


## ARTICLE

## Are Altruists Environmentally Responsible and Materialists Environmentally Irresponsible? An Analysis on the Moderation of Social Desirability and Mediation of Environmental Awareness

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### ABSTRACT

We investigated if altruism and materialism can explain attitudes related to the lower impact on the environment. This study aims to investigate the role of environmental awareness as a mediating variable between altruism and environmental responsibility, and if materialistic individuals can manifest environmental responsibility through social desirability. Also, we investigated the relations of altruism and materialism with environmental irresponsibility. Using the structural equations model, we analyzed the data from a survey with 339 individuals. The results conclude that altruism does not have a direct relationship with environmental irresponsibility, but has a relationship with environmental responsibility, not direct, but mediated by environmental awareness. Besides a direct relationship between materialism and environmental irresponsibility, we did not find a direct relationship with environmental responsibility, not even with the moderation of social desirability. This study shows values and attitudes that collaborate with pro-environmental behaviors, demonstrating the importance of environmental awareness for individuals to engage in actions favorable to sustainable consumption.

### KEYWORDS

environmental responsibility, environmental awareness, altruism, materialism, social desirability

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## 1. INTRODUCTION

Many studies have linked personal values with pro-environmental attitudes or behaviors, such as those from Stern, Dietz, and Guagnano (1995), Gilg, Barr, and Ford (2005), and Veiga and Ribeiro (2011), which positively link altruism with attitudes, concerns, and/or behaviors linked to the sustainability of the environment. Evident in parallel studies, such as those by Gökßen, Adaman, and Ünal Zenginobuz (2002), Chevarria and Gomes (2013), and Gifford and Nilsson (2014), is that even materialistic individuals can positively correlate environmentally friendly and sustainable actions or attitudes.

Over the years, environmental impact has been the “result of human desires for physical comfort, mobility, relief at work, pleasure, power, status, personal safety, maintenance of family traditions, and only recently has the protection of the environment become something important in consumer decisions” (Stern 2000, p. 408). Most people believe that climate change and sustainability are significant problems, but few are engaged in sufficient mitigation behavior to stem the growing flow of greenhouse gases and other environmental problems (Gifford, 2011). Individuals are inconsistent in their attitudes and behaviors related to the environment. Sometimes they are favorable, apparent by recycling of waste, while simultaneously harming the environment by using a polluting means of transportation (Gatersleben, Steg, & Vlek, 2002), so when analyzing an individual’s behavior, other factors, such as status, comfort, effort, and opportunity, must be considered (Steg & Vlek, 2009). Reflecting the conscious acceptance of environmental concerns (Garcia et al., 2011), recent research largely studied environmental awareness (for example: Gabarda-Mallorquí et al., 2018; Xu et al., 2019) to better understand its relationship with pro-environmental attitudes and behavior.

Although many individuals are engaged in some action to improve the environment, most could do more, however, psychological barriers undermine them, such as limited cognition about the problem, ideological worldviews that impede proactive attitudes and behaviors, comparisons with other important people, discrediting experts and authorities, perceived risks of change, and positive but inadequate behavior change (Gifford, 2011). Concerning personal values, altruism is identified as a type of behavior not aimed at making a profit, but as volunteering to do good (Krebs, 1970). This means that some people are consistently more generous, helpful, and kind than others, which makes them readily perceived and described as altruistic (Rushton, Chrisjohn, & Fekken, 1981). In contrast, materialism is considered a value that contributes to a higher level of consumption, moving in the opposite direction to the principles of sustainable consumption and pro-environmental attitudes (Hurst, Dittmar, Bond, & Kasser, 2013; Kilbourne & Pickett, 2008). Several studies have observed the negative effect of materialism on consumers’ intentions, attitudes, and behavior, discovering extreme relevance, considering the increasing levels of consumption in many countries (Polonsky, Kilbourne & Vocino, 2014; Alzubaidi, Slade, & Dwivedi, 2021).

Linked to this, social desirability bias can also affect self-report research findings, such as questionnaires, which are the dominant approach to exploring sustainable consumption and its drivers (Cerri, Thøgersen & Testa, 2019). Using data obtained through self-reported instruments can lead to a bias of social desirability, that is, it can lead to an over or underestimation of real behavioral intentions, which can be significant for socially accepted behaviors, such as pro-environmental consumption (Joanes, 2019). The social desirability bias is a construct that is still generating debates due to its possible impacts on the validity of the answers and, consequently, of the results obtained in research with a collection of self-declared data (Jann, Krumpal, &

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Wolter, 2019; Larson, 2019; Bergen & Labonté, 2020; Durmaz, Dursun, & Kabadayi, 2020; Shah, Cheema, Hussain, & Shah, 2020).

Considering altruism and materialism as conflicting values in relation to pro-environmental attitudes, we performed a structural equation modeling to confirm such interactions and confront other findings in the literature on the subject. This study aims to increase the knowledge about the influence of values on environmental responsibility and irresponsibility. The focus of this study is to investigate the role of environmental awareness as a mediating variable between altruism and environmental responsibility, and if materialistic individuals can manifest environmental responsibility through social desirability. Also, we investigated the relations of altruism and materialism with environmental irresponsibility. To reach this purpose, we surveyed 339 individuals, and, using structural equations modeling, we analyzed the data. As the major contribution of this study, we demonstrated the importance of environmental awareness as a mediator of the relationship between altruism and environmental responsibility. This result shows that environmental responsibility only manifests through awareness of the importance of these actions, even in altruistic individuals. Additionally, we have not identified the effect of social desirability as a moderator between materialism and environmental responsibility, which indicates that this bias does not impact materialistic individuals, and does not demonstrate favorable attitudes towards the environment, confirming the individualistic characteristics of materialism on individuals.

## 2. LITERATURE REVIEW

Through a bibliographic survey, this chapter aims to discuss the main constructs that will support the proposed theoretical model: pro-environmental attitudes, predictors of altruism and materialism, and social desirability.

### 2.1. PRO-ENVIRONMENTAL ATTITUDES AND THEIR RELATIONSHIP WITH PRO-ENVIRONMENTAL BEHAVIOR

Attitude is understood from the definition of Fishbein and Ajzen (1975) as a favorable or unfavorable feeling towards an object. An object's values or its assessment of attributes form a person's attitude about that object, also, by the strength of these relations (Ajzen, 2012). When a person forms a belief about the object, he acquires an attitude toward the object, influencing his behavior. Every belief links the object with some attribute, and the attitude to the object is a function of its evaluations of these attributes. Therefore, a person's attitudes "represent his assessment of some object and influences his other reactions to it" (Ajzen & Fishbein, 1977, p. 888). Environmental attitudes are a crucial focus of study in environmental psychology, which is a psychological bias expressed by evaluating the environment with some favorability or unfavorability (Milfont & Duckitt, 2010).

Pro-environmental behavior is a type of behavior that aims to meet the needs of current generations, benefiting the environment while enabling future generations to also meet their needs (Leary, Vann, Mittelstaedt, Murphy, & Sherry Jr., 2013). This concept refers to one of the first definitions of sustainable development, present in the report *Our Common Future* (1991), a document prepared by the United Nations published in 1987. With increasing environmental awareness, the number of consumers looking for products that cause less negative environmental impacts has grown, valuing those produced by environmentally responsible companies, and

repudiating those products that may contaminate the environment. Based on this, one behavior that consumers choose when seeking a more sustainable standard is the purchase of green products. In line with Bagozzi's (1981) model, in which attitudes precede behavior, the pro-environmental behavior only happens with strong pro-environmental attitudes (Casaló & Escario, 2018).

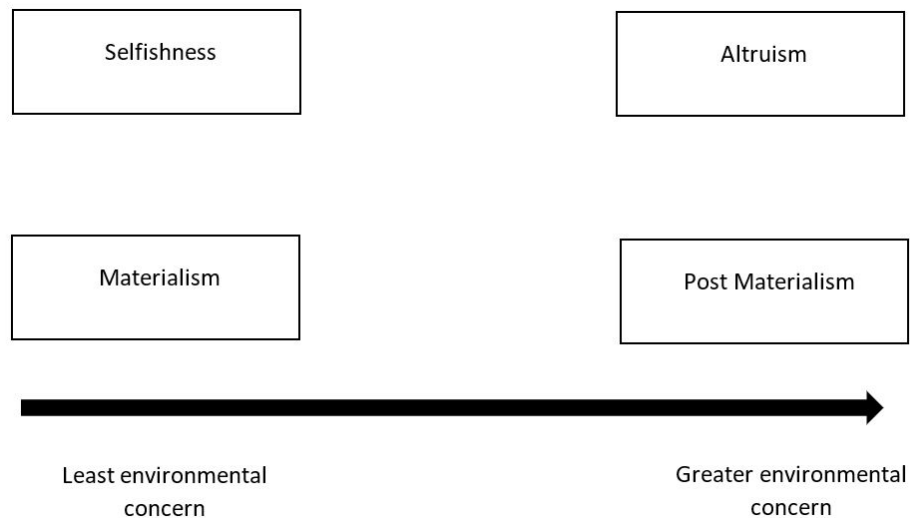
One of the biggest threats to the environment is excessive consumption of natural resources. This requires the consideration of alternative ways of reducing consumption (Brown & Cameron, 2000). The concern with the consequences of lifestyles and with consumerism formed the basis for the emergence of "green consumption", where the consumer considered the environmental variable in the acts of consumption to influence energy and technological matrices of the production system. The focus was initially on recycling, the use of clean technologies, reduction of waste, and the emergence of a green market. Aspects such as consumption reduction, disposability, and programmed obsolescence, as well as inequality of access to material goods, were also emerging and expanding the concept of pro-environmental behavior (Godecke, Naime, & Figueiredo, 2013).

Thus, Garcia, Silva, Pereira, and Pinheiro (2011) introduced attitudes that can be positively or negatively related to the adoption of pro-environmental behavior: 1) Environmental Awareness reflects the conscious acceptance of environmental concerns, while 2) Environmental Responsibility reflects what people believe, defend, value, and support environmental causes. The authors identified that there is a strong influence of environmental awareness on environmental responsibility. 3) Environmental Irresponsibility reflects individuals who do not value, support, or reflect on environmental issues. They are three independent constructs that can reflect some pro-environmental attitudes.

Environmental awareness is a concept that includes: "perception and understanding of threats, changes, and the available options and values, attitudes and preferences among conflicting goals" (Takala, 1991, p. 591). Environmental awareness has been growing, with some consumers caring more about the environment (Rodríguez-Ibeas, 2007). D'Souza et al. (2006) found that environmental awareness increases individuals' perception of buying green products (environmentally friendly products). Furthermore, environmental awareness is an essential condition for consumers to pay attention to products' attributes that are relevant to environmental causes (Thøgersen, 2000). Song et al. (2019) discovered a mediating role for environmental awareness in the relationship between environmental concern and the purchase of environmentally friendly products.

## 2.2. ALTRUISTIC AND MATERIALISTIC VALUES

Analyzing values toward pro-environmental attitudes and behavior, Stern, Dietz, and Guagnano (1995) argue that individuals who are more concerned with the environment tend to be more altruistic or more socially friendly. In analyzing these values, Inglehart (1990) denotes that materialistic individuals give greater value to their possessions and material goods to achieve their life goals (Belk, 1984; Richins, 2004). In summary, we illustrate these characteristics, as proposed by Gilg, Barr and Ford (2005) in the model presented in Figure 1. This model suggests a continuum between opposite values, countering on the same scale selfishness and altruism, and materialism and post-materialism.



*Figure 1.* Conceptualization of social and environmental values.

*Source:* adapted from Gilg et al. (2005).

### 2.3. ALTRUISM

Altruism is believed to exist in most human beings, manifesting to a greater or lesser extent depending on the situation or circumstance in which the individuals find themselves. The concept of altruism is often confused with the concepts of helping and giving behavior, however, these are distinct concepts. The concept of help refers to the act of helping or assisting someone with a certain goal and may imply a gain. The concept of giving refers to the act of contributing by involving the granting of material things, such as a charity (Goldstein, 1983). The dominant characteristic of altruism is greater involvement and greater self-sacrifice in an action than any possible gain that can be obtained. Even though it may involve acts of helping and giving, altruistic behavior does not imply obtaining a clear or unobtrusive reward or gain (Chou, 1996; Goldstein, 1983).

In contrast, selfish behaviors are those motivated by seeking benefit for oneself or one's close ones. Although individuals report pro-environmental and social concerns and have values characterized as self-transcending or altruistic, their intention to consume organic foods, for example, may primarily be related to selfish goals, such as personal and family health (Chevarria & Gomes, 2013). Factors can reinforce altruistic values, such as the religiosity of the individual (Bhuan, et al., 2018), being something inspirational that transcends the individualistic orientation of perceiving the world. Conversely, there is the perception that negative consequences to collective goods, such as the environment, can also have negative impacts on the individual. Therefore, pro-environmental attitudes may originate from selfish motivations, beneficial to the individual (Chevarria & Gomes, 2013).

Based on the literature review, several authors argue that an individual's pro-environmental attitudes derive from his altruistic characteristics (Inglehart, 1990; Stern, Dietz, & Guagnano, 1995; Göksen, Adaman, & Ünal Zenginobuz, 2002; Tilikidou & Delistavrou, 2004; Kilbourne & Pickett, 2008; Veiga & Ribeiro, 2011; Gifford & Nilsson, 2014; Polonsky, Kilbourne, & Vocino, 2014). Values, such as altruism, may also affect peoples' awareness of environmental problems associated with their behavior (de Groot & Steg, 2007). So we propose the following hypotheses.

- **H1:** Altruism tends to have a positive relationship with environmental responsibility.
- **H2:** Environmental awareness mediates the positive relation between altruism and environmental responsibility.
- **H2a:** Altruism has a positive and direct relation to environmental awareness.
- **H2b:** Environmental awareness has a positive and direct relation to environmental responsibility.
- **H3:** Altruism tends to have a negative relationship with environmental irresponsibility.

#### 2.4. MATERIALISM

Materialism can be defined as the importance a consumer gives to his possessions (Belk, 1985), as the individual's interest in spending, or as the importance that an individual gives to the acquisition of material goods to achieve their life goals and their desirable states (Richins, 2004). Characteristics such as envy, possessiveness, and lack of generosity (Belk, 1984) can be directly associated with materialism, and can still be characterized as a consumption value (Richins & Dawson, 1992). A characteristic of materialism is the fact that acquisition can often be the means to pursue the happiness of individuals, i.e. the purchase of goods can lead to happiness and satisfaction in life, more than other avenues such as interpersonal relationships, experiences, or achievements. Another obvious feature is that possessing material goods means success for the individual. Specifically, the amount of accumulated goods and possessions reflects their degree of success, projecting through these goods the desired self-image (Richins & Dawson, 1992). Individuals who have a high degree of materialism value products of higher financial value more than similar products that have public meanings related to greater success or prestige (Richins, 1994).

People who have materialistic values feel happiness when purchasing goods, so they increasingly buy products to maintain and/or increase that feeling of happiness and are therefore constantly compelled towards consumerism. Consumerism is a factor that generates environmental impacts (Tilikidou & Delistavrou, 2004). Thus, environmentally conscious consumers cannot be classified as materialistic and are those who tend to buy less, consume less, choose products with less negative environmental impact, generate less waste, and recycle (Tilikidou & Delistavrou, 2004). From this information, the following hypotheses were identified:

- **H4:** Materialism tends to have a positive relationship with environmental irresponsibility.
- **H5:** Materialism tends to have a negative relationship with environmental responsibility.

#### 2.5. SOCIAL DESIRABILITY

Studies on social desirability first expanded in the work of Allen L. Edwards in the 1950s. The term social desirability can be defined as the propensity of research participants to tentatively answer the questions asked (Ribas Jr., Moura & Hutz, 2004) or through their answers, want to please the research applicator (Gouveia, Gonçalves, Costa, Araújo, Gouveia, & Medeiros, 2009). Edwards (1957) observed that in personality research, individuals could not fully and truly portray themselves, for there was a conscious or unconscious influence of society on their expression of behavior. Respondents tend to answer questions as they find them most acceptable, or socially correct, even if the answer does not match their attitudes or opinions (Braga Junior et al., 2013; King & Bruner, 2000).

Self-reported psychological research, social and cultural rules, or patterns considered politically correct, end up influencing the individual's responses. Thus, the individual may always give positive answers or, depending on the wording of the question, always negative answers (Gouveia, Gonçalves, Costa, Araújo, Gouveia, & Medeiros, 2009). The bias caused by the influence of social desirability is one of the most impactful and common in psychological and social research, compromising its results and validity. As a result, research in Marketing, especially that which is related to consumer behavior, pays attention to the social desirability bias (King & Bruner, 2000). Social desirability may be more subjective, varying according to mood and self-perception of individuals, or by self-deception, which is when the respondent is unaware their response is biased. Here, the influence of social desirability is involuntary (Ribas Jr., Moura & Hutz., 2004). The social desirability variable may compromise the reliability of behavioral research, consequently, its further study is important (Ribas Jr. et al., 2004). King and Bruner (2000) recommend the use of scales that monitor social desirability bias in behavioral research, such as the Social Desirability Scale developed by Crowne and Marlowe (1960).

Based on the literature review, two studies demonstrate that selfishness (Chevarria & Gomes, 2013) and materialism (Furchheim, Jahn, & Zanger, 2013) can be positively related to pro-environmental attitudes. Thus, we propose that social desirability influences the relationship between materialism and environmental responsibility.

- **H6:** Social desirability moderates the negative relationship between materialism and environmental responsibility, making it weaker.

Figure 2 shows the theoretical model.

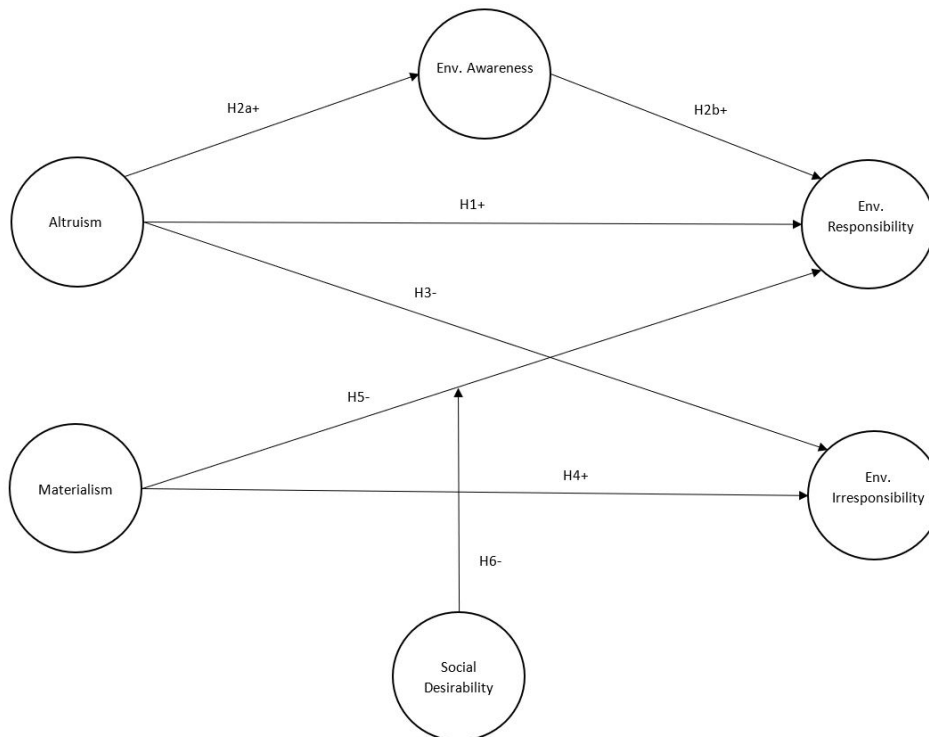


Figure 2. Theoretical Model.

### 3. METHOD

We conducted quantitative research, through a descriptive survey, with a collection of primary data. We printed and distributed self-completed questionnaires to a classroom of undergraduate students, in a convenience sample. The authors collected the data through a self-completion form in which we inserted questions to identify the demographic characteristics of the respondents, as well as the scales for measuring altruism, materialism, environmental awareness, environmental responsibility, and environmental irresponsibility, along with the scale to estimate social desirability, as advised by King and Bruner (2000). We conducted a pre-test with five respondents with characteristics similar to the sample to be studied and the respondents identified no errors or difficulties regarding the data collection instrument or evidence of problems in the translation of the scales. The final analysis of the data disregarded these five forms.

The final sample consisted of university students, over 18 years old, from a large institution of higher education in São Paulo, who came from management courses (e.g. Business, Human Resources Management, Foreign Trade). As a filtering issue, participants had to be responsible for at least half of the household purchases or be the person who decides the brands and products that are purchased. We collected data from 350 respondents, the double of indicated by G \* Power statistical software, considering the 5% significance level ( $\alpha = .05$ ), the test power above .95, and the effect size ( $f^2$ ) below .15 (Cohen, 1992).

Based on the inconsistency in the existing literature that measures altruistic behavior in individuals, Rushton, Chrisjohn and Fekken (1981) developed the Self-Report Altruism Scale (SRA), originally composed of 20 items. The SRA allows respondents to assess how often they perform altruistic activities, measured using a 5-point scale anchored between 1 = “never” and 5 = “very often”. We used a Portuguese version of this scale, which was reduced to 17 items, as a unidimensional scale, and validated by Gouveia, Athayde, Gouveia, Gomes and Souza (2010).

The scale elaborated by Richins and Dawson (1992) aims to measure materialism based on three criteria: definition of success, acquisition as a central action, and pursuit of happiness. Originally composed of 18 items, Richins (2004) proposed to reduce the original scale into two versions: one with 15 items, five for each dimension, which allows measuring the variations of the three dimensions of materialism, and another with nine items to measure materialism. As this work does not aim to evaluate materialism according to its three dimensions, the authors used the scale composed of nine items as a unidimensional construct. Based on the scale proposed by Richins (2004), we used Ponchio, Aranha and Todd (2007) translated and validated scale, in the Brazilian context, which is composed of nine items in a one-dimensional design ( $\alpha = 0.74$ ), measured by a 5-point scale anchored between 1 = “never” and 5 = “very often”.

To identify environmental awareness, environmental responsibility, and environmental irresponsibility, we used the scale built and validated by Garcia, Silva, Pereira and Pinheiro (2011) that has 20 assertions, measured through a 5-point scale anchored between 1 = “strongly disagree” and 5 = “agree fully”. Although the same study developed the statements, the authors found that each of the three constructs is independent.

The Marlowe-Crowne Social Desirability Scale – MCSDS is one of the most widely used scales to measure social desirability (Beretvas, Meyers, & Leite, 2002). It is a scale composed of 33 statements, in which the individual must choose whether they are true or false, according to their perception (Crowne & Marlowe, 1960). Gouveia, Guerra, Sousa, Santos and Costa (2009)



translated and adapted to Portuguese and validated the Marlowe-Crowne scale to apply in the Brazilian context. We used this scale as a single indicator, to measure individuals more and less likely to social desirability.

The initial data analysis included the verification of missing values, the analysis of outliers through the box-plot graph, and multivariate through the Mahalanobis distance (D2), and the univariate normality of the variables (Hair, Black, Babin, Anderson, & Tatham, 2009). We analyzed the data using Structural Equation Modeling (SEM). According to Malhotra, Lopes and Veiga (2014), structural equation modeling is a regressive technique used to estimate the relationships between latent variables of a theoretically oriented relational model. The structural equation modeling with partial least squares estimation (PLS-SEM) is useful in researches whose data came “from attitude scales or Likert type, and such scales present data that are rarely adherent to the multivariate normal distribution” (Bido & Silva, 2019, p.510). Thus, we used SmartPLS 3 software and we performed the SEM in two phases. In the first phase we analyzed the convergent and discriminant validity and in the second, the structural relationships (Bido & Silva, 2019).

## 4. RESULTS

### 4.1. PRIOR DATA PREPARATION AND RESPONDENT PROFILE

We distributed 350 questionnaires, of which 11 (3.14%) were disregarded for containing missing values. Thus, the analysis incorporated 339 valid questionnaires. In terms of demographic profile, most respondents were women ( $n = 233$ ), representing 68.8% of the valid respondents. The respondents were young, aged approximately 18 to 30 years ( $n = 275$ ; 81.2%). In addition, 71.2% ( $n = 242$ ) of the respondents declared themselves single and 82.5% ( $n = 280$ ) said they had no children, and 81.2% ( $n = 275$ ) reported being currently employed.

A few questions were asked to better understand individuals' spending habits. Considering the purchase of routine products such as food, beverages, and cleaning products, 54.8% ( $n = 185$ ) said they were responsible for at least half of their home purchases. In terms of personal products such as deodorants, shampoos, clothes, watches, and shoes, 64.9% ( $n = 220$ ) of respondents said they decide only the brands of products purchased for themselves; 24.4% ( $n = 83$ ) said they decide the brands of products purchased for themselves or other family members.

### 4.2. MODEL INDICATORS AND CONVERGENT VALIDITY

For model adjustment analysis, we used SmartPLS 3 software. First, to evaluate the relational model, we analyzed the fit indicators. In this phase, we used the criteria indicated by Ringle, Silva and Bido (2014): average variance extracted (AVE) greater than .50, internal consistency, and using Cronbach's Alpha and composite reliability (Dillon-Goldstein rho). Appropriate values above .60 for Cronbach's alpha and above .70 for composite reliability are considered adequate (Ringle et al., 2014), as shown in Table 1. To verify the convergent validity, we analyzed the charges between the manifest variables and the latent variables. Good estimators are latent variables with a load greater than .50 in construct formation.

**Table 1**  
*Construct's Reliability and Validity*

	AVE	Composite Reliability	R Square	Cronbach's Alpha	rho_A
Altruism	.599	.817	–	.670	.697
Env. Awareness	.699	.874	.037	.782	.784
Env. Irresponsibility	.576	.801	.070	.628	.665
Materialism	.520	.883	–	.847	.860
Env. Responsibility	.511	.836	.513	.761	.794

### 4.3. DISCRIMINANT VALIDITY

Discriminant validity analysis is defined as the degree to which two similar concepts are distinct. The discriminant validity test verifies the correlation between the measures, identifying if the multiple scales correlate with similar but distinct measures (Hair et al., 2009). One way to analyze discriminant validity is by using the criterion of Fornell and Larcker (1981), where, according to Ringle et al. (2014, p. 72) “the square roots of the stroke values of each construct with the (Pearson’s) correlations between the constructs”. The authors also recommend that the square roots of strokes should be larger than the correlations between those of the constructs. Table 2 displays this perfectly achieved condition. We also consider the Heterotrait-Monotrait Ratio (HTMT) and the Cross-Loadings to assess the discriminant validity. To analyze HTMT, Henseler et al. (2015) suggest a value below 0.90, a condition reached, as shown in Table 3. For cross-loadings, the indicator is expected to correlate more strongly in its own construct than with other constructs (Henseler et al., 2015), a condition that is also satisfied, as shown in Table 4.

**Table 2**  
*Discriminant Validity – Fornell and Larcker criterion*

	AVE roots	Altruism	Env. Awareness	Env. Irresponsibility	Env. Responsibility	Materialism
Altruism	<b>.774</b>	.774				
Env. Awareness	.836	.192	<b>.836</b>			
Env. Irresponsibility	.759	-.013	.060	<b>.759</b>		
Env. Responsibility	.715	.196	.711	.117	<b>.715</b>	
Materialism	.721	-.029	-.042	.264	-.046	<b>.721</b>

**Note:** The bolded diagonal matrix indicates the square root AVE of the construct.

**Table 3**  
*Discriminant Validity - Heterotrait-Monotrait Ratio (HTMT)*

	Altruism	Env. Awareness	Env. Irresponsibility	Env. Responsibility	Materialism
Altruism					
Env. Awareness	.255				
Env. Irresponsibility	.080	.166			
Env. Responsibility	.272	.873	.180		
Materialism	.105	.080	.340	.104	

**Table 4**  
*Discriminant Validity - Cross Loadings*

	Altruism	Env. Awareness	Env. Irresponsibility	Env. Responsibility	Materialism
ALT4	.798	.141	-.011	.171	-.033
ALT5	.687	.108	-.026	.110	-.027
ALT6	.830	.184	-.000	.165	-.010
ENV15	.017	.056	.743	.099	.186
ENV17	-.014	.011	.861	.091	.241
ENV18	-.036	.088	.659	.078	.164
ENV19	.106	.537	.150	.788	-.023
ENV2	.173	.623	.086	.765	.011
ENV3	.169	.887	.102	.622	.007
ENV4	.139	.854	.107	.539	-.018
ENV5	.162	.586	.013	.788	-.110
ENV6	.168	.762	-.052	.610	-.094
ENV7	.145	.437	.113	.690	-.060
ENV8	.104	.236	.071	.502	.056
MAT2	.046	-.017	.250	-.038	.743
MAT3	-.089	-.031	.102	-.058	.706
MAT4	-.029	-.034	.208	-.023	.790
MAT5	-.040	.008	.212	-.005	.789
MAT6	-.068	-.028	.153	-.031	.687
MAT8	-.004	-.068	.182	-.052	.645
MAT9	-.019	-.058	.161	-.042	.677

#### 4.4. PATH ANALYSIS

With the guarantee of convergent and discriminant validity, we began the process of structural model analysis, with the analysis of the paths. In a first analysis, considering only the altruism and materialism constructs, we observed a positive and high charge. The second has a negative but low charge when considering all constructs. We verified the significance of relationships through the bootstrapping technique. According to Hair et al. (2009), the bootstrapping technique is a form of re-sampling whose original data is repeatedly sampled with a replacement for model

estimation. This technique considers the t-test (Student), which “assesses the statistical significance of the difference between two independent sample means or, the t value represents the difference in groups in terms of standard error” (Da Silva & Lopes, 2014, p.49). It is critical values for this test (200 iterations):  $1.65 = p < 10\%$ ;  $1.96 = p < 5\%$  and  $2.53 = p < 1\%$  (Hair et al., 2009).

#### 4.5. MODEL ANALYSIS RESULTS

Analyzing the structural equation model, we observed the relation of altruism-environment responsibility was not significant, rejecting H1 (Altruism tends to have a positive relationship with environmental responsibility). We confirmed H2 (Environmental awareness mediates the positive relation between altruism and environmental responsibility), with H2a (Altruism has a positive and direct relation to environmental awareness) ( $p < .05$ ) and H2b (Environmental awareness has a positive and direct relation to environmental responsibility) ( $p < .01$ ). We performed the calculations to test mediation according to the guidelines of Hair Jr. (2014) combined with SmartPLS 3 software, as can be seen in Tables 5 and 6, respectively. We did not confirm H3 (Altruism tends to have a negative relationship with environmental irresponsibility).

The relation of materialism-environment irresponsibility was significant, as exhibited in Table 5. Thus, we confirmed hypothesis H4 (Materialism tends to have a positive relationship with environmental irresponsibility). Conversely, we did not confirm the relation of materialism-environmental responsibility, rejecting H5 (Materialism tends to have a negative relationship with environmental responsibility). By including the social desirability variable as moderator, the relationship materialism-environment responsibility did not become significant, which involves rejecting H6 (Social desirability moderates the negative relationship between materialism and environmental responsibility, making that weaker), as shown in Table 7. Figure 3 presents the final structural model.

**Table 5**  
*Hair’s Explained Variance*

Hair (2014) Explained Variance					
VAF (Variance Accounted For)	1st relation	2nd relation	Direct Relation	VAF	
Altruism → Env. Awareness → Env. Responsibility	.192	.699	.06	.6911	Partial Mediation

**Table 6**  
*Specific Indirect Effects*

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics ( O/STDEV )	P Values
Altruism → Env. Awareness → Env. Responsibility	.134	.139	.039	3.448	.001

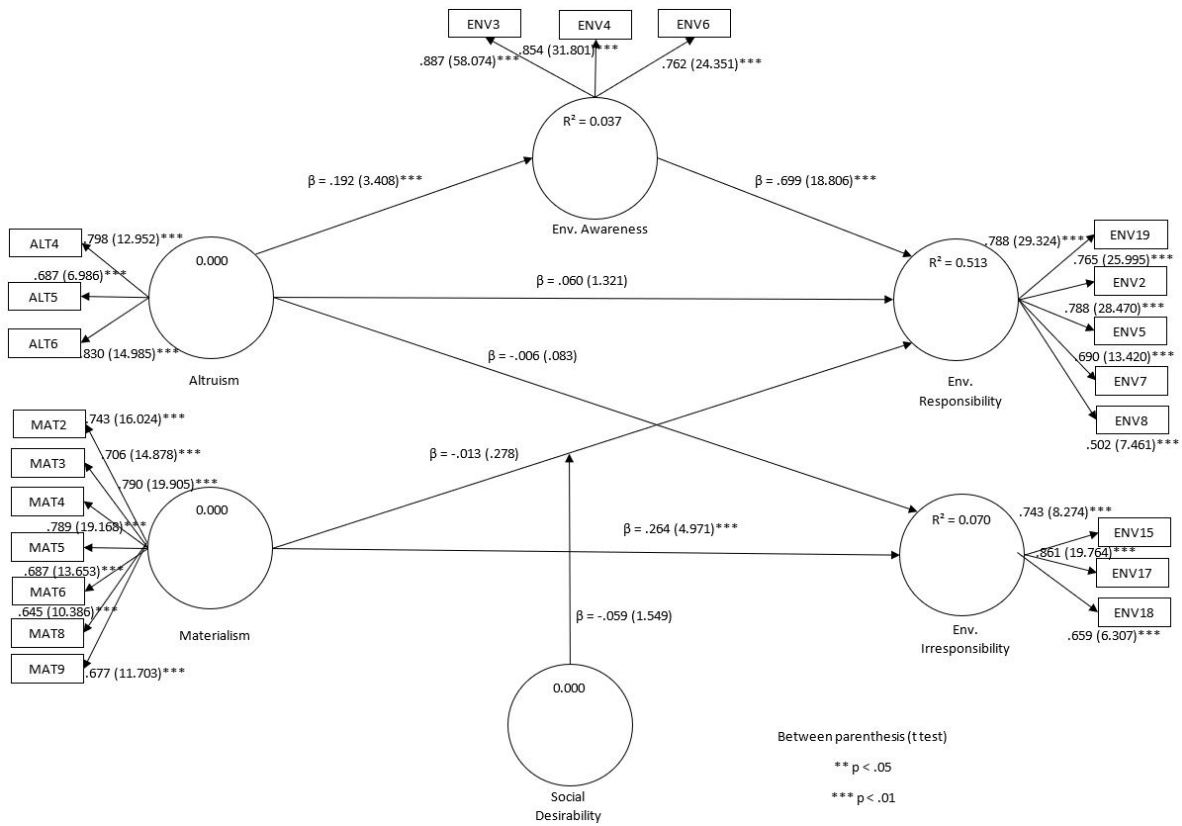


Figure 3. Final Structural Model.

Table 7  
Path Analysis

	Hypothesis	Coefficient	T Statistics	P-Value	Significance	Diagnosis
Altruism → Env. Responsibility	H1	.085	1.321	.187	n.s.	Not supported
Altruism → Env. Awareness → Env. Responsibility	H2	–	3.448	.001	P = .01	Supported
Altruism → Env. Awareness	H2a	.183	3.408	.001	p = .01	Supported
Env. Awareness → Env. Responsibility	H2b	.599	18.806	.000	p < .01	Supported
Altruism → Env. Irresponsibility	H3	.446	.083	.934	n.s.	Not supported
Materialism → Env. Irresponsibility	H4	.258	4.974	.000	p < .01	Supported
Materialism → Env. Responsibility	H5	.032	.278	.781	n.s.	Not supported
Materialism* Social Desirability → Env. Responsibility	H6	.112	1.549	.122	n.s.	Not supported

## 5. DISCUSSIONS

From the data presented, it is possible to establish contributions from the previously presented theoretical body. The first confirmed finding is that people with more altruistic characteristics tend to have a more positive relationship with environmental responsibility. More generous individuals who make personal concessions to help someone without personal gain interests as their purpose (Chou, 1996; Goldstein, 1983) tend to be those who care most about a person and social good, such as pro-environmental attitudes, which is reflected in all people. Environmental protection, for example, is viewed as something an altruistic individual does, as it is something for society that expands the individual domain (Chevarria & Gomes, 2013). This reinforces that those who are more helpful to others tend to think of pro-environmental causes, and those causes are social. This result corroborates that those individuals with the most intense spiritual and social values tend to worry about this type of cause (Bhuian, et al., 2018).

Our findings complement the findings of Xu et al. (2019), and Zhang et al. (2019), that state altruism alone does not motivate environmental responsibility. First, there must be environmental awareness. Thus, we understand that the individual only becomes environmentally responsible if he or she is also environmentally conscious.

The results confirm the fourth hypothesis, which is that people with materialistic characteristics tend to have a more positive relationship with environmental irresponsibility. This appears to be because interests in their property and material goods are commonly individual goals of great importance to the individual (Belk 1984; Richins 2004). Unlike altruism, which is essentially socially oriented, materialism is justified as something individual when it carries within it the possession of something (Belk 1984) and the interests transposed into personal consumption (Richins & Dawson, 1992). The concern of personal materialism about pro-environmental concerns leads to an exacerbated consumerism that is more negatively impactful to the environment (Tilikidou & Delistavrou, 2004) and is in favor of behavior that prioritizes individual possessions and goods.

Given this, the altruistic and materialistic characteristics of individuals explain, in part, their attitudes and how environmental concerns or motivations may support them. We found that altruism positively related to environmental responsibility when mediated by environmental awareness, while materialism is directly and positively related to environmental irresponsibility. The results of this research predominately corroborate the studies by Stern, Dietz and Guagnano (1995), Gilg, Barr and Ford (2005) and Veiga and Ribeiro (2011), which indicate that altruism has a positive relationship with attitudes, concerns, or behaviors related to the environment or sustainability. However, they remain divergent, as proposed by the studies by Göksen, Adaman and Ünal Zenginobuz (2002) and Gifford and Nilsson (2014), which indicate that materialistic individuals can somehow positively correlate with actions or attitudes favorable to the environment and sustainability. These results still conflict with the findings of González-Rodríguez, Díaz-Fernández and Biagio (2019) who identified that altruistic values such as self-transcendence and conservation, encourage consumers to act in accordance with society. This combined result of the hypotheses shows that those who have values that are more focused on individualism and less on social, concern themselves less with pro-environmental issues, considered essentially to be positively linked to a person's collective feelings and not to their individualistic behavior.

Finally, the individual who behaves more collectively, perhaps does this without final personal interests, going against the findings of Chevarria and Gomes (2013). This is because their social desirability does not interfere with this relationship between their materialism and environmental responsibility. Even if the individual wants to be well regarded by society, it does not potentiate

their materialism leading to greater environmental concern. Individuals with a great level of materialism do not worry about what society thinks of them (social desirability) and this does not reinforce the relationship between their materialism and environmental responsibility. The materialist likely wants to be seen as self-directed who is self-made with a plethora of material gains, and the more he (or she) cares to be socially correct, the more he or she explores materialistic sides, which means having things that should be praised and that represent personal success, and this person does not care about collective gain.

This point serves as a breakthrough in current theories regarding pro-environmental behavior. The more individuals are individualistic and concerned about material possessions, the more concerned they are with making a social impression, then he or she prefers that society see material goods and individual achievements rather than those concerned with collectivities, such as preserving the environment.

## 6. CONTRIBUTIONS AND FINAL CONSIDERATIONS

This study aimed to contribute to the theoretical framework in disciplines related to sustainable consumption or pro-environmental behavior. Specifically, the study analyzed the characteristics and attitudes of individuals regarding environmental issues. We identified the influence of environmental awareness on environmental responsibility. We conclude that altruism does not lead individuals to environmental responsibility, this relationship only happens through the mediation of environmental awareness. As Littleddyke (2008) elucidated, an individual can promote their environmental awareness through different levels, including self-awareness, which includes: a) a perception of individual impact, involving lifestyle and consumer choices; b) social awareness, which considers a perception of environmental impacts due to the social interaction; and c) environmental awareness, that includes a perception of how society, in general, impacts the ecosystems. Thus, we reinforce the necessity to create policies to develop individual's awareness, in different levels of society, to promote and encourage environmental responsibility.

Besides the theoretical contribution, the study brings contributions to the practice, generating new information about individuals and their consumption habits. Governmental and business entities must come to better understand the consumption behavior of these individuals and their motivations due to the impact that consumption has on the environment. By focusing on the values of their target audience, or even the consumer market, companies can direct their positioning and communication strengths to attract and encourage such individuals to consume products that are more sustainable and more environmentally friendly. Increased knowledge of the consumer market, therefore, enables companies to adapt or create new products or new businesses to maintain or increase profits while negative environmental impacts are mitigated.

Such work may be useful for government and third sector institutions, in activities of public interest involving environmental protection, such as saving water or energy or recycling waste. By better understanding the characteristics of the population, including their most present values, it is possible to design more effective communication and publicity campaigns that encourage individuals to change their attitudes or even to make them definitively aware of their needs and environmental problems.

As an indication for further studies, we suggest investigating how social desirability can relate to other values to map possible consumer profiles more or less likely to adopt pro-environmental attitudes. Values such as self-efficacy, openness to experience, kindness, need for material resources, need for bodily resources, and emotional instability can be analyzed with altruism and materialism to identify other possible relationships between such values among themselves and those with others

pro-environmental attitudes. Another suggestion is investigating how materialistic individuals can contribute or engage in pro-environmental actions. Our sample being composed of individuals of similar age and social status is another limitation. So, we also suggest investigating individuals with distinct socio-demographic characteristics, that is, individuals from other social classes, with other levels of education or other ages to identify how these variables may influence the relationships found in this study.

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#### **LEGAL WARNING**

The authors certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge, or beliefs) in the subject matter or materials discussed in this manuscript.

#### **AUTHOR'S CONTRIBUTION**

Author 1: Articulation of the project. Development of the line of reasoning, elaboration of hypotheses and theoretical model, and writing of the text.

Author 2: Development and improvement in several parts of the text, mainly with regard to concepts about sustainability and environmental responsibility.

Author 3: Collaboration in the development of the method and quantitative analysis. Contribution to the concept of environmental awareness and social desirability.

Author 4: Contribution to articulation throughout the text, in the analysis of results and in the development of concepts related to altruism and materialism.