceptable limits to translate evidence into human resource and training decisions [82]. For management in the region, this implies avoiding the direct scaling of corporate policies without intercultural validation or co-designed process metrics involving students, teams, and communities [40,82].

From a complexity standpoint, any intervention aimed at strengthening sustainable behavior operates within the ecology of action: once initiated, actions enter feedback loops with the environment and may deviate or generate unforeseen consequences. For business schools and human resource departments in Latin America, this suggests the adoption of adaptive management (pilots, process evaluation, and iterations) and the cultivation of leadership sensitive to the ecology of action [87].

6.2. Recommendations and Future Research

Future research should address the limitations of self-reporting by incorporating behavioral metrics and mixed methodological approaches. These may include: (a) documenting observable behavior in academic or corporate contexts (e.g., measurable energy use, waste reduction, cafeteria choices, and involvement in sustainability initiatives); (b) experience sampling method (ESM) studies to capture daily micro-decisions; and (c) reflective diaries describing the "ecology of action", or how initial intentions evolve through environmental feedback [87]. Such approaches would allow for the modeling of mediators and moderators, such as subjective norms, perceived control, and environmental

guilt, which represent plausible pathways linking religiosity or spirituality to sustainable behavior [9,78,80].

Other promising alternatives include minimizing self-report biases through continuous time-based measures (EMA/AA) and digital records. The use of ecological momentary assessment (EMA) and ambulatory assessment (AA) via mobile applications enables researchers to capture micro-decisions "in context", thereby reducing retrospective biases [88]. In addition, multilevel modeling (observation ↔ individual ↔ period) can be used to structure individual profiles, drawing upon proximal indicators from the Theory of Planned Behavior [89]. This approach connects the philosophical dimension (ecology of action) with the psychometric dimension (detailed trajectories from intention to action).

Beyond methodology, replacing convenience sampling with random or stratified sampling—considering institutional type, region, socioeconomic status, biological sex, and religious beliefs, among others—along with conducting coordinated multi-site replications, will reduce bias and enhance generalizability [90]. Moreover, future work should employ multilevel analysis and consider internal meta-analyses to strengthen the robustness of findings [89].

Finally, to fully grasp the sociocultural and individual/collective constructs related to spirituality, it is essential to employ mixed methods that explain "how" and "why" meaning is translated into action [91]. Triangulating survey data with semi-structured interviews and reflective diaries would help elucidate cultural understandings of ecological responsibility and its tensions with religious and spiritual repertoires. Such an approach integrates both "hard" evidence and situated narratives, consistent with the ecology of knowledge [82].

6.3. Practical Implications

Within organizations, these findings are especially relevant for human resource departments. A deeper understanding of spirituality and sustainability enables the strengthening of organizational culture, fostering spiritual expressions that contribute to a shared vision of sustainability. Such an approach may help HR departments design programs and interventions that foster attitudes, practices, and beliefs aligned with sustainable behavior, ultimately enhancing the organization's capacity to integrate sustainability into its core values.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of Colegio de Estudios Superiores de Administración (protocol code: Acta No 002, date: 9 January 2020) for studies involving humans.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The original data presented in the study are openly available in the following public GitHub repository (accessed on 1 July 2022) https://github.com/rodzarate/Sustainability-Spirituality/blob/main/StatisticsExcel.xlsx. All data were analyzed using the R software (Version 2023.06) [92], and the supplemental report was compiled in RStudio with R Markdown [93].

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