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# Mediating and Moderating Factors Affecting Pro-environmental Decision-Making: A Spanish Study

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## Abstract

Because it is relevant to analyse the variables that may influence pro-environmental decision-making, the aim of this study was to analyse (a) the mediating role of perceived responsibility towards climate change (CC) in the relationship between scepticism towards CC and pro-environmental decision-making; and (b) the moderating role of implicit theories about CC (ITCC) in the relationship between responsibility and pro-environmental decision-making. For this purpose, 209 Spanish students (48.8% female, 43.1% male, and 8.1% preferring not to report their gender; mean age = 17.48,  $sd = 3.78$ ) completed a questionnaire twice (two months apart) and subsequently (again, two months apart) indicated how many days they wanted to participate in a beach cleanup campaign. The results corroborate that (a) responsibility mediates the relationship between scepticism and pro-environmental decision-making, and (b) ITCC moderates the relationship between responsibility and pro-environmental decision-making. The study highlights the need to foster beliefs about the mitigation of CC and to promote reliable information in order to reduce scepticism towards CC, as well as feelings of responsibility towards CC in the field of Environmental Education.

**Keywords:** Climate change scepticism; implicit theories towards climate change; perceived responsibility towards climate change; pro-environmental decision-making

## Introduction

The current environmental crisis means that it is a pressing concern to find ways to promote the adoption of pro-environmental behaviours by individuals and groups (Bouman et al, 2020). Climate change (CC) is a major problem facing the current population, prompting various authors to speak of a planetary emergency (Canaza-Choque, 2019). In the specific context in which this study is carried out, in Andalusia, the drought resulting from CC is increasingly evident, with more and more water restrictions and higher temperatures in summer.

Human beings' responsibility for CC and the global planetary emergency was corroborated and highlighted at the last climate summit (IPCC, 2022). It is therefore urgent to find mechanisms to encourage pro-environmental behaviour aimed at protecting the environment and the planet and to explore how certain variables predict pro-environmental decision-making, in order to design intervention guidelines and campaigns to promote effective pro-environmental behaviours.

In this study, we explore how some variables that can become pertinent to the prediction of pro-environmental behaviours and pro-environmental decision-making (implicit theories about CC (ITCC), individuals' scepticism about CC, as well as individuals' perceived sense of

responsibility towards CC) interact with each other to predict pro-environmental decision-making of Spanish (Andalusian) secondary school students.

### **Scepticism**

Although the scientific community has reached a consensus regarding the existence of CC and its relationship with human action (Berger & Wyss, 2021; IPCC, 2022), a portion of the population still expresses certain doubts about CC and human influence on it, or even denies it (Berger & Wyss, 2021). Such doubt and denial are often referred to as scepticism towards CC.

Capstick and Pidgeon (2014) argue that there are two types of scepticism: epistemic scepticism, relating to doubts about the status of CC as a scientific and physical phenomenon; and response scepticism, which refers to doubt as to the effectiveness of actions directed at preventing CC, the latter type of scepticism being associated with a lack of awareness towards CC (Capstick & Pidgeon, 2014). The mechanisms behind the denial of CC are also applicable to other taxonomies, such as that of Rahmstorf (2004), who developed a typology of climate sceptics distinguishing three different levels: Trend sceptics, which refers to individuals who deny the existence of global warming; Attribution sceptics, which refers to those who accept that CC exists, but attribute it to natural (non-anthropogenic) causes; Impact sceptics, who accept anthropogenic CC but claim that its effects will be beneficial. The present study focuses on trend and attribution scepticisms, including in the construct evaluated not only the denial of CC itself, but also the denial that such CC is a product of human activity.

Although still scarce (Berger & Wyss, 2021), there are different studies indicating that less sceptical individuals engage in more pro-environmental behaviour (Aji & Sutikno, 2015; Albayrak *et al.*, 2013; Berger & Wyss, 2021; Gifford, 2011; Golob, Kos Koklic, Podnar & Zabkar 2018). In this regard, Gifford (2011) argued that scepticism towards CC is one of the main inhibitors of pro-environmental behaviour and other climate-oriented collective actions. Likewise, Aji and Sutikno (2015) showed that the more sceptical consumers are, the less they embrace green purchasing behaviours. Golob *et al.* (2018), meanwhile, showed how more sceptical people are less likely to engage in greener food consumption. And, Berger and Wyss (2021), using an experimental economic paradigm, showed that people sceptical about CC make more selfish and less pro-environmental decisions, seeking their own personal benefit, however small, regardless of their environmental cost. In view of the above, the following study hypothesis is proposed:

**H1.** The more sceptical people are of CC, the less they will make pro-environmental decisions.

### **Perception of responsibility towards CC**

A sense of responsibility held by individuals regarding CC is another psychosocial variable that may play an important role in decision-making and pro-environmental behaviours. Meanwhile plastic pollution and CC have been commonly treated in the past as separate problems, recent studies are demonstrating that plastic pollution contributes significantly to greenhouse gases and then to CC (Ford *et al.* 2022; Shen, Huang, *et al.*, 2020; Shen, Ye *et al.*, 2020). In the same line of reasoning, some studies suggest that microplastic present in the seas can induce climate feedback cycles (Vishnu Radhan *et al.*, 2019). In any case, beyond the impact of plastic and the sea of plastic on CC, it is worth noting that the feeling of responsibility towards CC reflects not only a certain awareness of CC and environmental unsustainability in general, but also an awareness of one's own responsibility in said problem. This sense of responsibility should also be related to more responsible attitudes and behaviours oriented to the search for favourable action to reduce such CC and processes of environmental unsustainability. In this sense, different traditional theories assign an important role to a sense of responsibility as a predictor of pro-environmental behaviour (Stern, Dietz, Abel, Guagnano & Kalof 1999; Schwartz, 1977). Moreover, perceived responsibility

has been seen as one of the key variables in the explanation of pro-environmental behaviours (Directorate General for Climate Action, 2017) and for the promotion of pro-environmental action in individuals and communities (Punzo et al., 2019).

Several studies suggest that individuals who assume part of the responsibility for CC and the negative effects of unsustainable behaviour on the planet make more sustainable decisions and adopt more pro-environmental behaviours than individuals who do not (Bouman et al., 2020; Cuadrado, Macías-Zambrano, Carpio et al., 2022; Directorate General for Climate Action, 2017; Punzo, Panarello, Pagliuca, Castellano & Aprile 2019; Reese & Jacob, 2015). In turn, a sense of greater responsibility in individuals is related to more pro-environmental behaviour (Fathimath et al., 2017). Thus, it has been shown that while environmental knowledge or awareness, environmental sensitivity and attachment to place are strongly related to pro-environmental behaviour, this effect decreases if individuals do not feel responsible (Cheng & Wu, 2015). Considering the literature reviewed, individuals' perceived responsibility is regarded as a relevant factor that increases pro-environmental decision-making, and the following study's hypothesis is proposed:

**H2.** The more individuals perceive that they are partly responsible for CC, the more they will decide to adopt pro-environmental behaviours.

### ***Relationships established between scepticism and perceived responsibility towards CC***

Thus far we have seen that both scepticism and perceived responsibility impact decisions to adopt pro-environmental behaviour. It would seem worthwhile to also analyse whether these two variables interact to explain pro-environmental decision-making.

In this regard, it seems difficult to imagine how someone who is sceptical of CC could ascribe themselves responsibility for it. How can one assume responsibility for something when they do not even acknowledge its existence? Previous literature, even if not in the environmental field, has already established and corroborated the relationship between scepticism and perceived responsibility (Arli, Van Esch, Northey, Lee & Dimitriu 2019; Cuadrado, Tabernero & Maldonado, 2022; Macarthur, 2006). In fact, Macarthur has stated that there is an inherent link between scepticism and a loss of commitment and responsibility. Sceptical individuals cannot engage in behaviours or take responsibility for something they do not really believe in. In an area quite different from this study's, Cuadrado, Tabernero & Maldonado (2022) found that people who exhibit scepticism towards COVID-19 do not take responsibility for the transmission of the virus. Applying this reasoning to the field of CC and the environment, it is to be expected that people who are sceptical towards CC do not perceive themselves as having any responsibility in relation to it.

Then, if as we have argued scepticism influences perceived responsibility (Arli et al., 2019; Cuadrado, Tabernero & Maldonado, 2022; Macarthur, 2006); and both scepticism (Aji & Sutikno, 2015; Berger & Wyss, 2021; Gifford, 2011; Golob et al., 2018) and perceived responsibility (Directorate General for Climate Action, 2017; Punzo et al., 2019; Schwartz, 1977; Stern et al., 1999; Stern, 2000) influence pro-environmental decision-making, as we have argued earlier; the following hypothesis can be proposed:

**H3.** Perceived responsibility towards CC mediates the relationship between scepticism and pro-environmental decision-making.

### ***Implicit theories towards climate change***

Today, there is still significant debate in the society about whether CC can be mitigated by the specific actions of individuals and society in general (Hansen, 2018), that is, about whether CC is modifiable or not (Lovelock, 2003). This different perception about the modifiability, or not, of CC is related to what Dweck, Chiu, and Hong (1995) calls implicit theories (IT). These IT refer to the

beliefs that individuals have about whether things can improve and change (in this case, IT are said to be incremental); or whether, on the contrary, individuals believe that they cannot change (IT are said to be static). As individuals who hold incremental IT believe that things can improve, they adopt behavioural motivation and behavioural pattern lead oriented to success; On the contrary, as individuals who hold static IT believe that things cannot change they adopt avoidance and failure-oriented motivational and behavioural patterns (Chiu, Hong & Dweck 1997; Dweck *et al.*, 1995; Dweck, 1996; Dweck & Leggett, 1988; Levy & Dweck, 1998; Molden *et al.*, 2006).

Recently, taking Dweck and her followers' theory as a reference (Chiu *et al.*, 1997; Dweck *et al.*, 1995; Dweck, 1996; Dweck & Leggett, 1988; Levy & Dweck, 1998; Molden *et al.*, 2006; Yang & Hong, 2010), and adapting it to the domain of pro-environmental behaviour, Cuadrado, Macías-Zambrano, Guzman *et al.*, (2022) have shown in an experimental study how people who think that CC is modifiable (i.e., those who hold incremental ITCC) are more likely to adopt pro-environmental behaviours than people who hold static ITCC (and thus think that CC is no longer mitigable). Moreover, the Cuadrado, Macías-Zambrano, Guzman *et al.*, (2022) show that ITCC moderate the relationship established between responsibility and pro-environmental decision-making. Thus, they observe in their experiment how people who feel responsible towards CC decide to behave in a pro-environmental way only if they hold incremental ITCC, that is, if they think that CC is still mitigable, while if they hold static ITCC, concluding that CC is unmitigable, they do not decide to act in a pro-environmental way, as, even if they feel responsible, they believe that such behaviour would be in vain. It means, Cuadrado, Macías-Zambrano, Guzman *et al.*, (2022) have demonstrated that ITCC acts as a moderator of the relationship between responsibility and pro-environmental behaviour, by changing the way responsibility relates to pro-environmental behaviour: people with a high sense of responsibility only act pro-environmentally when they perceive CC to be mitigable.

Considering the above literature and hypotheses, we present the following study hypothesis: the mediation hypothesised in H3 will be moderated by ITCC, which will modify the relationship between responsibility and pro-environmental decision-making.

**H4.** the mediation hypothesised in H3 will be moderated by ITCC, which will play a moderating role in the relationship between responsibility and pro-environmental decision-making, such that people who feel responsible will decide to behave in a more or less pro-environmental way depending on their ITCC levels.

In summary, we establish the predictive model of pro-environmental decision-making shown in Fig. 1.

## Method

### **Procedure**

After receiving approval from administration at the Andalusian secondary school that the participants were attending, and the approval of the Ethics Committee on Human Research of the University of Cordoba through reference number CEIH-22-52, a questionnaire was distributed to the secondary school students. The secondary school is emplaced in a coastal town of Cadiz.

Data collection was carried out in three different phases. In the first phase, participants completed a questionnaire that assessed ITCC and scepticism, in addition to sociodemographic variables. Before completing the questionnaire, the participants had to provide their informed consent, in which it was explained to them that their participation was voluntary and that they could withdraw from the study whenever they wished.

The second phase took place two weeks later, when participants were asked to complete a second questionnaire, which measured feelings of social responsibility towards CC.

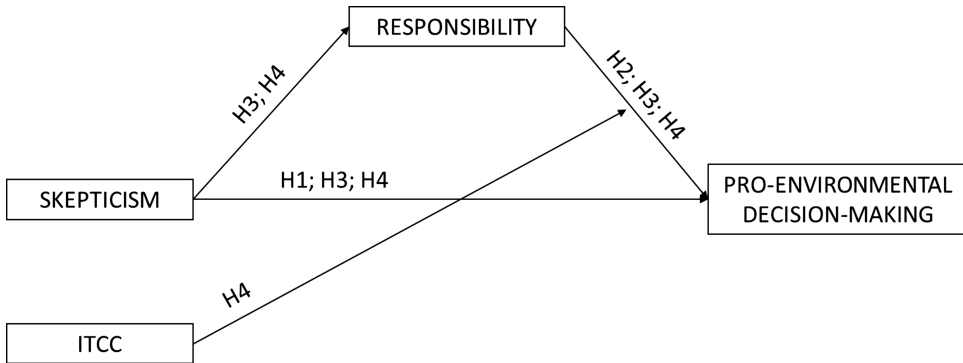


Figure 1. Hypothesised predictive model of pro-environmental decision-making.

The last phase, carried out two weeks after the previous one, consisted of evaluating to what extent the participants make pro-environmental decisions through the personal interest they showed in participating in a fictitious voluntary environmental activity (but which they believed to be real) of cleaning the beaches of their locality within a campaign organised by a prestigious non-profit environmental defence association.

When the participants finished filling out three phases, they were informed of the objectives of the study and the fictitious nature of the “Clean Beaches” campaign. As well, as the student finally did not have the possibility to participate in the “Clean Beaches” campaign, they were also fully debriefed and given information about anthropogenic causes of CC and the current climate emergency, as well as about different environmental actions promoted by known NGO that they can join, if they are interested.

**Participants**

The participants were 209 students from an Andalusian secondary school. The sample was fairly equal in terms of gender, with 48.8% female, 43.1% male and 8.1% preferring not to report their gender. Of the 209 participants, 74.6% were high school students, 6.7% were Basic Vocational Training (students, and 10% were Vocational Training students. Some 8.6% of the participants preferred not to answer the question referring to their educational level. The mean age of the sample was 17.48, with a standard deviation of 3.78, and the age range was between 16 and 45.

**Measurements**

To assess the extent to which individuals think that CC can be mitigated (Implicit theories about CC), we employed, in the first phase of data collection, the three incremental items of the IT towards CC scale (Cuadrado, Macías-Zambrano, Guzman et al., 2022). The reliability of the scale was high ( $\alpha = .87$ ).

To assess the extent to which individuals were sceptical towards CC (scepticism towards CC), a short version (11 items) of the Corner et al. (2012) CC scepticism scale was used, also in the first phase of data collection. The reliability of the scale was high ( $\alpha = .82$ ).

To assess the extent to which individuals accept responsibility for CC, we used, in the second phase of data collection, two weeks after the first, the Social Responsibility Scale for Climate Change (Cuadrado, Macías-Zambrano, Guzman et al., 2022). The reliability of the scale was high ( $\alpha = .93$ ).

To assess the extent to which participants adopt more pro-environmental decision-making, in the third and final phase of data collection they were asked whether they would like to participate in a voluntary pro-environmental activity: cleaning nearby beaches. The participants were asked

to sign up for 0 to 7 days of beach clean-up. The number of days participants signed up for the activity was related to pro-environmental decision-making on a linear scale, such that greater participation indicated more pro-environmental decision-making among participants. Although we may think that there may be no link between beach cleanups and CC, it could be highlighted that recent studies are demonstrating the nexus between plastic pollution and CC (Ford *et al.*, 2022; Shen, Huang, *et al.*, 2020; Shen, Ye *et al.*, 2020; Vishnu Radhan *et al.*, 2019). It should be noted that the majority of students preferred not to participate in the campaign (56.7%), while just over a tenth of them (11%) agreed to attend the campaign at least two days in a week.

### **Statistical analysis**

To assess the mediating role of responsibility in the relationship between scepticism and pro-environmental decision-making, and the moderating role of ITCC in the relationship established between responsibility and pro-environmental decision-making, a moderated mediation analysis was performed using the model 14 of the macro Process for SPSS. Scepticism was included in the model as the independent variable, sense of responsibility as the mediating variable, ITCC as the moderating variable and pro-environmental decision-making as the dependent variable. As Process for SPSS does not provide standardised values for model 14 and as the variables does not use the same scale values (All Likert scales were between 1 and 5 whereas the pro-environmental decision-making used a 0 to 7 interval), all the measures were transformed to Zscore before to be used in the analyses.

## **Results**

### **Analysis of moderated mediation**

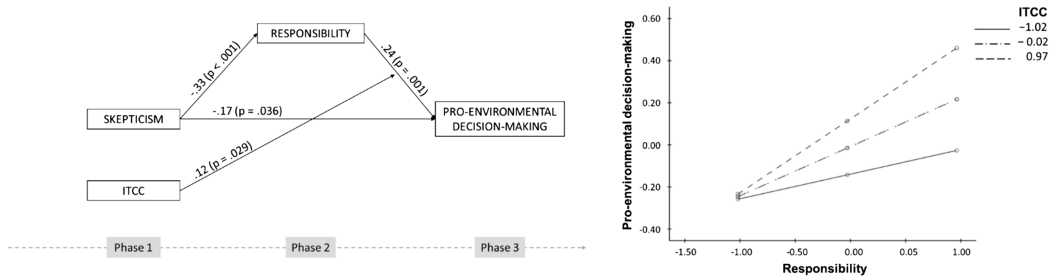
As shown in Fig. 2, the moderated mediation analysis ( $R^2 = .151$ ;  $F(4, 197) = 8.752$ ,  $p < .001$ ) confirmed that responsibility acts as a mediating variable between scepticism and pro-environmental decision-making, and that ITCC functions as a moderating variable in the relationship established between perceived responsibility and pro-environmental decision-making, confirming the hypothesised moderated mediation (Index of moderated mediation =  $-.039$ ,  $[-.098, -.004]$ ). The moderating effect can be observed in Fig. 2.

## **Discussion**

CC is, today, an unequivocal fact, recognised and agreed upon by the scientific community (IPCC, 2022), whose main cause is centred on anthropic action, and on the apparent contradiction between the urgency to act on climate issues and the lack of will to do so, at both the individual and social levels, as described in the “Giddens Paradox” (Giddens & del Bustillo, 2010). In this regard, environmental education represents a key strategy and tool to promote processes oriented towards the carrying out of pro-environmental decision-making. To this end, it seems appropriate to explore how certain variables at the individual level influence the decision to adopt pro-environmental behaviours, in order to be able to act accordingly via psychoeducational interventions in the environmental context.

Despite scientific unanimity in the scientific community about the existence of CC, there are still people who express some scepticism (Berger & Wyss, 2021), in addition to there being an open debate in society about whether CC can be curbed by specific actions by individuals and society in general (Hansen, 2018), with certain people holding incremental ITCC (believing then that CC can still be modified, mitigated) and others static ITCC (believing, in this case, that CC can no longer be mitigated). Thus, CC scepticism and ITCC appear to be two variables of interest in predicting pro-environmental decision-making. Likewise, another individual variable of





**Figure 2.** Moderated mediation and moderating effect of implicit theories towards climate change.  
 Note. ITCC = implicit theories towards climate change.

potential interest is individuals’ perceived personal responsibility towards CC. In this study we have explored the relationships between these variables and the decision to adopt pro-environmental behaviours, in order to propose some guidelines for intervention through environmental education.

The results confirmed H1, since the analyses carried out confirmed the relationship between scepticism measured in the first evaluation and the decision to behave in a pro-environmental manner evaluated one month later. Thus, the results show that students with higher levels of scepticism towards CC decided to participate less in the environmental task of cleaning nearby beaches than their less sceptical peers. This bears out the conclusions of Gifford (2011), who argued that scepticism towards CC is one of the main inhibitors of pro-environmental behaviour. Thus, the results obtained demonstrate the need to continue raising students’ awareness of CC, showing them the reality of the phenomenon, in order to encourage them to be more inclined to make pro-environmental decisions.

H2 was also corroborated by the analyses carried out, which show that the more students perceive that they are partly responsible for CC, the more they adopt pro-environmental decisions, by cleaning beaches near them. These results, which show a direct relationship between a sense of responsibility and the decision to act in a pro-environmental way, are in line with those of previous studies that indicated that individuals who assume part of the responsibility for CC adopt more sustainable decisions and more pro-environmental behaviours than those who do not (Bouman et al., 2020; Cuadrado, Macías-Zambrano, Carpio et al., (2022); Directorate General for Climate Action, 2017; Punzo et al., 2019; Reese & Jacob, 2015). The results obtained point to the need for environmental education to highlight the need to reinforce the values and feelings of responsibility among students in order to reinforce pro-environmental behaviour.

The results also confirm the mediating role of responsibility in the relationship established between scepticism and the decision to adopt pro-environmental behaviours is confirmed, as proposed in the third hypothesis. The analyses ratify that less sceptical students feel a greater sense of responsibility for CC and global warming and in turn make more pro-environmental decisions. The confirmation of the relation between responsibility for CC and pro-environmental decision-making is related to what Macarthur (2006) expresses through the existence of an inherent link between scepticism and responsibility, which had been found in other fields of study (Cuadrado, Tabernero & Maldonado, 2022). However, the literature review seems to indicate that it had not been studied in the specific field of the environment, highlighting the relevance and novelty of this result at the theoretical and practical levels. These results indicate the need to provide students with truthful and scientific information to combat possible sceptical beliefs towards CC, given the influence that such erroneous beliefs may have, influencing them not to feel responsible for CC and, as we will see below, to decide not to adopt behaviours to mitigate its effects. In this sense, providing individuals with a solid enough scientific background so that they can adequately

understand CC, its causes and consequences, seems relevant from environmental socio-educational interventions. Such training would allow individuals to counteract such falsehoods and scepticism on their own.

Based on the results of the mediation analysis, the scepticism variable has both a direct and indirect predictive role in the students' decision to adopt pro-environmental behaviours. Thus, the effect of scepticism on the decision to adopt a pro-environmental behaviour (in this case, cleaning beaches) is twofold: first, it has a direct influence on this decision, and second, it has an indirect influence, through the effect it has on responsibility, which, in turn, influences the decision to behave in a pro-environmental manner. Therefore, scepticism seems to be a very important variable that strongly impacts individuals' decisions to adopt pro-environmental behaviours. As such, it should be considered in environmental education programmes.

Finally, the results allowed us to confirm Hypothesis 4 and the moderating role of ITCC in the mediation established between scepticism, responsibility and pro-environmental decision-making. Congruently with previous literature (Cuadrado, Macías-Zambrano, Carpio *et al.*, 2022) the results of the present study found that the more people feel responsible for CC, the more they will tend to decide to behave in a pro-environmental way, but only if they think that CC is still reversible; no matter how much they feel responsible for CC, if they do not believe that there is nothing that can be done to avert it, they will not act in a pro-environmental way, because they will conclude that behaving in such a way would be maladaptive; meaningless, or useless in their view. In other words, a sense of responsibility is a necessary but not a sufficient condition for behaving in a pro-environmental way, as it depends on whether one holds incremental or static ITCC. These results highlight the importance, for environmental education, of fostering in students an incremental view of CC, allowing them to see that CC still may be mitigated, avoiding catastrophic attitudes and promoting more pro-environmental behaviours. Approaching environmental education with an attitude of resignation to disaster or leading them to believe that the fight against CC is hopeless, and cannot be mitigated, would engender apathy and the abandonment of pro-environmental behaviour. On the bright side, previous studies have shown that ITCC are relatively malleable and prone to change, such that an approach, from the perspective of environmental education, that endeavours to make students see the possibility of mitigating CC through appropriate individual and collective behaviours seems feasible (Cuadrado, Macías-Zambrano, Carpio *et al.*, 2022).

### **Limitations and future lines of research**

Although the results of the study are promising, some limitations should be noted. First, the sample consisted of a heterogeneous group of students, which limits the generalisability of the study to the overall population. However, this study may be a fairly representative sample of students' pro-environmental decision-making, such that its conclusions could be applicable to this population group. Secondly, the sample was not enough to perform an invariance analysis to test how the decision to adopt pro-environmental behaviours may vary according to gender or age. Considering the above, it could be valuable to replicate the study with an older, more homogeneous population, in order to observe whether the results can be extrapolated to the overall population; and to compare the different age and sex groups, thus being able to observe and study possible patterns of pro-environmental decision-making in society.

Regarding the ethical issues, it can be noted that the creation of a fictitious environmental campaign could be seen as an abrogation of the responsibility of the investigator to help students to take part in an environmental campaign. In this sense, it is relevant to highlight that the educator who has carried out the study has fully informed the participants and has made them aware of not only the impact of human behaviour on CC and the environmental crisis, but also of different environmental campaigns of a well-known environmental NGO that develops its activity in the area.



Another limitation could be related to the instrument used in the present studies. In this sense, the scales used to measure ITCC and perceived responsibility about CC are scales created by the authors of the present study due to a lack of scales to measure those specific constructs. Nevertheless, although this study does not present a specific validation of the scales, the reliability of the scales is high and the results of the exploratory factor analyses are satisfactory.

Due to the specific context of this study, the pro-environmental behaviour used was beach cleanup. Nevertheless, other relevant variables that could interact with the studied variables were not measured, such as the sense of responsibility to remove trash and help maintain a healthier beach environment or the sense of connection with places (beaches). Future research could include those and other variables to enhance the results found here.

## Conclusions

This study has demonstrated how individuals' ITCC, scepticism and perceived responsibility interact with each other and influence their decisions to adopt more or less pro-environmental decision-making, with (a) perceived responsibility acting as a mediator in the relationship between scepticism and pro-environmental decision-making, and (b) ITCC as a moderator in the relationship between responsibility and pro-environmental decision-making. Thus, the variables studied seem to be especially relevant to promoting more pro-environmental decision-making. As such, they should be taken into careful consideration in environmental education programmes.

The results indicate that, in order to tackle the challenge of improving individuals' pro-environmental decision-making, it is necessary (a) for people to understand and be aware that CC and global warming exist and have anthropological causes (refers to old low levels of scepticism about CC and its anthropogenic causes), by providing them with concrete information to counteract scepticism and misinformation, which can be found mainly on social media; (b) to encourage individuals to feel responsible as regards CC and unsustainability by providing them with experiences conveying the individual and collective responsibility we have in the process of CC, global warming and environmental crisis, taking into account the fact this feeling of responsibility is a necessary condition for making pro-environmental decisions, but not sufficient, as it will be moderated by the type of ITCC one holds; (c) to foster awareness that CC can still be mitigated, thereby avoiding resignation to catastrophe, showing and encouraging people to search for effective tools to counteract and reduce the CC process in which we are immersed.

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**Data availability statement.** Associated data are available on Mendeley Data at DOI: [10.17632/z7s4r2v4p7.1](https://doi.org/10.17632/z7s4r2v4p7.1)

**Competing interests.** The authors have no competing interests to declare.

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**Ethical standard.** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the Ethics Committee on Human Research (CEIH) of the University of Cordoba (Ref. CEIH-22-52) and individual informed consents were obtained from each participant before the start of the study. Informed consent was obtained from all individual participants included in the study.

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