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Contact to corresponding author: Pedro Severino-González, pseverino@ucm.cl

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Dolores Gallardo-Vázquez
University of Extremadura, Spain
orcid.org/0000-0003-4749-6034

Pedro Severino-González
Chatolic University del Maule, Chile
orcid.org/0000-0003-4784-9151

Efraín Tunjo-Buitrago
University Santo Tomás, Colombia
orcid.org/0000-0001-9354-9921

Giusseppe Sarmiento-Peralta
National University of San Marcos, Peru
orcid.org/0000-0003-0948-9271

José Romero-Argueta
University of El Salvador, El Salvador
orcid.org/0000-0003-4287-1835

Empathy and solidarity as a bridge between sustainable development goals and strategic management of higher education institutions

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Abstract

Research background: Globalization and environmental changes have driven greater complexity in the university governance system, leading to the modification of educational policies, institutional strategies and higher education models in countries on various continents. Specifically, within Social Responsibility (SR) in higher education institutions (HEIs), and under the commitment of university government, the challenges to achieve Sustainable Development Goals (SGDs) guide universities' strategic management. It involves various educational actors through strategies linked to the substantive functions of universities.
Purpose of the article: The objective of this study is to explain the influence of students' perceptions on the social responsibility of the HEIs through empathy and solidarity from the perspective of SDGs in Colombia. For this, we link these two variables with the strategies related to respect and dignity, freedom and citizenship, and environment using the reference point of the institutional challenges faced in university governance.
Methods: This study considers the development of a structural analysis for the confirmation of research hypotheses. The research subjects are students from universities in Colombia, who make up a non-probabilistic sample. A social responsibility perception scale composed of dimensions and variables. The variables are expressed in statements whose response form considers a Likert-type scale.
Findings & value added: The main contribution of the study lies in the value that students attach to empathy and solidarity, due to their connection with the values of SR and the principles of the SDGs. The results show that students' perceptions of social responsibility for HEIs from SDGs must drive the implementation of strategies based on empathy and solidarity. This would respond to the demands linked with human dignity, relations with the milieu, space generation, free expression of opinions, and fostering respect for others. Finally, it is important to implement comprehensive strategies based on SR values and the principles of the SDGs.

Introduction

Higher education institutions (HEIs) must recognize that society faces global challenges, tied to population growth, natural resource exploitation, global warming, and biodiversity loss (Naderi *et al*., 2022). This has created ecological and social challenges complicating relations between universities and communities at large (Goodyear, 2022), getting in the way of adequate external projection, as there should be in a presentation of University Social Responsibility (USR). Those institutions also have an important role to play in generating and diffusing knowledge making it possible to face social, environmental, and economic problems, including actions to achieve Sustainable Development Goals (SDGs) (Fanea-Ivanovici & Baber, 2022; Carrió

Llach & Llerena Bastida, 2023). These actions, which determine a given institutions' incorporation into 2030 Agenda, can lead to security for people and the planet (Vasconcelos *et al*., 2022; Gallardo-Vázquez & Juárez, 2022).

A key collective for HEIs is the student body. These future professionals must have the necessary tools to perform in diverse scenarios, which are increasingly changing, demanding, and competitive (Angheluță *et al*., 2023). HEIs consider SDGs as a framework to implement strategies to raise consciousness and environmental and social sensitivity. However, it is not common to develop a diagnosis of university students' perceptions of SR values and their relationship with the postulates of the SDGs and university governance. In this scenario, studies such as these are necessary, as they provide information that can be used to define guidelines that contribute to the training of future socially responsible professionals, who can contribute to mitigating the harmful effects inflicted on the environment and conserving natural resources through socially responsible strategies (Hope, 2020; Coelho & Menezes, 2021).

Furthermore, members of the university government are responsible for the creation and management of the strategic guidelines of the HEI, with implications at all levels and strategic units. University governance actions are manifested in the social responsibilities, which HEIs have with society, and, in the same sense, in the consequences of sustainable actions. Given these actions' importance, they can incentivize the development of student behaviors based on empathy and solidarity (Gallardo-Vázquez *et al*., 2020; Merma-Molina *et al*., 2021). These values, in turn, will determine their compassion, co-responsibility, respect for diversity, comprehension, and social inclusion (Giangrande *et al*., 2019; García-Rico *et al*., 2021).

HEIs apply diverse strategies to generate values emerging from practices linked with sustainability and SR. These actions are tools linked to HEIs' substantive functions. This has led to various activities characterized by SDGs, including social innovation, service learning, and community learning (Arocena & Sutz, 2021). They also respond to existing needs from community interest groups, aiming to satisfy them all, as stated in stakeholder theory. These needs have been studied through certain dimensions, such as education, extension, management, and research.

One core task for HEIs is training competent, socially responsibly professionals (Severino-González *et al*., 2022), making it essential to develop social sensitization and sustainable consciousness (Coelho & Menezes, 2021; Nardo *et al*., 2021). All this characterizes the strategies used by profes-

sionals in multiple decision processes (Rampasso *et al*., 2020). These situations have motivated the development of research that has installed various challenges, highlighting the gap that exists between theory and practice that arise from the from the SDGs, which motivate new studies due to the tensions that exist in the commitment of HEIs to each of their social responsibilities (Cavalcanti-Bandos *et al*., 2021; Suárez-Perales *et al*., 2021).

Empathy and solidarity are, therefore, the grounds for socially responsible behavior, as well as a challenge for achieving SDGs. This challenge could be approached via promoting values such as human dignity, respect for diversity, social inclusion, and compassion (Merma-Molina *et al*., 2021; García-Rico *et al*., 2021). These points form the pillars for facing poverty, precariousness, inequality, and social injustices (Sanz *et al*., 2017), aiming towards seeking the growth and development of a more fair, ethical and transparent society (Kibona & Woldegiorgis, 2023).

Empathy and solidarity are values which give proof of the weak contributions made by various organizations in the face of needs that seek to elevate human dignity (Sewpaul, 2022). This was considered by Justen *et al*. (2021) revealing the importance of the formative process in the value which people place on management and decision-making processes. Tan (2019) approaches the bond between empathy and solidarity on the one hand, and the actions seeking to mitigate the damage arising from social environments and environmental contexts, going deeper into the bond between actions of solidarity according to environmental particularities and contextual characteristics wherein aid and assistance are given (Schech, 2022). Also, according to Stavrou *et al*. (2022) empathy and solidarity are tied to freedom and citizenship through preserving human rights, which contribute to the developing of strategies that activate the desire to help in the face of needs and social inequalities, leading to caring for those around you, respect for authority, and social kindness (Ünal & Kaygın, 2020; Zembylas, 2022; Renger & Passini, 2024).

In relation to the above, the studies address empathy and solidarity without considering in depth the link that social responsibility values have in terms of the perception of university students regarding the strategies of HEIs.That is why the research question of this study is: What is the influence of university students' perception of SR through empathy and solidarity from SDGs? In addition, the objective of this study is to explain the influence of university students' perception of SR through empathy and solidarity from the perspective of SDGs in Colombia. This is why the value of

this research is the incursion and focus of SR through the values that constitute it, in addition to deepening empathy and solidarity due to the link it has with overcoming the challenges of the SDGs, where the principles of university governance are found in a transversal manner.

The study of SR from the students' perspective has considered various theoretical and contextual aspects (Gallardo-Vázquez *et al*., 2020), which has demonstrated its value based on certain perceptions and attitudes according to different conceptions and definitions (Palomino *et al*., 2022), which has allowed the partial understanding of the phenomenon under study that does not universally include students from different latitudes of the planet (Ramos-Monge *et al*., 2019). Therefore, this research addresses the perceptions of Colombian students as a cosmopolitan population experiencing various social and educational transformations, which could allow its replicability and comparison with various Latin American countries, allowing the discovery of gaps and the development of significant institutional learning.

Therefore, empathy and solidarity are addressed through strategies that are linked to respect and dignity, environment and freedom, and citizenship. The study is done with a structural equation model, via defining causal relations which we will try to confirm. In relation to the aforementioned, the research subjects are students from Colombian universities. In this sense, this research collaborates with the design and contruction of policies and strategies that include the principles an values of the SDGs and SR, which contribute to the training of competent and socially responsible citizens and professionals.

This document is organized as follows: in the first section, we present the problem of the research proposal; in the second section, we develop the theoretical framework and study hypotheses; in the third section, we describe the methodological decisions; the fourth section describes the main findings; the fifth section is a discussion of the results; and finally, the sixth section has the conclusions indicating the implications, challenges, and limitations of the investigation.

Literature review

Theoretical framework and hypothesis development

The university management milieu is increasingly complex, changing, and competitive (Angheluță *et al*., 2023), being necessary constant adaptations to new circumstances. The particular complexities of the current situation, environmental changes, and globalization all generate new challenges for HEIs, leading to tensions in university governance (Xue & Zhu, 2021; Belcher *et al*., 2021). The aforementioned has been studied from the theory of interest groups, complexity, sustainable development, and agency problems, among others; however, this research focuses on sustainable development and social responsibility. Given this situation, it is key that university institutions constantly reinvent themselves, adapting structures according to new contexts in search of management that focuses on providing responses according to the needs and demands of the university community (Groulx *et al*., 2021).

It is important to highlight that university governance strategies considered in SDGs can influence educational policies and organizational practices related to values such as empathy and solidarity (Belcher *et al*., 2021; García-Rico *et al*., 2021). This could contribute to the design of timely responses to the consultation of the interest groups that integrate the educational communities. These can include strategies focused on human freedoms and citizen participation, which can be tied with education for peace, education in virtues, quality education, university volunteering, health and social wellbeing (Chaleta *et al*., 2021; Sen *et al*., 2022).

Empathy and Solidarity as a university governance strategy to articulate actions based on respect and dignity in HEIs

Reports presented by HEIs publish the degree or level of implementation of values tied with solidarity, empathy, and sustainable development (Sandoval *et al*., 2020). Given the interest of this focus and in order to take advantage of the potential for action derived from HEIs, in recent decades it has been more relevant to spread reports including strategies that contribute to SDGs, from which we can see values emerging such as dignity, respect and empathy, positioning USR within various HEIs functions

(Nardo *et al*., 2021) and showing the clear orientation of governance towards empathy and solidarity.

Considering the important training and education role played by HEIs, we can affirm that they are leading organizations for transformations that improve the quality of life for people (Ashour, 2024; Babu, 2024) while transmitting values to society, especially through university students. This recognition must be integrated by teachers giving them a fundamental role in each decision-making process, which constitutes learning and teaching spaces, and the knowledge transmission role that they fulfill for their students. They also stand out for the role that they play in the natural connection with society and the working world (Kvilhaugsvik, 2021).

The aforementioned challenges can be faced through management which incorporates certain indicators, job descriptions, functions, and responsibilities from all university actors (Heaton *et al*., 2023), in order to evaluate and follow up on the implemented actions. Therefore, HEIs must consider the impacts and transcendence of each action they carry out (Bingab *et al*., 2018). In this context, it is necessary to highlight the role of respect that different members show towards the institution, as well as the work of ensuring process quality, which will be the consequence of this respect and demonstration of the dignity of the university institution. These elements all influence the efforts that university governance must develop to install USR and SDGs from values such as respect and dignity via empathic actions of solidarity (Merma-Molina *et al*., 2021; Severino-González *et al*., 2022). As a function of all this, the respective results achieved are a key aspect of fulfilling the mission of HEIs, contributing to fulfilling their ethical commitment to society (Schmal & Cabrales, 2018).

In line with our argument, we formulate the following research hypothesis:

Hypothesis 1 (H1): *The empathy and solidarity perceived by HEIs students, as university governance strategies, directly and positively influence the values of respect and dignity.*

Empathy and solidarity as an university governance strategy to articulate actions based on freedom and citizenship in HEIs

University governance strategies should incentivize the manifestation of university policies that must be led by the members of the highest colle-

giate bodies, who are the managers of institutional policies and co-responsible for their transcendence, simultaneously providing principles and values linked with human freedoms and citizen participation, generating value for each interest group within educational communities (Severino-González *et al*., 2019; Martínez-Virto & Pérez-Eransus, 2021).

The management and implementation of projects based on SDGs at the national and local levels could strengthen skills for self-awareness, collaboration, and critical thinking, incentivizing citizen participation and defense of social liberties (Aramburuzabala & Cerrillo, 2023). These initiatives must flow naturally, as a consequence of the commitment educational institutions should have with each interest group, which can be achieved via practices characterized by empathy and solidarity (Severino-González *et al*., 2019), providing benefits to universities and creating value for all intervening educational parties, as a consequence of the natural incorporation of transcendental, holistic, and conventional values and experiences (Gallardo-Vázquez *et al*., 2020; El-Kassar *et al*., 2023).

Incorporating values such as freedom and citizen participation through projects and programs led by HEIs, directly and indirectly, contributes to constant social transformations and human dignity. These transformations are upheld by the values of empathy and solidarity (García-Rico *et al*., 2021; Lochner, 2021), giving evidence about the importance of SR and its corresponding ties with sustainability (Makrakis & Kostoulas-Makrakis, 2021). This could contribute to the design of strategies and the management of plans for the generation of high social awareness, as well as suppressing social inequalities (Shymko & Frémeaux, 2022), with the formation of values linked with democracy and citizenship remaining elusive (Palomino *et al*., 2022).

Seeking cases for developing values creates a space that drives the implementation of strategies contributing to SDGs, contributing to satisfying needs from all educational estates, from those performing strategic management efforts to those that carry out operational actions. This can be achieved via educational innovations covering teaching, research, and even university extension (Arocena & Sutz, 2021). This action should also motivate curricular design or redesign, to include various aspects that can be tied with the community via strategies related to citizenship and SR (Goodyear, 2022).

According to the previous argument, we formulate the following research hypothesis:

Hypothesis 2 (H2): *Empathy and solidarity perceived by HEIs students, as university governance strategies, directly and positively influence the values of freedom and citizenship.*

Empathy and solidarity as a university governance strategy to articulate actions based on the environment in HEIs

Studying sustainability and SR in recent decades has seen an increase due to its implications for human quality of life, especially from the focus on environmental consciousness, sustainable consumption, and social action (Rampasso *et al*., 2020). Studying university students' behavior is thus essential, since some of them will become the professionals who must face new challenges, arising from social demands. They will have to respond to underlying challenges in their environment (Severino-González *et al*., 2022; Goodyear, 2022). This should contribute to the design and management of strategies that contribute to training in SR and SDG principles (Tomasella *et al.*, 2024). This situation will motivate the spread of values defending empathy and solidarity, as articulating mechanisms for freedoms, citizen praxis, healthy environments, and respect for nature and human dignity (Sanz *et al*., 2017; Matteucci & Repetto, 2021).

Empathy and solidarity together with recognizing the local and environmental particularities should develop or activate social sensitivity and sustainable consciousness, motivating socially responsible behavior, which is characterized by the values approached by HEIs including helping, care, and support for people who have less (Sanz *et al*., 2017; Suárez-Perales *et al*., 2021). These values generate a singular attitude about the environment and nature (Mónus, 2021). These points respond to strategic guidelines for HEIs to teach values grounded in SDGs and SR (Ramos-Monge *et al*., 2019; Rampasso *et al*., 2020; Bertossi & Marangon, 2021).

According to the previous argument, we formulate the following research hypothesis:

Hypothesis 3 (H3): *Empathy and solidarity perceived by HEI students, as university governance strategies, directly and positively influence the values of the environment.*

Now, considering the argument developed above, we present the following theoretical model below (see Figure 1).

Regarding all of the above, this research contributes to the exploration of students' perceptions of SR in HEIs (Carrió Llach & Llerena Bastida, 2023; Tomasella *et al*., 2024). In this sense, the analysis of strategies linked to empathy and solidarity is considered relevant, since they are related to respect and dignity, freedom and citizenship, and the environment (Larrán & Andrades, 2017; Severino-González *et al*., 2022). This responds to the challenges posed by the SDGs and university strategic management (Fanea-Ivanovici & Baber, 2022; Angheluță *et al*., 2023). The analysis through multivariate models according to the opinions of Colombian students generates inputs for the determination of gaps for their replicability and comparison with Latin American countries (Cabana-Villca *et al*., 2024; Elareshi *et al*., 2024). Finally, the inputs can be used for the strategic management of SR by universities because the determination of explanations through structural equations could support SR strategies from the SDGs (Gallardo-Vázquez & Juárez, 2022; El-Kassar *et al*., 2023).

Methods

General background

This research considers the development of a structural analysis for the confirmation of research hypotheses. The sample is not probabilistic and considers Colombian university students. The SR perception scale presents dimensions and variables expressed in statements whose form of response considers a Likert-type scale.

Structural Equation Models

The partial least squares structural equation modeling (PLS-SEM) was applied in this study, using Smart PLS software v. 4. The SEM models use combinations of statistics with their technical bases of multivariant analyses via multiple regression and factorial analysis, facilitating simultaneous estimation of the causal relations defined in the presented hypotheses (Chin, 1998a; Ringle *et al*., 2014; Hair *et al*., 2010). In turn, thanks to applying econometrics oriented towards prediction and focused on latent or non-

observed variables; this allows us to measure the predictive capacity of the model (Chin, 1998b). The measurement models whose bases are within the second-generation multivariant method allow us to approach abstract constructs via observed variables, giving rise to latent dependent and independent variables (Wright *et al*., 2012; Hair *et al*., 2013). Finally, all the aforementioned conceptual elements allow us to test hypotheses grounded in theoretical knowledge via empirical data (Chin, 2009; Hair *et al*., 2013).

We should mention that various studies linked with SR and SDGs carried out in social sciences, economics, and administration have used PLS-SEM, including diverse perspectives and application environments in business and university contexts (Rampasso *et al*., 2020; Ortiz-Paniagua *et al*., 2021; Gallardo-Vázquez & Juárez, 2022; Fanea-Ivanovici & Baber, 2022). Considering these elements, applying SEM-PLS in this research proposal confers greater validity to the focus applied herein, while also indicating the contribution to extant knowledge in this research field due to students' implications in a university setting.

Population and sample selection of subjects

The population is composed of university students located in downtown Bogotá, Colombia. We achieved participation from 292 students from various undergraduate majors (see Table 1). The non-probabilistic sample is composed of 63.7% women and 35.7% men. Their family income level saw the highest concentration in the group of students declaring a level at 1 to 2.9 times the current legal minimum wage, at 50.3%; for family size, the most common result was students from a family of 4 members (41.4%); and for their origin, the majority came from urban zones, at 95.5%.

In this sense, it is necessary to recognize how small the exclusive consideration of a specific group common to all universities on the planet and in a given country is (Raza *et al*., 2023; Handayani *et al*., 2024). However, various studies have demonstrated the importance of SR and SDG research where the sample only specifically captures reality through limited samples and in specific geographical areas (Cabana-Villca *et al*., 2024;). All of which has not mitigated the value of the findings, which can be used for different purposes due to the characteristics of SR and the SDGs (Adow *et al*., 2024).

Instrument

For data gathering we used a survey composed of three sections: a) First, there was a series of filter questions, through which we approached the sample subjects' main characteristics; b) Second, we considered a series of questions allowing us to characterize the research subject, including gender, income level, family group members, and origin; c) Third, we considered the different constructs comprising the scale of HEIs SR perception from the perspective of SDGs.

The scale considers the proposals from Larrán and Andrades (2017), Navarro *et al*. (2017). Concerning the above, the aforementioned scale was validated in a new version by Severino-González *et al*. (2022). This study was done in two phases: measurement model analysis, and structural model analysis. The dimensions comprising the measurement scale were: (i) Empathy and Solidarity, (ii) Respect and dignity, (iii) Freedom and citizenship, and (iv) Environment (see table 2). The scale was composed of Likert-type questions with five response levels: Totally disagree is 1 point, disagree is 2 points, neither agree nor disagree is 3 point, agree is 4 points, and totally agree is 5 points (see Appendix).

Procedure and analysis strategy

The data-gathering process was done based on an online survey during the latter part of 2020. Student participation was voluntary, anonymous, confidential, and free of any economic remuneration. After the survey was finished, its data was exported via Microsoft Excel to then be systematized and ordered, followed by the application Smart PLS software v. 4 (Chin, 2009).

On this basis, we developed a CFA, applying criteria associated with the Cronbach's Alpha and composite reliability (Henseler *et al*., 2016), along with the average variance extracted (AVE) and discriminating validity (Fornell & Larcker, 1981). Afterwards, we evaluated the structural model to prove the research hypotheses, in order to explain the causal relations between latent variables (Wright *et al*., 2012).

For the structural model, we carried out the R^2 analysis of the latent dependent variables' variances, allowing us to measure the predictive power of the structural model (Chin, 2009). We also analyzed the path coefficients (β), considering the criteria proposed by Falk and Miller (1992). Finally, we

evaluated the Q^2 and f^2 regarding the structural model proposal, which let us evaluate the hypotheses to contrast (Hair *et al*., 2011; Hair *et al*., 2013).

Results

Measurement model evaluation

Table 3 presents the measurement instrument reliability. We analyzed the individual reliability of each variable (λ), as well as the Cronbach's Alpha (α), rho_A, composite reliability (CR) and the AVE. The loads of each variable are considered acceptable, since they are greater than 0.7 (Hair *et al*., 2014), apart from variables S1 and L4, which were eliminated due to not meeting acceptability criteria. Out of a total of 18 variables, 16 remained in the model. With the Cronbach's α, we can observe that the minimum value is 0.744, higher than the suggested 0.7 (Cronbach & Shavelson, 2004); with the CR, all values are above 0.853, which is slightly higher than the recommended minimum of 0.8 (Vandenberg & Lance, 2000; Henseler *et al*., 2016). We can thus ensure that each construct is internally consistent. We also analyzed the convergent and discriminant validity of the model.

Convergent validity evaluates the degree to which the scale variables allow for measurements that can lead to the same or similar results (Fornell & Larcker, 1981). This validation is done via average variance extracted (AVE), observing that the values lie between 0.574 y 0.764 (Table 3). All are considered satisfactory, since they are above 0.5 (Hair *et al*., 2010). We see this in particular with empathy and solidarity: 0.664, respect and dignity: 0.592, freedom and citizenship: 0.574, and environment: 0.764.

For discriminant validity, we applied the criteria proposed by Fornell and Larcker (1981) and Roldán and Sánchez-Franco (2012). For their analysis, these criteria consider the findings of the square root of AVE, as the same time, the products of the calculations based on the heterotrait-monotrait ratio (HTMT) are examined. Following the criteria from Fornell & Larcker (1981), we see that the square root of AVE, located on the diagonal (Table 4), in correspondence with the values of each vertical and horizontal AVE is below the correlations between constructs (0.815>0.664, 0.576, and 0.505; 0.769>0.664, 0.681 and 0.581; 0.758>0.576, 0.681 and 0.493; and 0.874>0.505, 0.581 and 0.493), ensuring compliance with this criterion (Henseler *et al*., 2015).

For the heterotrait-monotrait (HTMT) criterion, to estimate the discriminat validity proposed by Henseler *et al*. (2015), we establish that the highest threshold must be below 0.90. In this sense, we can see that they all fall below this value, granting discriminant validity to the model (Table 5).

Finally, we can state that the proposed scale has enough discriminant and convergent validity to move into structural model development to contrast research hypotheses via empirical data.

Structural model evaluation

After establishing through the previously calculated indicators, it can be noted that the measurement model is valid and reliable. This will let us test the hypotheses arising from the theoretical review. To apply it, the predictive power of the theoretical model was studied, followed by the estimation of the values associated with the significance of the causal relationship proposed in the hypotheses through the path coefficient (β), supported with indicators such as standard deviations (SD), t statistics (Bootstrap), correlation, p-value, and explained variance. Afterwards, we determined CI percentile, and bias-corrected CI, all of which allow us to determine the validity and significance of the structural model in terms of its ability to explain empirical relationships between latent variables (Wright *et al*., 2012). Next, we developed statistics that allow us to analyze and determine the predictive power of the structural model through the values obtained from each dependent construct (Chin, 2009). For this, the strength of the structural trajectory is observed through the R^2 of the latent dependent variables' variances, along with the Q^2, f^2, SRMR, d-ULS, d-G and RMStheta (Henseler *et al*., 2015).

We can indicate that for H1, perceptions of empathy and solidarity positively influenced perceptions of respect and dignity (β=0.664; DE= 0.037; t=17.930; p-value=0.000), supporting H1. For H2, we see that perceptions of empathy and solidarity positively influence perceptions of freedom and citizenship (β=0.576; DE=0.055; t=10.421; p-value=0.000), also supporting H2. Finally, for H3 we can see that perceptions of empathy and solidarity positively influence perceptions about the environment (β =0.505; DE=0.050; t=10.107; p-value=0.000), supporting H3 (Table 6).

To estimate the formulated hypotheses, we carried out a non-parametric re-sampling, applying a bootstrapping technique, which provides both the standard error and the Student t-statistic values for parameters. For this,

we applied a boot test with 5000 subsamples and used a Student t-distribution, with a tail and n – 1 degrees of freedom where n is the number of subsamples (Chin, 1998b).

Table 7 evidence that all the routes proposed in the model have values that are considered significant with different levels significance, letting us affirm that the three model hypotheses are supported by the findings of this study, and confirming the contribution of empathy and solidarity to the construction of SR perceptions in university students. In this sense, to calculate confidence intervals (CI) and correct bias, we used the bootstrapping procedure. The results were all over zero and were thus satisfactory according to Chin (1998a).

For structural model quality (see Table 8), we performed a bootstrapping analysis (sample of 5000) and blindfolding, considering a Student t-distribution with n – 1 degrees of freedom, where n is the size of subsamples (Hair *et al*., 2011). We also estimated the goodness of fit of the model to determine the strength of each path according to the study hypotheses (Falk & Miller, 1992; Henseler *et al*., 2016). The Q^2 and f^2 values let us determine the predictive relevance and total effect of each independent variable on a variable regarding the structural model proposal. The Q^2 values are all above 0.2, so the model has predictive and positive relevance (Hair *et al*., 2013), with values of H1=0.252, H2= 0.285, and H3=0.191. For f^2, we can say that H1 and H2 present strong effects, while H3 has a moderate effect (see Table 8). For R^2, all values are satisfactory since they all exceed 0.1 in each hypothesis (Falk & Miller, 1992) (Table 8).

We should mention that we also used indices available for PLS (Henseler *et al*., 2016). Henseler *et al*. (2014) proposed a procedure to empirically value the global measurement along with applying PLS, as a standardized root mean square residual (SRMR), d_ULS, and d_G. The maximum suggested value for SRMR is met in the present study, since it is below 0.08, granting a general fit to the model. In the d_ULS and d_G aptitude tests, we saw values of 0.698 and 0.270, respectively (i.e., below the 95th percentile), which lets us say that any existing discrepancy is insignificant. Finally, we analyzed RMStheta, referring to the correlation value of the mean quadratic error, which must be between 0 and no more than 0.12 (Henseler *et al*., 2016). The present study saw a value of 0.176. Nevertheless, although the value slightly exceeds our quality criteria, it cannot be ruled out according to Henseler *et al*. (2016). Finally, we should mention that the

test results confirm the global model since it fits well with the data and aligns with the underlying theory.

Discussion

The present research has proposed the purpose of the study is to explain the influence of univesrity students' perceptions of SR through empathy and solidary form the perspective of SGDs in Colombia, considering connections between the latent variables constituting the study object. We found positive causal relations between empathy and solidarity concerning respect and dignity, freedom and citizenship, and environment. In this sense, according to the findings of Chaleta *et al* (2021), it can be noted that there are coincidences with the efforts developed by some universities to implement strategies that are consistent with the SDGs and that are in harmony with the values that constitute SR.

The above should motivate HEIs to include guidelines in their strategic development plans establishing functions and responsibilities for all constituent university governance actors (Sandoval *et al*., 2020; Kvilhaugsvik, 2021). This motivation has not been sufficient, as the various scandals in the different spheres of society have shown that efforts have not been sufficient. However, this could respond to the complexities and requirements of current society, since these HEIs must face new challenges and evident social and environmental threats (Naderi *et al*., 2022; Raza *et al*., 2023). The above is related to the findings of this research, as it could be linked to strategies of empathy and solidarity as a bridge that articulates efforts tied with SR, university governance, and SDGs, contributing to generating professionals who respect human dignity, defend freedom, promote citizen participation, and care for their environment (Nardo *et al*., 2021; Pálsdóttir & Jóhannsdóttir, 2021).

Moratis and Melissen (2021) said that education in responsible management via SDGs leads to instilling perspectives which characterize responsible management education, one of which is emotional education. This latter point involves boosting attention and development of environmental concerns and also requires the skills which comprise the actions characterized by empathy and responsibility. These lead to considering activities that incorporate elements related to the values which underpin SR. Compared to the findings of this study, due to the context previously

raised, these strategies undergirded by empathy and solidarity promote respect and dignity, as well as promoting freedom and a sense of citizenship. These ultimately lead to social sensitization and environmental consciousness about practices performed within the community (Coelho & Menezes, 2021). All of which has not been sufficient for the development of concrete policies and actions, which allow for responding to the needs of educational actors and the challenges faced by society in general.

Socially responsible strategies developed by HEIs are highly relevant for social sustainability, which includes various aspects, including environmental, health, and even equality aspects (Chen *et al*., 2021). This can be driven by actions led by actors within university communities seeking social transformations which improve human quality of life. This has shown the lack of commitments and responsibilities of some educational actors that are transcendental in personal and professional training. Related with this point, it is necessary to incentivize programs based on empathy and solidarity from university governance, via decision-makers, involving the entire educational community and contributing to social health and well-being (Chen *et al*., 2021; Bayhantopcu & Aymerich Ojea, 2024).

Finally, these findings are not sufficient for the design of projects that generate social benefits that consider human dignity, freedom, citizen participation, and environmental care from SR and SDGs (Chakraborty *et al*., 2021). This is due to the importance of actions that raise social awareness and sensitization injustices and precariousness present in society (Hope, 2020). However, in this context, the findings of this study can be valuable tools, given the evident connections between the latent variables comprising university SR from SDGs, for generating programs promoting sustainability and SR in search of territorial growth and progress (Naderi *et al*., 2022).

Conclusions

The current research had as a main objective to study the influence of students' perception of SR from through empathy and solidarity from the perspective of SDGs in Colombia. In that sense, the findings of this study suggest that SDGs-based SR strategies must consider the relations between empathy and solidarity regarding respect and dignity, freedom and citizenship, and environment. This is a product of university students' percep-

tions. In this context, strategies linked with university governance can include various SR aspects in strategic plans, helping develop operational plans which collaborate in SR and SDGs training.

This study also contributes to theories on SR, university governance, sustainability, and higher education via useful tools for designing programs, models, strategies, and plans to contribute to satisfying interest groups' needs and requirements. In this scenario, HEIs must properly manage social complexities and political uncertainty, facing the vicissitudes of volatility, while focusing on a socially sustainable, integral, and consciously responsible education.

Education in empathy and solidarity is holistic, integrative, and dynamic, given its various perspectives on human behavior, attitudes, and perceptions, which makes it harder to design diverse strategies and programs. Building on this fact, this study provides guidelines that can be used to design management models based on HEIs' values. Similarly, identifying variables that affect university SR perceptions of SDGs is fundamental to implement policies and strategic programs. This reveals the importance and value of people within educational communities for HEIs, presenting theoretical implications and practical suggestions that can be used by higher university management.

This study shows the importance of sensitization, social consciousness, and environmental consciousness regarding the practices and decisions carried out by educational community members. This space is where education considering environmental problems can install mechanisms developing empathy and solidarity among HEI actors. This is all highly relevant given the socio-environmental crisis which has led to installing strategies aimed at SDGs and SR.

The present results could also be used with the support of other studies for the creation of strategies linked to the challenges of SR and the SDGs in HEIs. This is especially important given the need for government educational policies and strategic organizational practices to be guided by decision-makers within university governance. These efforts must be aligned with the core functions of HEIs, creating shared value that addresses the needs of stakeholders.

Carrying out studies that include raising perceptions presents various limitations. The sample for this study is relatively small and does not apply probabilistic techniques in the sampling plan. There is also no inferential analysis to compare perceptions by study subjects' sociodemographic

traits. It also does not consider consulting with all actors within university communities via applying surveys or in-depth interviews. Finally, the collection of opinions of research subjects from different countries is not developed.

The research presents as a limitation the application of the model to the entire sample in a complete manner, not considering subsamples, which could lead to new findings. In this sense, it is necessary to use analysis strategies that lead to results that can be used with greater confidence according to certain characteristics of the context. The analysis does not consider the cultural and political scope that can strain the results, nor the sociodemographic characteristics of university students.

It is important for future studies to consider a probabilistic sampling procedure to more reliably contrast findings, in relation with results presented in other articles. The survey about SR perception for HEIs based on SDGs must be applied at different times, to generate temporal comparisons. We recommend doing a study that includes an inferential analysis according to participants' characteristics, along with one that compares internal and external community HEIs actors' perceptions. It is essential for future research to carry out investigations with greater epistemological and statistical properties of university governance, sustainability, and SDGs.

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Compliance with ethical standards

This article does not contain any studies with human participants or animals performed by the authors. Extracting and inspecting publicly accessible files (scholarly sources) as evidence, before the research began no institutional ethics approval was required.

Data availability statement

All data generated or analyzed are included in the published article. The raw data supporting the conclusion of this article will be made available by the authors, without undue reservation. The raw anonymized data can be provided by emailing the primary author.

Author contributions

All listed authors have made a substantial, direct and intellectual contribution to the work, and approved it for publication. The authors take full responsibility for the accuracy and the integrity of the source analysis.

Conflict of interest statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Annex

Table 1. Sample characteristics

Characteristic	Criteria	Number	Percentage (%)
Gender	Men	104	35.6
	Women	186	63.7
Income level (current legal minimum wage)	Less than 1x	23	7.9
	Between 1 and 2.9x	147	50.3
	Between 3 and 5.9x	97	33.2
	Over 6x	23	7.9
Family group members	1	4	1.4
	2	34	11.6
	3	65	22.3
	4	121	41.4
	5	48	16.4
	Over 6	20	6.8
Origin	Urban	13	4.5
	Rural	279	95.5

Table 2. SR perception scale from SDGs

Dimensions	Variables	Affirmations
Empathy and Solidarity	M1	Educated in preventing diseases which affect their members' integrity.
	S1	Support for poor communities is incentivized, along with excluded, vulnerable and/or minority groups.
	S3	Respectful treatment is promoted for all people without exception (ethnicity, disability, gender, sexual orientation, and more).
	S4	Activities are done to integrate all institutional members.
Respect and dignity	D1	There is an environment of respect among institutional members.
	D3	Members with problems receive personal and emotional support.
	D4	Respect is encouraged towards people who are not part of the institution.
	D5	Resources are applied to do activities with safe hygiene and security conditions.
Freedom and Citizenship	C1	There are mechanisms to voice opinions and doubts among institutional members.
	C2	Opinions are considered when defining tasks and responsibilities.
	C3	Contributions are made to forming a solid opinion about topics affecting the community.
	C5	Respect for institutional members' rights and duties is encouraged.
	L1	Institutional members are incorporated into various social activities.
	L3	Institutional members' ideas and initiatives are encouraged and incorporated.
	L4	Spaces for conversation about social and environmental problems are promoted.
Environment	M2	Environmental protection is included in curricular training.
	M3	Proper and efficient water, energy and gas use is encouraged.
	M4	Devices are available to separate waste by material type (glass, paper, plastic, organic waste, and others).

Source: Severino-González *et al*. (2022).

Table 3. Reliability analysis and convergent validity

Dimensions	Variables	Loads (λ)	Cronbach's Alpha (α)	rho_A	Composite reliability (CR)	Average variance extracted (AVE)
Empathy and solidarity	M1	0.781	0.744	0.754	0.855	0.664
	S3	0.772				
	S4	0.887				
Respect and dignity	D1	0.785	0.771	0.775	0.853	0.592
	D3	0.793				
	D4	0.768				
	D5	0.731				
Freedom and citizenship	C1	0.785	0.851	0.853	0.890	0.574
	C2	0.757				
	C3	0.736				
	C5	0.780				
	L1	0.760				
	L3	0.724				
Environment	M2	0.883	0.845	0.848	0.907	0.764
	M3	0.858				
	M4	0.881				

Table 4. Discriminating validity according to criteria from Fornell and Larcker (1981)

Dimensions	Empathy and solidarity	Respect and dignity	Freedom and citizenship	Environment
Empathy and solidarity	0.815			
Respect and dignity	0.664	0.769		
Freedom and citizenship	0.576	0.681	0.758	
Environment	0.505	0.581	0.493	0.874

Table 5. Discriminating validity following criteria from Henseler *et al*. (2015)

Dimensions	Empathy and solidarity	Respect and dignity	Freedom and citizenship	Environment
Empathy and solidarity				
Respect and dignity	0.869			
Freedom and citizenship	0.720	0.842		
Environment	0.636	0.772	0.582	

Table 6. Significant structural model results

Hypothesis	Path coefficient (β)	Standard deviation (SD)	T statistics (Bootstrap)	Correlation	P Values	Variance explained	Supported (yes/no)
H1: Empathy and solidarity -> Respect and dignity	0.664	0.037	17.930	0.577	0.000	0.452	Yes
H2: Empathy and solidarity -> Freedom and citizenship	0.576	0.055	10.421	0.509	0.000	0.331	Yes
H3: Empathy and solidarity -> Environment	0.505	0.050	10.107	0.674	0.000	0.257	Yes

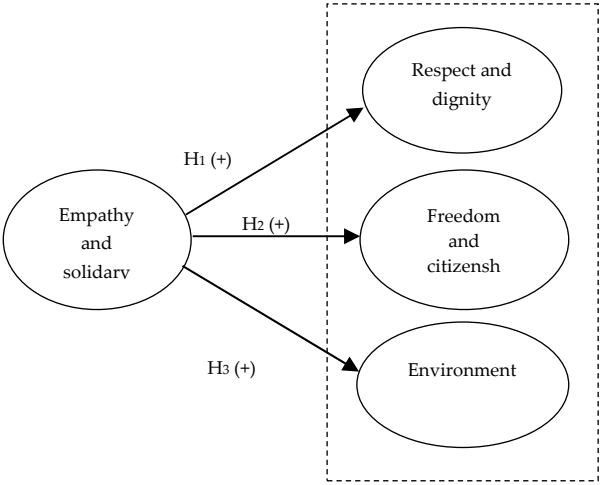
Table 7. Trajectory coefficient (β), CI percentile, and bias-corrected CI

Hypothesis	Path coefficient (β)	CI – percentile 5.0%	CI – percentile 95.0 %	Corrected CI bias - 5.0%	Corrected CI bias -95,0%
H1: Empathy and solidarity -> Respect and dignity	0.664	0.615	0.741	0.592	0.726
H2: Empathy and solidarity -> Freedom and citizenship	0.576	0.485	0.685	0.439	0.653
H3: Empathy and solidarity -> Environment	0.505	0.436	0.602	0.405	0.576

Table 8. Hypothesis effects and prediction

Hypothesis	Q^2	f^2	R2	SRMR	d-ULS	d-G	RMStheta
Empathy and solidarity -> Respect and dignity	0.252	0.788	0.452	0.072	0.698	0.270	0.176
Empathy and solidarity -> Freedom and citizenship	0.285	0.496	0.331				
Empathy and solidarity -> Environment	0.191	0.343	0.257				

Figure 1. Conceptual model and hypothesis



Appendix

Questionnaire: SR perception scale from SDGs

Dimensions	Affirmations	1	2	3	4	5
Empathy and Solidarity	Educated in preventing diseases which affect their members' integrity.					
	Support for poor communities is incentivized, along with excluded, vulnerable and/or minority groups.					
	Respectful treatment is promoted for all people without exception (ethnicity, disability, gender, sexual orientation, and more).					
	Activities are done to integrate all institutional members.					
Respect and dignity	There is an environment of respect among institutional members.					
	Members with problems receive personal and emotional support.					
	Respect is encouraged towards people who are not part of the institution.					
	Resources are applied to do activities with safe hygiene and security conditions.					
Freedom and Citizenship	There are mechanisms to voice opinions and doubts among institutional members.					
	Opinions are considered when defining tasks and responsibilities.					
	Contributions are made to forming a solid opinion about topics affecting the community.					
	Respect for institutional members' rights and duties is encouraged.					
	Institutional members are incorporated into various social activities.					
	Institutional members' ideas and initiatives are encouraged and incorporated.					
	Spaces for conversation about social and environmental problems are promoted.					
Environment	Environmental protection is included in curricular training.					
	Proper and efficient water, energy and gas use is encouraged.					
	Devices are available to separate waste by material type (glass, paper, plastic, organic waste, and others).					

Source: Severino-González *et al*. (2022).