

Exploring the Relationship between Social Norms and Pro-Environmental Attitudes in University Students: Implications for Environmental Education

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Abstract

The purpose of this study was to investigate the relationship between social norms and pro-environmental attitudes in university students, as well as to explore the implications of these findings for environmental education. A total of 706 participants were recruited from three public universities in northern Peru by means of proportional stratified probability sampling, considering a confidence level of 95% and a margin of error of 3.5%. Both quantitative approach and correlational research designs were used. Data were collected using structured questionnaire-type scales that assessed students' social norms and pro-environmental attitudes. The results show a positive relationship both moderate and significant between social norms and pro-environmental attitudes ($R_s=0.268$, $p=0.000^ < 0.05$). In addition, socio-demographic characteristics such as gender, age, academic cycle and area of knowledge were observed to have no significant impact on pro-environmental attitudes, while the factor institution and place of residence did influence this variable. In conclusion, this study sheds light on the relationship between social norms and pro-environmental attitudes in university students. It highlights the importance of considering social norms as part of environmental education programs in order to encourage more sustainable behavior and thus contribute to environmental conservation. These findings provide a solid basis for the implementation of effective strategies in the education of citizens committed to environmental conservation in this particular university context.*

Keywords: *social norms, pro-environmental attitudes, university students, environmental education, sustainable behaviors.*

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INTRODUCTION

Social norms have long been considered as an important factor driving people's motivation and behavior (Reynolds et al., 2015). Therefore, the concept of social norms has been recognized as a key component of motivation and behavior, as well as a critical factor in influencing and changing behavior (Reynolds et al., 2015). People tend to follow social norms to gain social approval or avoid social sanctions (Keizer & Schultz, 2019). Social norms are what is commonly done or disapproved of; they refer to what other people think or do (Keizer & Schultz, 2019). This differentiates them from personal norms, which are rules or standards for one's own behavior.

It is useful to distinguish between two types of social norms: cautionary norms, which refer to the degree of approval or disapproval of a given behavior, and descriptive norms, which refer to the behavior exhibited by the majority of group members (Jacobson et al., 2011; Keizer & Schultz, 2019; Neighbors et al., 2013). Littering or pouring waste paint down a storm drain are socially disapproved behaviors, and there is a precautionary norm that prohibits doing so (Keizer & Schultz, 2019). Prudential social norms tell us what behavior is approved or disapproved of. Conforming to such norms is often associated with social acceptance or rewards; violating them, conversely, leads to disapproval and social sanctions (Jacobson et al., 2011). This explains why people conform to precautionary norms, in order to gain social approval or avoid social sanctions.

In essence, with injunctive norms, one seeks to please others, and this type of motivation is referred to as normative social influence; whereas complying with descriptive norms generally has a different motivation, i.e., the desire to be correct. In many cases, following the group will lead to a correct outcome due to normative social influence. According to Neighbors et al. (2013), perceived descriptive and injunctive norms are positively related to behavior.

In that sense, social norms are supported by the Norm Activation Theory (TAN) developed by Schwartz in the 1970s to describe the relationship between activators, personal norms, and behavior (Octav-Ionuț, 2015; Wang et al., 2023). It has been widely used to predict people's altruistic and prosocial behavior (Shin et al., 2018) and is currently used to explain altruistic and environmentally friendly behavior (Sheng et al., 2017). According to TAN, an individual's pro-environmental behavior is determined by his or her level of personal responsibility to such behavior, reflected in the personal norm (Sheng et al., 2017). Pro-environmental behavior is considered as a type of prosocial behavior, as it involves positive consequences for others (Steg & De Groot, 2010; Y. Zhu et al., 2021). Prosocial behavior refers to a person's actions with the goal of helping others, and encompasses a wide range of helping, sharing, and cooperative behaviors (Shin et al., 2018).

According to the norm activation model, a person's pro-environmental attitude is predicted by three core components: consequence awareness (CC), attribution of responsibility (RA), and personal norm (NP) (Schwartz, 1977). CC indicates a conscious action of negative consequences for others or other things when not acting prosocially (Steg & De Groot, 2010). In other words, it triggers initial norm activation and is likely to generate feelings of obligation caused by norms (Schwartz, 1977). RA refers to feelings of responsibility for the negative consequences of not acting in a prosocial manner (Steg & De Groot, 2010). For example, a person may feel responsible for the harmful effect on the environment if he or she throws garbage in the river. NP is a person's moral obligation to perform or refrain from specific actions with negative consequences (Schwartz, 1977). Therefore, social-norm activation theory predicts social norms in the context of pro-environmental attitudes (Shin et al., 2018).

In this regard, several studies have addressed the relationship between social norms and pro-environmental attitudes in university students. According to a survey conducted by Saldaña-Almazán et al. (2020), 78% of university students reported that social norms

influence their decisions related to the environment. In addition, 65% of the participants expressed positive pro-environmental attitudes, indicating an interest and concern for the natural environment. Likewise, a longitudinal study conducted by Sevillano y Olivos (2019) found that university students' pro-environmental attitudes increased significantly after participating in environmental education programs based on the promotion of positive social norms. These results suggest that social norms may play a crucial role in the development of pro-environmental attitudes among the student population.

Despite increasing attention being paid to the relationship between social norms and pro-environmental attitudes in the scientific literature, there is still a significant gap in knowledge about how these variables relate specifically in the context of college students. Although some studies have shown that social norms influence pro-environmental attitudes and behaviors in the general population (Saldaña-Almazán et al., 2020), more in-depth and specific research is needed to better understand this relationship in the university context.

The facts previously described led us to propose a cross-sectional research, guided by the following research question: What is the relationship between social norms and pro-environmental attitude in university students? To this end, it was proposed as an objective to determine the degree of relationship between social norms and pro-environmental attitude in university students, as well as to evaluate the level of each variable and find the correlation between the dimensions.

MATERIAL AND METHODS

Participants and design

The participants were 706 university students from three public universities in the north of Peru, enrolled in the first academic semester 2022-I. The sample size was determined considering a confidence level of 95% and a margin of error of 3.5%. In order to obtain a representative sample, a probability sampling method by proportional allocation was used. This approach made it possible to select a sample that adequately reflected the characteristics of the population under study.

The research was developed under a quantitative approach, whose method of analysis was hypothetico-deductive and a cross-sectional descriptive-correlational research design was used (Sánchez & Reyes, 2017). This design allowed us to examine the association between variables at a specific time and provided information on the magnitude and direction of the relationship. The central variables in this study are social norms and pro-environmental attitudes. Social norms are defined as the shared rules and expectations within a society or social group that influence the behavior and attitudes of individuals (Jacobson et al., 2011). On the other hand, pro-environmental attitudes refer to positive dispositions and valuations towards the environment, which translate into behaviors orientated toward the conservation and protection of the natural environment (Keizer & Schultz, 2019).

Instruments

To measure social norms, the Social Norm Scale (ENS) adapted from previous work by Milfont & Duckitt (2010) and Gkargkavouzi et al. (2019) was used. It consists of 32 items grouped into two dimensions: descriptive norms and injunctive norms. These dimensions assessed different aspects related to behavior and approval in relation to the environment.

To measure pro-environmental attitudes, the New Environmental Paradigm (NEP) Scale, developed by Dunlap et al. (2000) and revised and adjusted in 2008 by the same author, was used; finally in 2017 it was revised by Zhu & Lu (2017). This scale consists of items

designed to assess participants' ecological orientation and their agreement with statements related to environmental conservation and protection.

Both scales, the ENS and the NEP, were administered online through the Google Forms platform. Participants indicated their degree of agreement with each item on a five-point rating scale, ranging from "strongly disagree" (1) to "strongly agree" (5).

Procedures

Ethical approval for the research was given by the University Council of each university. Then data collection proceeded. An e-mail was sent to students at the three participating universities, explaining the objectives of the study and providing a link to the online questionnaire. Participants were assured that their responses would be treated confidentially and anonymously, and that their participation was voluntary. Finally, clear instructions were provided on how to complete the questionnaire and a deadline was established for completion. Participants were reminded to respond honestly and thoughtfully.

Data analysis

Once data collection was completed, statistical analysis was performed. Descriptive analyses were performed to obtain measures of central tendency, such as means and standard deviations, for each variable. In the inferential analysis, Kolmogorov-Smirnov (KS) normality tests were performed to evaluate the distribution of the data. The chi-square test of independence was used to examine the relationship between variables and to determine whether the categories of one variable were related to the other. Spearman's correlation analysis was also used to examine the relationship between social norms and pro-environmental attitudes. Tests of symmetric measures and directionality, such as Somers' Gamma and D statistics, were applied to assess the association and strength of the variables. Finally, the logistic regression technique was used to estimate a model based on sociodemographic predictor variables of the pro-environmental attitude.

RESULTS

The results are based on a sample of 706 university students from the northeastern region of Peru. Among the participants, 52% were women and 48% were men. Eighteen percent were under 18 years of age, 76% were between 18 and 25 years of age, and 6% were over 26 years of age. Thirty-nine percent resided in rural areas and 61% in urban areas. As for the distribution by universities, 25% belonged to the Universidad Nacional de Frontera, 33% to the Universidad Nacional de Jaen and 42% to the Universidad Nacional Toribio Rodríguez de Mendoza. The participants were distributed in different academic cycles, from the first to the tenth. Regarding the areas of knowledge, according to the (2017) classification, 9% specialized in Agricultural Sciences, 19% in Medical and Health Sciences, 7% in Natural Sciences, 25% in Social Sciences, 3% in Humanities and 38% in Engineering and Technology.

When analyzing the level of the variable "social norms", it was observed that 3.8% were at the high level, 86.4% at the moderate level and 9.8% at the low level. Regarding the dimension "descriptive norms", 16.0% were at the high level, 80.3% at the moderate level and 13.7% at the low level. In the dimension "prudential norms", 2.7% showed an approval, 80.3% remained at the moderate level, 15.3% had a disapproval, and 1.7% had no prudential norms. This indicates that the variable "social norms", in both dimensions, the predominant level is moderate.

Table 1 presents the level of pro-environmental attitude according to the levels of the social norm's variable. It is observed that, with a moderate level of social norms (86.4%), a low (0.1%), moderate (11.2%), good (65.4%) and very good (9.6%) pro-environmental

attitude is obtained. This shows a direct relationship between the variables, where a moderate level of social norms is related to a good pro-environmental attitude.

Table 1. Distribution of the levels of the variable social norms and pro-environmental attitude in university students.

Social norms		The pro-environmental attitude				Total
		Low	Moderate	Good	Very good	
No social norms	Count	0	0	0	0	0
	% of the total	0,0%	0,0%	0,0%	0,0%	0,0%
Low social norms	Count	0	39	27	3	69
	% of the total	0,0%	5,5%	3,8%	0,4%	9,8%
Moderate social norms	Count	1	79	462	68	610
	% of the total	0,1%	11,2%	65,4%	9,6%	86,4%
High social norms	Count	0	6	21	0	27
	% of the total	0,0%	0,8%	3,0%	0,0%	3,8%
Total	Count	1	124	510	71	706
	% of the total	0,1%	72,2%	17,6%	10,1%	100,0%

Note. Survey applied to university students.

Table 2 presents the chi-square test statistic X^2 , and the results reveal a significant dependence between the two variables. The value of the test statistic ($X^2=84.798$, $gl=6$, $p=0.000<0.05$) indicates a statistically significant relationship. Furthermore, when comparing the critical value of X^2 (133.63) with the reference tabular value (16.92), used to make decisions on the null hypothesis H_0 , it is observed that the critical value is higher. Therefore, the null hypothesis is rejected, thus confirming the existence of a dependence between the variables of social norms and pro-environmental attitude.

Table 2. Chi-square test of independence between the social norms of the variable and the pro-environmental attitude in university students.

Test statistic	Value	gl	Significance (bilateral)
Pearson's Chi-square	84.798	6	0.000**
Likelihood ratio	68.829	6	0.000**
Number of valid cases	706		

Note. (**) The test is statistically significant.

In Table 3, the test statistics for symmetric and directional measures are presented. The Gamma statistic ($\text{Gamma}=0.346$, $p=0.000<0.05$) shows agreement between the variables, indicating a moderate and significant relationship between social norms and pro-environmental attitude. Furthermore, Somers' D statistic ($\text{Somers' D}=0.293$, $p=0.000<0.05$) points to a significant cause and effect direction of moderate level. This suggests a causal relationship between social norms and their effect on the pro-environmental attitude.

Table 3. Symmetric and directional measures for variables: social norms and pro-environmental attitude in university students.

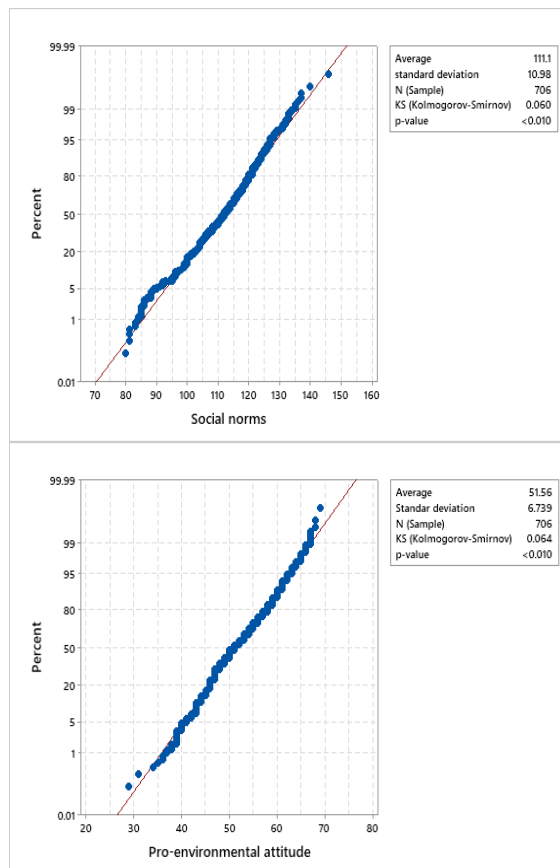
Type of measure	Test statistics	Value	Asymptotic standard error	Approximate T	Approximate significance
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Symmetric	Gamma	0.346	0.073	3.756	0.000**
Directional	Somers' D	0.293	0.050	3.756	0.000**
Number of valid cases		706			

Note. (**) The test is statistically significant.

Figure 1 represents the cumulative probability plot of the scores of the social norms and pro-environmental attitude variables. The Kolmogorov-Smirnov statistic ($K_s=0.060$, $p<0.01$) was used to assess the normality of the scores. The statistical results significantly demonstrate that the scores do not follow a normal distribution.

Figure 1. Normality test (KS) of the variable scores.



Note. Ks: Kolmogorov-Smirnov

Table 4 and Figure 2 show the correlation between the scores of the pro-environmental attitude and the social norms variables. By applying Spearman's correlation statistic ($R_s=0.268$, $p=0.000^*<0.05$), a moderate and positive correlation between both variables is evident, which is statistically significant.

Table 4. Spearman correlation test of the social norms of the variable and the pro-environmental attitude of university students.

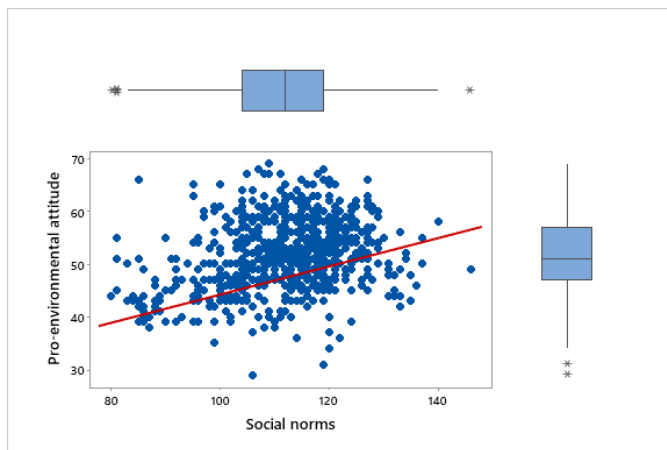
Variables	Test statistic	Social norms	Pro-environmental attitude
	Spearman correlation	1.000	0.268
Social norms	Significance p-value	-	0.000**
	Sample	706	706

Pro-environmental attitude	Spearman correlation	0.268	1.000
	Significance p-value	0.000**	-
	Sample	706	706

Note. (**) The test is statistically significant.

Figure 2 shows the graphical correlation between the scores obtained in the pro-environmental attitude and social norms variables. It can be seen that the points are scattered on the X-Y axes, indicating a statistically low correlation.

Figure 2. Spearman correlation of the scores of the social norms and pro-environmental attitude variables.



In Table 5, it is evident that when evaluating the ordinal logistic regression model using the likelihood function, the sociodemographic variables did not significantly and statistically ($p > 0.05$) influence the pro-environmental attitude response variable. This indicates that these variables are not necessarily primary as predictors for estimating the level of pro-environmental attitude. Similarly, the model that only includes sociodemographic variables was assessed as nonsignificant when applying the zero-slope test ($p = 0.816 > 0.05$, $gl = 6$, $G = 2.942$), suggesting that at least one factor is not significant.

Table 5. Logistic regression table of sociodemographic factors on pro-environmental attitude.

Predictor	Coef	Coef SE	Z	P	Odds	95% CI	
					Ratio	Lower	Upper
Const(1)	-6.9510	1.1319	-6.141	0.000			
Const(2)	-1.9279	0.5371	-3.589	0.000			
Const(3)	1.8138	0.5366	3.380	0.001			
Gender	-0.0015	0.1704	-0.009	0.993	0.998	0.715	1.394
Age group	0.1251	0.1963	0.637	0.524	1.133	0.771	1.665
Study center	-0.0639	0.1158	-0.552	0.581	0.938	0.748	1.177
Academic Cycle	-0.0067	0.0353	-0.190	0.849	0.993	0.927	1.065
Area of knowledge	-0.0193	0.0490	-0.393	0.694	0.981	0.891	1.080
Place of residence	0.2481	0.1714	1.448	0.148	1.282	0.916	1.793

Log-likelihood function = -549.703

Note. Coef=coefficient of the estimated model; Coef SE =standard error of the coefficient; CI=confidence interval; Z=statistical value of the estimated coefficient; P=significance; Odds ratio = Odds ratio or proportions.

DISCUSSION

The present research explored the relationship between social norms and pro-environmental attitudes in university students, with the objective of obtaining relevant information for environmental education. The results obtained provide a deep insight into this topic and provide important implications for the development of educational strategies oriented towards environmental sustainability.

First, social norms and pro-environmental attitudes were found to be positively correlated in university students. These findings support previous studies that have shown a relationship between social norms and pro-environmental attitudes (Bergquist et al., 2019; Bertoldo & Castro, 2016; Silvi & Padilla, 2021). The moderate correlation found in our research ($R_s = 0.268$, $p < 0.05$) indicates that as social norms become more favorable toward the environment, pro-environmental attitudes also tend to become more positive. However, it is important to remember that this relationship can be conditioned by a variety of factors. For example, some people may perform pro-environmental attitudes and behaviors not only because of intrinsic motivation from the social norm, but also because of the influence of external factors, such as expected social approval (precautionary norm) or financial gain (Ejelöv et al., 2022).

These results are consistent with the theory of socially normative behavior, which suggests that social norms exert a significant influence on people's attitudes and behaviors toward the environment (Hewitt et al., 2023; Tuesta et al., 2022; Y. Zhu et al., 2021). When individuals perceive that social norms favor pro-environmental behaviors, they are more likely to adopt sustainable attitudes and behaviors (Bertoldo & Castro, 2016; Perry et al., 2021; Silvi & Padilla, 2021). Therefore, these findings highlight the importance of fostering positive social norms in the university setting as part of environmental education programs.

Similarly, the ordinal logistic regression model was evaluated using the likelihood function and including sociodemographic variables such as gender, age, type of institution, academic cycle, area of knowledge, and place of residence. However, with the exception of type of institution and place of residence, they did not show a significant influence ($p > 0.05$) on the pro-environmental attitude response variable. These results lead us to question the importance of sociodemographic variables as fundamental predictors in estimating the level of pro-environmental attitude. These findings differ from empirical evidence suggesting that pro-environmental attitude increases as students spend more years on campus (Meyer, 2016), that pro-environmental behavior is positively correlated with education and age (Casaló & Escario, 2018), and that females show higher levels of pro-environmental attitudes (Bleidorn et al., 2021; Casaló & Escario, 2018), as well as greater concern for environmental problems (Li et al., 2022; Ter-Beek et al., 2019; Xiao & Hong, 2010).

On the other hand, the model reported statistically significant differences in the type of institution and place of residence. These results are consistent with empirical evidence showing that women and men did not differ significantly in their pro-environmental attitudes (Karpudewan, 2021), and it is also consistent with that, in rural areas, environmental knowledge is lower than in urban areas, although no differences in attitudes or practices were observed (A. Wang et al., 2022; S. Wang et al., 2022). However, previous studies indicated that the formation of pro-environmental attitudes was significantly dependent on the cultural background and sociodemographic characteristics of the society (Karpudewan, 2021).

Implications for environmental education

In terms of implications for environmental education, our results highlight the need to design educational interventions that promote environmentally friendly social norms. It is critical that environmental education programs do not focus exclusively on the transmission of knowledge about environmental issues, but also address the influence of social norms on individual attitudes and behaviors (Culiberg & Elgaaied-Gambier, 2016; Ejelöv et al., 2022). By creating university environments that foster pro-environmental social norms, positive change in students' attitudes and behaviors towards the environment can be fostered.

In such a context, there is sufficient corroborating evidence that a high degree of environmental awareness in college students influences their behavior (Barba-Sánchez et al., 2022; Lin & Niu, 2018), and both descriptive social norms and precautionary norms play an important role in attitude formation. Furthermore, the pro-environmental effort of individuals has been found to be driven by their beliefs about social norms (Dorner, 2019). If this effect is strong, social norms may even influence preparedness to mitigate climate change (Namagembe, 2021). In turn, higher education has been found to have an impact on pro-environmental attitudes, supporting the notion that higher education institutions can play an important role in making societies more sustainable (Meyer, 2016).

Similarly, there have been findings that indicate that young people tend to be more environmentally friendly, at least in terms of intention, compared to older people (Sarmiento & Loureiro, 2021). Furthermore, meta-analyses suggest that social norms can promote desired pro-environmental behavior (Perry et al., 2021). These findings suggest the need to adapt educational approaches to address pro-environmental attitudes in different academic areas, recognizing the contextual and disciplinary differences that may exist (Al-Naqbi & Alshannag, 2018; Torroba et al., 2023). Therefore, it justifies the need to raise awareness and improve university students' engagement with sustainability activities to establish sustainable initiatives both on and off campus (Handoyo et al., 2021).

In this sense, understanding the relationship between social norms and pro-environmental attitudes has important implications for environmental education at the university level. First, the research findings highlight the need to foster social norms that support and promote sustainable behaviors in the university setting. Second, the worrisome global environmental issues have generated the urgency to educate the general public on environmentally friendly pro-environmental attitudes (Karpudewan, 2021). Finally, environmental education programs should emphasize the importance of positive social norms as facilitators of pro-environmental attitudes and behaviors (Sevillano & Olivos, 2019).

Limitations and future research directions

The study was based on a cross-sectional design in a single measurement; however, to understand a greater consistency of the relationship between social norms and pro-environmental attitudes, it would be beneficial to conduct longitudinal studies to examine changes in these variables over time. On the other hand, there is the possibility that participants may have given socially desirable or biased responses, which could affect the validity of the results. In future research, it is recommended to use methods that minimize this bias, such as in-depth interviews or more confidential data collection techniques.

An effective approach to implementing environmental education programs based on social norms could be the creation of interventions that promote the observation of pro-

environmental behaviors by students. According to a study by Fru & Ndaba (2023), exposure to pro-environmental role models can influence the formation of social norms and positive attitudes toward the environment. These role models may be influential individuals within the student community, such as teachers, student leaders, or classmates committed to sustainable practices. Social norms, relationships, and comparisons have previously been studied as explanatory factors for prosocial and pro-environmental behaviors, but not as factors that influence well-being (Welsch & Kühling, 2018).

In addition, it is essential to address the barriers that may hinder the adoption of pro-environmental social norms and attitudes. A study by Saldaña-Almazán et al. (2020) revealed that lack of knowledge and awareness of the environmental consequences of individual actions can limit the formation of pro-environmental attitudes in university students. Therefore, environmental education programs should provide clear and accessible information on current environmental problems and their implications, in order to motivate a change in attitude and behavior.

Finally, in terms of possible areas of future research, it would be interesting to further study social norms and pro-environmental attitudes in different cultural and geographic contexts (Karpudewan, 2021); given that social norms may vary between different cultures and contexts, understanding this variability would allow context-specific educational strategies to be adapted to each context. Similarly, studies are required on the effect of university students' environmental intelligence on environmental variables (Torroba et al., 2023). Likewise, it would be relevant to investigate effective strategies to promote environmentally friendly social norms, both in the university setting and in other contexts. Furthermore, it would be relevant to examine the long-term impact of environmental education on social norms and pro-environmental attitudes, as well as their relationship with specific sustainable behaviors.

CONCLUSIONS

The study has shown that there is a significant relationship between social norms and pro-environmental attitudes in university students. This underscores the importance of social norms in the formation of sustainable attitudes and behaviors in this demographic group. In addition, sociodemographic characteristics such as gender, age, academic cycle, and area of knowledge were observed to not present significant differences in the pro-environmental attitude of university students. However, it was found that the institution and place of residence factor had a significant impact on their attitudes towards the environment. This suggests that the university environment and the context of residence play a crucial role in the formation of pro-environmental attitudes.

Consequently, it is essential to integrate strategies to raise awareness and promote pro-environmental social norms into educational programs aimed at university students. This integration will strengthen the connection between social norms and pro-environmental attitudes, encouraging more sustainable behaviors and contributing to environmental conservation. Environmental education programs should take into account the significant influence of social norms and focus on promoting environmentally friendly norms in the university environment. This involves generating awareness of the environmental consequences of individual actions and providing clear and accessible information about current environmental problems.

Disclosure of interest

The authors reported no possible conflicts of interest.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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