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A Motivational Model for Environmentally Responsible Behavior

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This paper presents a study examining whether self-efficacy and intrinsic motivation are related to environmentally responsible behavior (ERB). The study analysed past environmental behavior, self-regulatory mechanisms (self-efficacy, satisfaction, goals), and intrinsic and extrinsic motivation in relation to ERBs in a sample of 156 university students. Results show that all the motivational variables studied are linked to ERB. The effects of self-efficacy on ERB are mediated by the intrinsic motivation responses of the participants. A theoretical model was created by means of path analysis, revealing the power of motivational variables to predict ERB. Structural equation modeling was used to test and fit the research model. The role of motivational variables is discussed with a view to creating adequate learning contexts and experiences to generate interest and new sensations in which self-efficacy and affective reactions play an important role.
Keywords: self-efficacy, intrinsic motivation, environmentally responsible behavior.

Este artículo analiza si autoeficacia y motivación intrínseca están relacionadas con el comportamiento ecológico responsable. El estudio analiza la relación del comportamiento proambiental en el pasado, los mecanismos de autorregulación (autoeficacia, satisfacción, metas) y la motivación intrínseca y extrínseca con el comportamiento ecológico responsable actual, en una muestra de 156 estudiantes universitarios. Los resultados muestran que todas las variables motivacionales estudiadas están vinculadas con el comportamiento ecológico responsable. Los efectos de la autoeficacia en el comportamiento ecológico responsable están mediados por las respuestas de motivación intrínseca de los participantes. Se confirmó mediante análisis de vías un modelo teórico, que puso de manifiesto la potencia de las variables motivacionales para poder predecir el comportamiento ecológico responsable. Mediante un modelo de ecuaciones estructurales se probó el ajuste el modelo. Se discute el papel de variables motivacionales a la hora de crear contextos de aprendizaje adecuados y nuevas experiencias, en los que la autoeficacia y las reacciones afectivas tienen gran importancia.
Palabras clave: autoeficacia, motivación intrínseca, conducta ecológica responsable.

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In many of the conceptual models created to explain the genesis, maintenance, and change in pro-environmental behavior it has been explicitly or implicitly assumed that the main psychosocial constructs are motivational in nature. Some of these approaches have generated a large volume of research in environmental psychology (Bamberg & Möser, 2007). In their explanations, these theories incorporate variables that motivate environmentally responsible behaviors (ERBs). Mischel and Shoda (1998) propose a framework for analyzing how people tackle challenging tasks, and how personal and situational factors influence motivation, performance, and learning. This general theoretical framework explains human behavior by focusing on the cognitive and affective processes that influence how people react to different situations (new, complex, and challenging tasks), such as how to establish a new recycling system in the home, and how to modify energy consumption habits and mobility patterns.

In recent years, research into the role of self-efficacy to explain behavior has taken centre stage (García & Fidalgo, 2008; Vancouver, Moore, & Yoder, 2008; Zimmerman & Schunk, 2003). Vancouver et al. (2008, p. 36) suggest that 'self-efficacy is arguably the most popular form of expectancy belief in the applied psychology literature', and other scholars claim that 'self-efficacy has proven to be one of the most focal concepts in contemporary psychology research' (Judge, Jackson, Shaw, Scott, & Rich, 2007, p. 107). The role of self-efficacy has been analyzed chiefly in academic (Pajares & Urdan, 2006), health (Bandura, 2005), sporting (Feltz, Short, & Sullivan, 2008), and organizational contexts (Combs & Luthans, 2007). In these contexts, the results of behavior can be quantified. The individual receives immediate feedback, reward, and social recognition (from the other members of a team, department, etc.), and behavior takes place within a structured context with a supervisor, teacher, doctor, or coach, and in relation to specific goals that are generated externally (to increase insurance sales, to reduce body fat, or to improve the team's position in the league).

In this context, the meta-analyses carried out by Stajkovic and Luthans (1998) revealed high consistency in the link between self-efficacy and behavior. Other authors (Judge et al., 2007) have also indicated that the relationship between self-efficacy and behavior is more intense when the task has an average level of complexity, there is a brief interval between the evaluation of self-efficacy and performance, there is a clear assignation of goals, and individuals have had previous practice with the task. Therefore, self-efficacy may not be as 'pervasive across contexts and domains of human functioning' as Zimmerman and Schunk (2003, p. 448) suggest.

Fewer studies, however, have analyzed the role of self-efficacy in pro-social and altruistic behaviors, for which a quantifiable reward is either not received or is received after a substantial period of time has elapsed. In order for this type of behavior to take place, people must feel able to perform the acts and manage the emotions it generates. Ramus and Killmer (2007) argue that pro-environmental behavior is a special type of pro-social behavior (e.g. behaviors that are directed toward and performed with the intention of promoting the welfare of an individual, group, or organization). In order to carry out these acts and make their abilities available for the well-being of others, it is not enough for people simply to perceive that they have the emotional and social abilities required for pro-social behavior. The perception of capacity must be accompanied by the intrinsic motivation that the behaviors generate. Caprara and Bonino (2006) claim that the capacity to act for the benefit of others contributes to intrinsic or vital satisfaction, whereas Grant (2008) affirms that intrinsic motivation moderates the association between pro-social motivation and behavior. Conceptually, the proposed relationships between self-efficacy and intrinsic motivation are not new in the literature (Bandura, 1982), but the mediational role of intrinsic motivation in the association between self-efficacy and pro-environmental behavior has yet to be assessed. On the basis of this concern, the main purpose of this study is to analyze the role of motivational variables—such as self-efficacy and intrinsic motivation—in the explanation of ERB.

Self-efficacy guiding behavior

As indicated previously, of all the different self-regulatory mechanisms of behavior, Bandura (2002) maintains that self-efficacy is the best predictor of the acts we choose to carry out and for which a greater level of effort is required. Self-efficacy can be defined as the belief in one's own capacity to organize and guide the courses of action needed to tackle certain situations in the immediate future (Wood & Bandura, 1989). The studies reviewed by Bandura (1997) show that self-efficacy judgements affect the goals people set for themselves and their affective reactions to the levels of performance achieved in very different contexts, where goals are conceptualized as cognitive representations of positive or negative competence-relevant possibilities that are used to guide behavior (Elliot & Trash, 2001).Therefore, according to this theory, it is necessary to create the perception of capacity within the individual for a motivational process to appear. The individual must feel able to carry out the act at a certain point in time and to a specific level.

Given that judgements of self-efficacy or expectations of capacity derive from an individual's self-evaluation of the performance levels attained in the past, there is a strong correlation between past performance and self-efficacy (Vancouver, Thompson, & Williams, 2001). There are, however, other mechanisms through which self-efficacy has a direct effect. Self-efficacy helps individuals to focus their attention and reduces surrounding distractions (Kanfer &

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Ackerman, 1996), influences the level of difficulty of the goals selected, the level of commitment to those goals (Locke & Latham, 2002), and the efficient allocation of resources toward the accepted goals (Vancouver et al., 2008), in addition to facilitating the search for more efficient strategies (Tabernero & Wood, 1999). Therefore, even though there are motivational mechanisms that can guide our actions, such as goals or incentives, if individuals do not feel capable of carrying out an act, however high the reward, they will not do so and will not be able to persist in their effort when encountering difficulties (Bandura, 1997).

Perceived self-efficacy influences cognitive functioning through its impact on self-satisfaction with personal development and the demands of the goals selected. Satisfaction is conceptualized as the difference between what individuals think they should receive and what they feel they actually receive (Locke, 1968). Bandura (1997) has shown that individuals who initially doubt their capacity feel dissatisfied with themselves and their achievements, and it is highly likely that they will lose interest in the task. Similarly, they will tend to avoid change and stick to goals they are certain they can achieve. In contrast, the higher their perception of self-efficacy, the greater the changes in their chosen goals (Earley & Lituchy, 1991). These authors affirmed that the chosen goals serve a directive function in individuals' estimates of their capacity to perform in their work environment

Given the theory and research reviewed above and transferring these results to the sphere of pro-environmental behavior, it is reasonable to assume that, for example, individuals who have a high self-efficacy judgement of themselves vis-à-vis recycling, saving water, energy, etc. will feel more satisfied when undertaking these actions, set themselves more demanding goals in relation to these actions, and will accordingly engage in more pro-environmental behaviors. From a dynamic perspective, such behavior provides feedback that will encourage individuals to achieve a higher perception of self-efficacy in the future, feel more satisfied, and so on. Hence, these self-regulatory mechanisms act like ascending spirals that interact dynamically to motivate behavior (Lindsley, Brass, & Thomas, 1995). The strong theoretical basis provided by the studies reviewed would suggest a positive relationship between self-regulatory mechanisms, intrinsic motivation, and performance. We therefore specifically suggest the following hypotheses:

H1a: Individuals with numerous past environmental acts will show higher levels of self-efficacy judgements.

H1b: Individuals with high self-efficacy judgements will set more challenging goals and feel more satisfied with environmental acts than individuals with a lower perception of their efficacy to perform environmental acts.

H1c: Individuals with high self-efficacy judgements will engage in more pro-environmental behaviors than individuals with a lower perception of their efficacy to perform environmental acts.

Intrinsic and extrinsic motivation guiding behavior

When analyzing the reasons individuals choose and engage in while maintaining their behaviors, Kasser and Ryan (1996) examined the content of the goals that people set for themselves, distinguishing between intrinsic and extrinsic motivations. Intrinsic motivations refer to 'participation in an activity for the very pleasure and satisfaction one feels from doing it' (Moreno, González-Cutre, & Chillón, 2009, p. 328) and aim to satisfy psychological needs directly in terms of relationships, autonomy, competence, self-acceptance, affiliation, a sense of community, or health. Extrinsic motivations, on the other hand, refer to obtaining some kind of reinforcement or social recognition, such as economic success, image, or popularity, and so refer to 'commitment to the activity as a means to achieve something, but not an end in itself' (Moreno et al., 2009, p.328). Intrinsic motivation can be defined as the desire to expend effort based on interest in and enjoyment of the work itself, whereas extrinsic motivation is the desire to expend effort to obtain outcomes external to the work itself, such as reward or recognition (Grant, 2008).

With regard to motivation in terms of ERB, research has identified two main approaches related to the contrast between external and internal motives (De Young, 2000). The external approach, in the context of ERB, assumes that people engage in behavior in order to gain maximum benefit for themselves as a course of habit, to satisfy a social norm and all 'separable goals', including environmental protection (Oceja & Berenguer, 2009). Given the principles of functional analysis, it is reasonable to assert that the consequences of behavior are the motivating factors for that behavior and analyze the effect of incentives and penalties to promote or modify ERB (Geller, 2002). For example, in relation to petrol consumption, reinforcement has been considered an effective way of reducing consumption and enhancing efficient use (Syme, Nancarrow, & Seligman, 2000). The efficacy of this approach has also been observed in relation to saving water, recycling glass, and many other ERBs (Corral-Verdugo & Frías, 2006). Research has shown, however, that although incentives or punishments can be useful when generating ERB they have almost no effect on the duration of change in the long term or the permanence of change when contingencies disappear, even when intermittent reinforcement is applied (Dwyer, Leeming, Corben, Porter, & Jackson, 1993; Levitt & Leventhal, 1986; Srivastava, Locke, & Bartol, 2001).

As regards the internal approach, researchers focus their interests and actions on internal motivations, values, beliefs, or attitudes that guide the actions of individuals or collectives (Hartig, Kaiser, & Bowler, 2001). Certain authors (Kalinowski, Lynne, & Johnson, 2006) consider that people's personal interest in engaging in ERB is the key to explaining environmental motivation. Corbett (2005) maintains, however, that personal interests as well as values

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and beliefs (altruism, personal norms, participation, possibility of choice) would need to be present for ERB to be achieved among citizens. When a person engages in a certain behavior purely to obtain intrinsic satisfaction, this is associated more with a personal interest in the behavior than an ecocentric or anthropocentric interest; the individual simply feels satisfied by carrying out the act. There is a kind of relationship with altruism, considering that these actions are chosen freely by the individual; they imply a certain level of sacrifice but provide high levels of personal satisfaction. Given the theory and research outlined above, it is reasonable to conclude that pro-environmental behavior is promoted for both internal and external reasons and, therefore, we suggest the following hypotheses:

H2a: Individuals with high intrinsic motivation will engage in more pro-environmental behaviors than individuals with lower intrinsic motivation.

H2b: Individuals with high extrinsic motivation will engage in more pro-environmental behaviors than individuals with lower extrinsic motivation.

Mediational role of intrinsic motivation in self-efficacy and ERB relationships

The power of self-efficacy as an intrinsic reinforcement has been highlighted by De Young (2000), who indicates that we must not assume that just because people know *what* to do, they ought to know *why* they should do it, and *how* to behave. The reason is that when individuals feel capable of carrying out a certain kind of behavior, they feel an intrinsic satisfaction resulting from their own judgements of competence, which promotes choice and the generalization of new behaviors and personal development. Establishing a link with the review undertaken by De Young (2000), intrinsic motivation would be the satisfaction of having certain competences and engaging in responsible consumption, whereas extrinsic motivation would be based on the satisfaction of maintaining a sense of community. Both motivations can be activated depending on the type of activities or behaviors that make individuals focus their efforts on achieving a certain goal at a specific point in time. Therefore, on the basis of these arguments and the literature outlined above, we propose the following hypotheses:

H3: The relationship of self-efficacy judgements with pro-environmental behavior will be mediated by intrinsic motivation.

A path analysis will be developed to show the impact of self-regulatory mechanisms, and intrinsic and extrinsic motivations on the explanation of ERB. The expected order of the relationships between all variables has been shown previously: past environmental acts will be related to self-efficacy (H1a), self-efficacy will have an influence on goals and satisfaction (H1b), and these will explain ERB (H1c) across the mediational role of intrinsic motivation (H2a, H3).

In summary, this study analyses the relationship between motivational variables and pro-environmental behavior. Specifically, it explores the relationships between pro-environmental acts carried out in the past, self-regulatory mechanisms of behavior, intrinsic and extrinsic motivation, and pro-environmental behavior.

Method

Participants

The participants in this study comprised 156 students from the University of Cordoba (n = 76) and the University of La Laguna (n = 80), with an average age of 23.75 (SD = 6.21), ranging from 18 to 48 years. Of the sample, 69.2% were female and 30.8% male. None of the demographic variables had any effect on the other variables analyzed.

Task and procedure

A two-part questionnaire was used to evaluate the variables studied. The first part presented nine generically described pro-environmental acts, which the participants were required to score in terms of the degree to which the acts were part of their everyday behavior, perception of their capacity to carry them out, the importance of getting involved in the future, and the satisfaction associated with each of the nine actions. The nine environmental acts were based on the items presented by Osbaldiston and Sheldon (2003) to analyze the internalization process of environmental behaviors. These acts refer to environmentally friendly purchases, treatment of waste, paper recycling, energy saving, reduction of consumption, use of plastic bags, convincing others to act pro-environmentally, and only serving the right amount of food to be consumed. The last of the environmental actions proposed by these authors, 'stop eating meat', was replaced by 'save water', as this environmental problem is of greater concern to the Spanish population (Aragonés, Sevillano, Cortés, & Amérigo, 2006; TNS, 2005). Participants had to give their answers using a five-point Likert scale, where one indicated a lack of action, capacity, importance, or satisfaction, and five indicated the maximum presence of these measures.

The second part of the questionnaire was designed to analyze the specific environmental acts carried out and individuals' level of intrinsic or extrinsic motivation to perform them. This section was based on the extrinsic-intrinsic regulation continuum proposed by Deci and Ryan (2000). First, there was a brief introduction, which said 'We are interested in knowing what leads you to behave in a certain way at any given time in relation to specific environmental behaviors (both positive and negative)'. Participants were then told to describe specific behaviors carried out over the last weekend which fitted within each

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of the nine actions described in the first section. Subsequently, they were asked to choose the main reason(s), intrinsic and/or extrinsic motivation, which had led them to engage in these activities.

The questionnaires were administered during the students' practical classes. The students were told of the importance of their collaboration and the need to answer honestly, to avoid their responses being biased by social desirability. The students took between 25 and 35 minutes to complete the questionnaires.

Measures

Past environmental acts. A score was calculated for each participant for the variable 'past environmental acts' based on the adaptation of a variable initially proposed by Osbaldiston and Sheldon (2003). The score for each participant was the mean of the nine answers provided about the extent to which each of the nine environmental acts was practiced in his/her life.

Self-efficacy for environmental behavior. The perception of participants' capacity for pro-environmental behavior was evaluated with the item *How confident are you that will be able to carry out this act?* for each of the nine behaviors described in the first section of the questionnaire. This self-efficacy measure was created according to the instructions of the guide for constructing self-efficacy scales (Bandura, 2006). The score for each participant was the mean of all the answers given to this question for each of the nine environmental acts.

Self-set goals for environmental behavior. Considering the importance of engaging in each of the nine behaviors, two items were created for each act: *To what extent would you like to make more of an effort to do better?* and *To what extent do you think you will try to maintain this goal in the future?* The score for each participant was the mean of all the answers given for the two questions in relation to each of the nine environmental acts.

Environmental satisfaction. In order to evaluate the level of satisfaction experienced with each of the different environmental acts, participants were asked about the satisfaction they felt when carrying out each of the nine environmental acts in the past and the level of satisfaction they would gain when carrying them out in the future. The score for each participant was the mean of all the answers given for the two questions in relation to each of the nine environmental acts.

Intrinsic and extrinsic motivation. Based on the extrinsic-intrinsic regulation continuum proposed by Deci and Ryan (2000), a variable was created for extrinsic motivation using the sum total of all the acts carried out for any of the following reasons: *I do it… because of the consequences of this behavior, …because I want to obtain rewards or to avoid possible penalties, …because everyone does it, …because I have internalized the regulation and I accept that I must do it.* A variable was created for intrinsic motivation from the sum total of all the acts carried out for any of the following reasons: *I do it …because I enjoy doing it without receiving a reward or reinforcement, … for the sheer pleasure of doing it, … because personally I think it's worthwhile, … because I feel it's important to do it*.

Self-reported environmental behavior. In the second section, the students described which environmental acts they had carried out over the previous weekend (e.g. taking used batteries to an appropriate recycling point). The information reported consisted of a free recall of every ERB in which they had engaged. All reported behaviors were treated equally. The total number of acts described gave the score for this variable.

Data analysis

In relation to the aims of this paper (H1a, H1b, H1c, H2a, H2b), the data were analyzed with descriptive and correlational statistics. In accordance with the aims of this study, the mediational analysis (based on Baron & Kenny's (1986) procedure) and the path analysis (with the statistical package EQS 6.1) were used to test the hypotheses and fit of the research model. Multiple fit indices were used to assess the adequacy of the estimated model: the Bentler-Bonett normed fit index, the comparative fit index (CFI), and the root mean squared error of approximation (RMSEA). In summary, since this study evaluated intrinsic motivation together with the type of pro-environmental acts carried out, path analysis was performed in order to analyze the relationship between past actions, self-regulatory mechanisms, and intrinsic motivation in order to predict environmental behavior. The relationship between the variables analyzed in the study enables an explanatory model to be defined for the motivations and self-regulatory mechanisms that lead individuals to engage in ERB.

Results

Overall, the results provide support for the hypotheses about the effect of self-efficacy and intrinsic motivation on ERBs, and the mediational role of intrinsic motivation in this relationship.

Descriptive statistics and correlations (H1a, H1b, H1c, H2a, and H2b)

Table 1 lists the mean, standard deviation, response range, and internal consistency for each of the measurement scales used in this research paper. This table reflects these parameters for past ERB, self-regulatory mechanisms (*self-efficacy for environmental behavior*, *self-set goals* and *environmental satisfaction*), extrinsic motivation and intrinsic motivation to develop ERB and, finally, in relation to the

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Table 1
Means, standard deviations, ranges, reliability coefficients, and correlations for all the variables studied

	Mean(SD)	Min – Max	1	2	3	4	5	6	7
1. Past Environmental Acts	3.23(0.53)	1.78 - 4.67	α = .61						
Self-Regulatory Mechanisms									
2. Self-efficacy for EB	3.72(0.53)	2.22 - 5.00	.640**	α = .77					
3. Self-set Goals	3.78(0.55)	1.89 - 4.94	.544**	.741**	α = .88				
4. Env. Satisfaction	3.71(0.71)	1.17 - 5.00	.486**	.678**	.734**	α = .93			
Motives to develop EB									
5. Extrinsic Motivation	2.68(2.82)	0 – 15	-.073	-.060	.017	.061	α = .74		
6. Intrinsic Motivation	3.03(2.61)	0 – 12	.263**	.276**	.273**	.315**	.366**	α = .70	
Behaviors									
7. Environmental Behaviors	5.40(2.20)	1 – 9	.361**	.277**	.361**	.336**	.498**	.586**	α = .68

number of pro-environmental acts carried out over the previous weekend (*self-reported environmental behaviors*).

Most of the measures displayed adequately high reliability; *past environmental acts* alone presented a moderate level of reliability. This measure, however, was maintained on the basis that Osbaldiston and Sheldon (2003), who initially proposed this scale, found a lower internal consistency (α = .55) when recording ERB than we observed in our study. In any case, the low reliability of 'past environmental acts' is not at all surprising. Adding up which of nine distinct behaviors are performed arguably produces a formative rather than a reflective measure, and a formative measure does not require high internal consistency (Diamantopoulos, Riefler, & Roth, 2008).

Table 1 shows a high level of correlation between self-regulatory mechanisms and past acts. Therefore, all the correlations found were as expected.

In summary, these results confirmed our hypotheses H1a (Individuals with numerous past environmental acts will show higher levels of self-efficacy judgements), H1b (Individuals with high self-efficacy judgements will set more challenging goals and feel more satisfied with environmental acts than individuals with a lower perception of their efficacy to perform environmental acts), H1c (Individuals with high self-efficacy judgements will engage in more pro-environmental behaviors than individuals with a lower perception of their efficacy to perform environmental acts), and H2a and H2b (Individuals with high intrinsic and extrinsic motivation will engage in more pro-environmental behaviors than individuals with lower intrinsic and extrinsic motivation).

The mediational role of intrinsic motivation (H3)

Regression analyses were performed to test the prediction that intrinsic motivation mediates the effects of self-efficacy on ERB (Baron & Kenny, 1986). A mediating variable (intrinsic motivation) transmits the effect of an independent variable (self-efficacy) on a dependent variable (ERB). In the first step, a significant relation of self-efficacy to the ERB is apparent (B = .19, p < .001); in the second step, self-efficacy shows a significant effect on intrinsic motivation (B = .28, p < .001); in the third step, this mediational variable, intrinsic motivation, has a significant effect on ERB (B = .59, p < .001), once self-efficacy and intrinsic motivation are inserted as predictors in an equation; finally, in the fourth step, the coefficient relating self-efficacy to ERB is larger (B = .19, p < .001) than the coefficient relating self-efficacy to ERB (B = .03, p > .05) in the regression model when both self-efficacy and intrinsic motivation predict the ERB in the third step. The Sobel test evaluates whether or not the total effect of self-efficacy on ERB is significantly reduced after the addition of a mediator, intrinsic motivation, to the model: Sobel test (z = 3.297, p = .00009). All coefficients show that the mediational effect of intrinsic motivation is significant on the relationship between self-efficacy and ERB.

Path analysis proposed to explain environmentally responsible behavior

The data obtained enabled a path analysis to be created in which previous environmental behaviors determined the individuals' levels of confidence in their capacity to recycle (B = .64, p < .001, Standardized Error = .41). This self-efficacy judgement establishes their level of satisfaction with recycling behavior (B = .29, p < .001, Standardized Error = .58) and the goals these individuals set for themselves (B = .41, p < .001, Standardized Error = .55). Subsequently, the level of satisfaction determines the intrinsic motivation that individuals manifest when carrying out the said behavior (B = .22, p < .001, Standardized Error = .34).

Figure 1 shows that all the variables proposed can explain 45% of the variance in environmental behavior,

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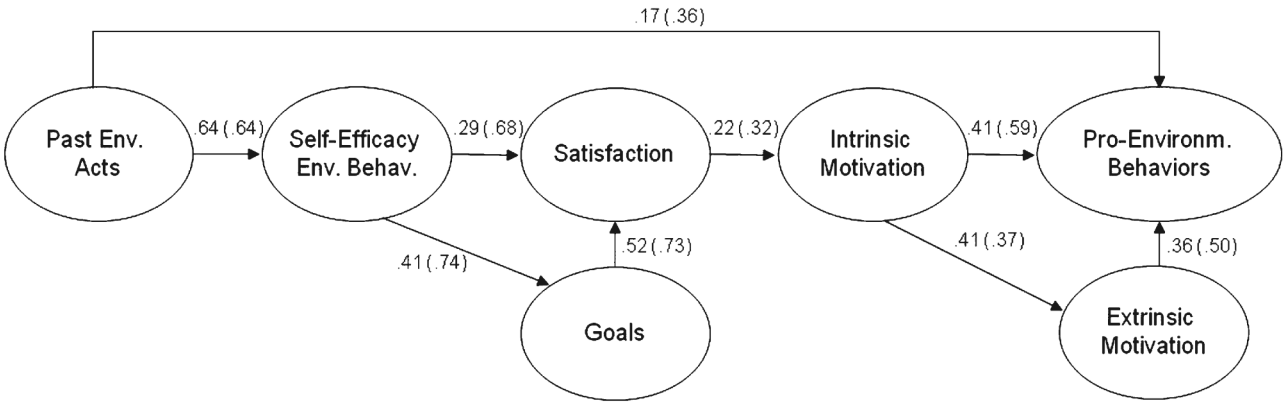


Figure 1. Path analysis between the variables studied (the initial numbers represent the significant beta coefficients from the regression analyses performed; the numbers in parentheses are the first-order correlation: $p < .05$). The model proposed for analysis of pro-environmental behavior explains 45% of total variance (R^2_{Adj}= .45, $F(6, 147) = 21.45$, $p < .001$) and a good fit was found ($\chi^2(df = 12, N = 156) = 15.03$, $p = .24$; Bentler-Bonett fit index= .99; CFI = .99; RMSEA = .04 (RI = .01 – .09)).

although only environmental past actions (β = .17, $p <$ .001), intrinsic motivation (β = .41, $p < .001$) and extrinsic motivation (β = .36, $p < .001$) have a direct effect. Therefore, the model confirms that past actions determine self-regulatory mechanisms, and both these factors influence intrinsic motivation, which partially explains behavior. Neither past actions nor self-regulatory mechanisms have a direct effect on extrinsic motivation. The path analyses presented in Figure 1 showed an overall good model fit (R^2_{adj} = .45, $F(6, 147) = 21.45$, $p < .001$; $\chi^2(df = 12, N = 156) = 15.03$, $p = .24$; Bentler-Bonett fit index = 0.99; CFI = 0.99; RMSEA = .04 (RI = .01 – .09)).

Discussion

The results reveal that individuals with a higher perception of self-efficacy engaged in more environmental acts in the past than those whose perception was lower. Individuals with a higher perception of self-efficacy to develop their ERB had higher levels of intrinsic motivation. Both variables showed a direct effect on ERB: it was tested across the correlational and meditational analysis developed. Correlational analysis also revealed that individuals with a higher perception of self-efficacy showed higher levels of satisfaction, set higher goals, and engaged in more environmental behaviors than those with a lower perception of self-efficacy. Finally, the path analysis demonstrated the effect of past environmental behavior on all self-regulatory mechanisms analyzed (self-efficacy, goals, satisfaction) and of intrinsic and extrinsic motivation on the ERBs developed. The motives for carrying out pro-environmental acts seem to be related; however, as expected, only intrinsic motivations are related to self-regulatory mechanisms, whereas extrinsic motives present no significant correlation with any of the self-regulatory mechanisms analyzed. In this context, Pelletier and Sharp (2008) affirmed that extrinsic motivation has a predominant value in the early stages of pro-environmental behavior, where intrinsic motivation is specifically important for progression toward maintenance. This motivational process is explained by the fact that individuals are inherently motivated to integrate within themselves the regulation of activities that are useful for effective functioning in the social world.

These results reveal that in order for pro-environmental behavior to take place there must be a combination of self-efficacy and intrinsic motivation, where intrinsic motivation plays a mediational role. Extrinsic motivation also plays a significant role in explaining behavior, however. Self-efficacy emerges as a mechanism capable of conferring unity, continuity, and direction on individuals' actions so that they may persist in the pursuit of desired results, without necessarily having incentives to achieve them, and persevere in the face of difficulties. In pro-social contexts, it is not enough to feel capable; the individual must also experience intrinsic motivation to engage in this behavior for its own sake. From a theoretical standpoint, we believe that the mediational effect found in this investigation could make a significant contribution to explaining pro-environmental behavior.

In this paper, the results provide considerable support for the proposed mediational role of intrinsic motivation in the strong relationship between self-efficacy and pro-environmental behaviors. The model presented underpins the thesis put forward by Bandura (1997) in relation to self-efficacy judgements being based on a self-evaluation judgement of past levels of achievement. It also sustains the high correlation between past performance and self-efficacy defended by Vancouver et al. (2001). Self-efficacy judgement influences other self-regulatory mechanisms, such

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as satisfaction with the personal development achieved and the demands of the goals selected (Tabernero & Wood, 1999). Finally, this study sustains the argument put forward by Caprara and colleagues (Caprara & Bonino, 2006; Caprara & Steca, 2007) regarding the need to incorporate perception of capacity and intrinsic motivation in order to explain pro-social behavior.

This research supports the idea that a combination of self-efficacy and intrinsic motivation is needed to explain individuals' performance of ERBs, although extrinsic motivation is also useful. Importantly, satisfaction is associated with greater intrinsic motivation. Bandura (1997) claims that creating adequate learning contexts and experiences generates interest and new sensations in which self-efficacy and affective reactions play an important role. Hence, Bandura (1997) defends the importance of knowing self-efficacy judgements, in order to explain how people develop an implicit interest in tasks for which initially there was no intrinsic motivation. This occurs, for example, with the satisfaction experienced when recycling or saving water. Similarly, Locke and Latham (2002) argue that almost any activity can generate an implicit interest in citizens if the activity is a challenge and provides feedback in relation to achievements and goal attainment.

Our study supports the strong relationships between self-efficacy and previous performance. Certain authors (Vancouver, Thompson, Tischner, & Putka, 2002) have suggested that self-efficacy is simply the product of past performance and therefore does not help to explain levels of motivation or future engagement. Eden and Aviram (1993) and García and Fidalgo (2008) demonstrated, however, that levels of self-efficacy can be manipulated, in turn manipulating motivation and the ultimate level of achievement. Thus, for example, individuals who take part in a training program for recycling in the home based on generating self-efficacy judgements increase their analytical strategies, skills, and activities, which will lead to ERB even though the same individuals may have scored low levels of achievement in the past.

As regards the dual directionality of the relationships between self-regulatory mechanisms, Hartig et al. (2001) maintain that the affective state can be influenced by the environment, whereas perception of the environment can also be determined by the affective state of the individual evaluating it. Therefore, as shown in our results, the level of satisfaction experienced by university students when engaging in pro-environmental behaviors could be decisive in terms of their choice of action, behavioral intentions, level of performance, and future motivation. The results found by Hartig et al. (2001), however, once again highlight the importance of other cognitive variables; these authors claim that individuals who perceive greater probabilities of influencing the environment engage in more ERBs. Thus, it is logical to assume that university students who accord greater importance to their participation in the separation of waste have greater feelings of self-efficacy. It seems obvious that this relationship is reciprocal and that the student may also think 'I feel capable of recycling, and I think this behavior is important for environmental conservation'.

The present study distinguished between extrinsic and intrinsic motivation at the theoretical level. The intrinsic motivation measure combines what the Self-Determination Theory (SDT) defines as internalized or identified extrinsic motivation (i.e. more autonomous extrinsic motivation) and intrinsic motivation. This has been done in many studies that used SDT as a framework (Martín-Albó, Núñez, & Navarro, 2009), because SDT predicts very similar outcomes for both kinds of motivation (e.g. persistence). They are clear motivations according to the theory, however, and recent research suggests that they may have distinct effects on the motivation process over time (Burton, Lydon, D'Alessandro, & Koestner, 2006). In future research, a longitudinal study should permit us to address the effects of motivational processes as a Self-determination continuum (a-motivation with non-regulation, external regulation, introjected regulation, identified regulation, integrated regulation, and intrinsic regulation) on the development of ERBs over time. Longitudinal and experimental studies (e.g. Burton et al., 2006) would facilitate the analysis of how individuals acquire the motivation to engage in ERBs (e.g. the process by which a norm is internalized, or when a performed ERB can be enjoyed), and how such motivation affects the ongoing behavioral choice and analytical strategies, the strength of effort, persistence, and commitment, and the success or failure of subsequent performance.

This line of research would help to create in environmental educational programs and mass media reports on environmental campaigns, inter alia, patterns of ERBs across models of behavior, whether they introduce norms, values, rewards, and penalties or whether they generate positive experiences of satisfaction with self or community. These results have also pinpointed certain areas on which environmental policies should focus in order to generate more responsible environmental behaviors to create judgements of capacities within individuals and to promote the belief that people can instigate environmental change in the future, resulting in satisfaction with the recycling behavior performed. In this context, Pelletier and Sharp (2008) suggest a persuasive communication program for three phases of behavioral change: (1) before people decide to act, *a detection phase* focuses on sending messages that aim to draw people's attention to a specific problem (e.g. risk or fear associated with climate change); (2) *a decision phase* focusing on the thoughts and feelings associated with the awareness of an issue (an extrinsic motivation would be essential to generate new behaviors in this phase); and (3) *an implementation phase* where intrinsic motivation and self-regulatory mechanisms are largely responsible for maintenance of the implemented behavior over time. Darner (2009) affirms that previous experiences based on initial

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activities related to environmental behaviors are essential for successful participation in educational programs.

But how can we design a pro-environmental training program to generate self-efficacy judgements? When introducing the power of self-efficacy as exercise of control, Bandura (1986) shows the four sources from which we can generate judgements of capability in training programs. Specifically, Bandura shows that it is necessary to combine three elements in these programs: first, we must promote the basic skills that are essential to the training by establishing a series of rules and operational strategies via an *instructive model* training program; second, so that each of the trainees generates their own judgements of capability they should use *simulation practice* which is related to their actual performance but allows them to develop more confidence in their capabilities; finally, they should present day-to-day pro-environmental situations in which they can practice and *transfer the skills learnt* which helps to increase their perception of achievement and control over their capabilities. Recently, Ahn and Bailenson (2011) created a training program focused on the promotion of the first source of self-efficacy, the own experience, and demonstrated that embodied experiences in an immersive virtual environment (the sensorimotor experiences of cutting down a tree in a virtual forest) had a stronger effect on pro-environmental self-efficacy and behavior than a training program focused on mentally simulating the same experience. In sum, the present research contributes to a better understanding of the dynamics of motivational variables on ERBs from a social cognitive perspective. Results confirm that intrinsic motivation plays a mediational role in the relationship between self-efficacy and pro-environmental behavior. A theoretical model shows the impact of past environmental acts, self-regulatory mechanisms, and intrinsic motivation on the explanation of ERBs. These conclusions are drawn from a sample of university students where global environmental behaviors were analyzed. This paper provides evidence for the independent and mediational role of motivational variables in explaining pro-environmental behavior. Once individuals generate a perception of their ability to develop a specific ERB, intrinsic motivation appears to play a mediational role in behavior.

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