Journal of Applied Social Psychology, 2012, **42**, 11, pp. 2797–2833.
doi: 10.1111/j.1559-1816.2012.00962.x

Comparative Study Between the Theory of Planned Behavior and the Value–Belief–Norm Model Regarding the Environment, on Spanish Housewives' Recycling Behavior

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Environmental behaviors have been analyzed from different theoretical models. The theory of planned behavior emphasizes the attitudinal aspects associated with behavior, while the value–belief–norm model regarding the environment focuses on the importance of moral components when setting environmental behaviors in motion. The objective of this study was to analyze both models, comparing both their degree of fit and their predictive power regarding recycling behavior. To do so, we used a sample made up of 154 Spanish housewives. The results indicated that despite the fact that the theory of planned behavior is a general model for predicting and explaining behavior, it has a greater degree of fit and greater capacity to predict recycling behavior than the value–belief–norm model regarding the environment.

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Introduction

The characteristic heterogeneity of proenvironmental behaviors has led to the development of several theoretical approaches in order to understand their nature. Within the psychosocial perspective that defines this type of behavior as the result of a set of behaviors influenced by values, beliefs, norms, and attitudes toward the environment, one of the most recent models is that proposed by Stern, Dietz, Abel, Guagnano, and Kalof (1999) and Stern (2000). This model, the value–belief–norm (VBN) model on the environment, proposes that proenvironmental behavior is based on a causal chain of representational variables, where personal norm (PN) acts directly on behavior. Subsequent studies have pointed out the importance of this variable in explaining different environmental behaviors (Gärling, Fujii, Gärling, & Jakobsson, 2003; Nordlund & Garvill, 2002; Steg, Dreijerink, & Abrahamse, 2005).Nevertheless, although this model emphasizes the influence of moral components as proenvironmental behavior determinants, other theoretical approaches, such as the theory of reasoned action (TRA) and its extension, the theory of planned behavior (TPB; Ajzen, 1991; Ajzen & Madden, 1986), stress the importance of attitudinal

components in explaining and predicting behavior. To this effect, many authors believe that the use of the TPB as a framework for studying environmental behavior can explain much of the intention as well as the future behavior (e.g., Bamberg, Ajzen, & Schmidt, 2003; Boldero, 1995; Hwang, Kim, & Jeng, 2000; Kaiser, Hübner, & Bogner, 2005; Kaiser, Wölfing, & Führer, 1999; Mannetti, Pierro, & Livi, 2004, among others).

Many studies on environmental behavior have been based on these two theoretical approaches, although certain limitations have been pointed out, mainly in reference to the small percentage of variance explained both in the case of behavioral intention and in behavior (Berenguer & Corraliza, 2000; Berenguer, Corraliza, Martín, & Oceja, 2001; Hernández, 2004; Stern, 1992, 2000; Thøgersen, 1996). Furthermore, few studies have focused on analyzing the relationships established between the variables that were used to explain these behaviors (Collins, O'Doherty, & Snell, 2006; Gärling et al., 2003), because even though many studies have looked into these models, they have only partially done so. Taking heed of the suggestions made by these and other researchers, the objective of this study was to analyze both models (VBN vs. TPB), comparing both their

degree of fit and their capacity to predict glass-recycling behavior in a sample of Spanish housewives. Following Chung and Poon (1996), the attitudes of housewives as a social group, compared with the population as a whole, are decisive when it comes to establishing environmental behavior in the home, so they should be taken into account when designing environmental awareness and education pro- grams. However, most studies with this approach have used samples of students (e.g., Fielding, McDonald, & Louis, 2008; Kaiser et al., 2005), which somewhat limits the findings obtained. For this reason, this study has used a sample made up exclusively of housewives, in the understanding that this is one of our study's original contributions.

Moreover, given that there are differences in cultural values between different countries (Hofstede, 1980), it would be interesting to examine both theoretical approaches regarding recycling behavior with Spanish samples, and this is the second contribution offered by this study.

Hofstede's (2001) individualism–collectivism dimension has been used for unpackaging cultural similarities and differences (Smith & Bond, 1998) and has also been used to understand

cultural differences in environmentally related studies (Bechtel, Corral-Verdugo, & Pinheiro-Queiroz, 1999; Corral- Verdugo & Armendáriz, 2000; Gouveia, 2002). Hofstede's studies (1980, 2001) point out that while North American countries—in which most of these types of studies have been carried out—are more inclined to individualist values, Spain shares more collectivist values.

Following on from this, in a recent study, it was suggested that countries with individualist values have a greater orientation toward biospheric motivation, whereas those countries in which collectivist values predominate show a greater orientation toward egocentric motivation when it comes to explaining environmental behavior (Milfont, Duckitt, & Cameron, 2006). To this effect, abiding by the inherent characteristics of each country, we could consider that the results found in this field of research may not easily be extended to Spanish culture. Consequently, we believe it would be interesting to compare both models (VBN vs. TPB), but in samples with different characteristics to those that are normally used.

A third contribution offered by this study is the investigation

of the relations that are established between the different variables that are considered in both models, as suggested by other authors (e.g., Oom Do Valle, Rebelo, Reis, & Menezes, 2005), as few studies have looked into analyzing and comparing both theoretical approaches in their entirety and applied to glass-recycling behavior.

Theoretical Framework

The TRA and Its Extension: the TPB

In the TRA developed by Fishbein and Ajzen (1975), the immediate predictor of behavior is behavioral intention, in turn determined by attitude toward behavior and subjective norm (Fishbein & Ajzen, 1976). Attitude toward behavior is defined as a "learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object" (Fishbein & Ajzen, 1975, p. 6). According to its authors, attitudes are determined by *personal beliefs* about behavior; it is a question of the subjectively attributed probability that certain behaviors will have certain consequences. The second factor is made up of those beliefs that are associated with social or subjective components; more specifically, subjective norm refers to the beliefs that a person

has regarding what the majority of those people who are important to him or her will think about the fact that he or she will behave a certain way, or in other words, the normative beliefs and the degree to which the person is willing to comply with the expectations of others (motivation to comply, MC).

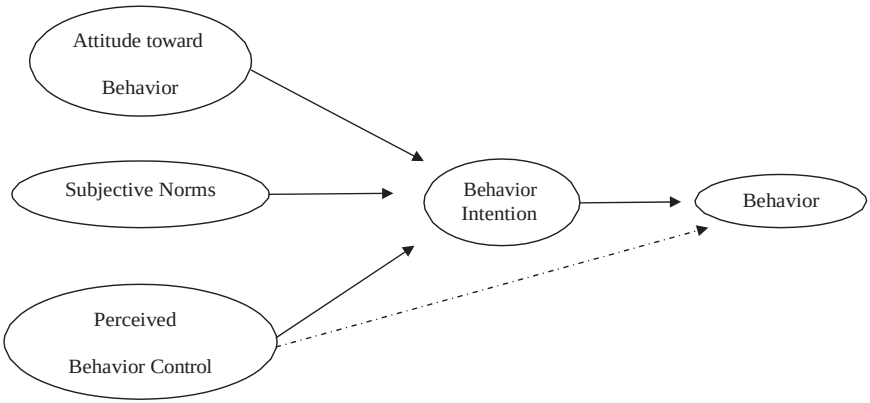

Figure 1. Factors determining behavior according to the theory of planned behavior.

The TRA has proved to be one of the strongest models in predicting human behavior through attitudes; in fact, it is one of the most used models in psychosocial research in that area. Nevertheless, the model has also been criticized for its lack of variables that could have a bearing on intention and behavior. Another criticism of the TRA is that made by Eagly and Chaiken (1993), among others,

who believe that the TRA is far from being a theory predicting human behavior in general and that it is only useful when attempting to explain the preceding causes of volitional behavior, and therefore its application is limited to this type of behavior.

In order to overcome these limitations, Ajzen (1985) and Ajzen and Madden (1986) added a third predictor of behavioral intention and of behavior to the TRA, which would then go on to be known as the TPB. This third predictor, perceived behavioral control, was added in order to be able to predict and explain those other behaviors that escape a person's voluntary control. Therefore, the TPB considers that people do not only bear in mind certain beliefs about an action or behavior (both personal and normative), but that they also bear in mind those other beliefs relating to their possibilities of performing that behavior or *control beliefs*. These beliefs, which make up the perceived behavioral control, are the factors that will finally have an influence on intention and, therefore, on action. Ajzen (1985) suggested that the perceived behavioral control and intentions interact in predicting behavior, increasing the predictive power of intention as a person's degree of control over behavior increases. With this new variable, the TPB model would remain as shown in Figure 1.

The VBN Model on the Environment

This model starts by assuming the traditional notion that values act by "guiding action and the development of attitudes" (Rokeach, 1968, p. 160), in this case, toward environment-related behaviors. These behavior guides are related to a series of general beliefs regarding the environment that have been developed under the New Ecological Paradigm (NEP; Dunlap & Van Liere, 1978; Dunlap, Van Liere, Mertig, & Jones, 2000). Furthermore, following the approaches raised in the normative influences on altruism model (Schwartz, 1977), the model proposed by Stern et al. (1999) analyzed the process by which people behave ecologically. According to their postulates, an altruistic behavior (as could be considered the case for ecologically responsible behaviors) depends on the activation of moral norms that, in turn, are derived from values themselves. The idea that moral aspects are closely related to environmental behavior has frequently been applied in environmental behavior studies (Berenguer, 2007; García-Mira & Real- Deus, 2001). In this sense, the activation of the moral norm or PN from values is explained through two other variables: the awareness of the consequences (AC) of an action, that is, the specific beliefs associated with behavior, and the ascription of responsibility

(AR), understood as the degree of responsibility that a person assumes over his or her acts, in this case, toward the environment (see Figure 2).

To put the VBN model's proposals to the test, and on the basis of what other authors had already suggested with regard to the importance of PN and to value orientations as ecologically responsible behavior guides (Black, Stern, & Elworth, 1985; Heberlein & Black, 1976; Stern & Dietz, 1994; Stern, Dietz, & Black, 1986; Stern, Dietz, & Guagnano, 1998; Stern & Oskamp, 1987), Stern et al. (1999) carried out a comparative study between the VBN model and other approaches that were also used to explain this type of behavior. In this project, the responsible ecological behaviors measured were classified in three groups: a first group, called "consumption behaviors," included behaviors such as the consumption of certain "ecological" products and recycling behaviors, among others. A second group included the personal sacrifices that one would be willing to make in order to improve the environment, such as paying higher taxes on the price of petrol in order to help reduce pollution. The third group covered those behaviors related to active participation in ecologist groups or associations, as well as including different questions regarding behavioral intention (such as the predisposition to sign proenvironment petitions or

the willingness to donate money, among others). The results indicated that PN or moral norm strongly correlated with two of the three behavior groups measured, being the only variable in the VBN model to have a direct effect on behavior. Only in the case of the last behavior group, namely the participation group, did the results show very little relationship with PN. For their part, social/altruistic values (VSoci/Alt), com- pared with the other types of values, best explained a higher percentage of variance for the three behavior types, although their explanatory power was less than that of PN. Moreover, the relationship between Vsoci/alt and the group of consumption behavior was greater than with the two remaining groups (personal sacrifice and participation behaviors). To conclude, the study revealed the importance of PN and value orientations as proenvironmental behavior conductors, in keeping with previous research.

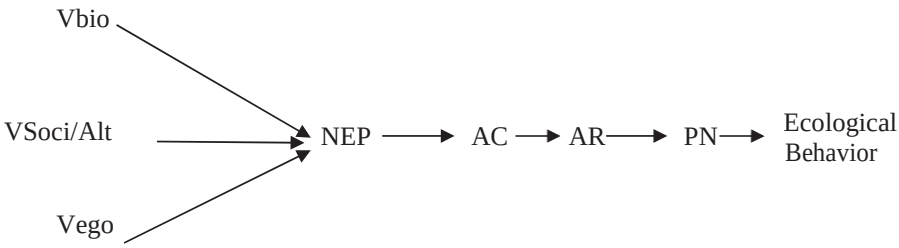

Figure 2. Components of the value–belief–norm theory. Vbio = biospheric value; VSoci/ Alt = social/altruistic values; Vego = egocentric values; NEP = New Ecological Paradigm; AC = awareness of the consequences; AR = ascription of responsibility; PN = personal norm.

Problem Approach

On the basis of social psychologists' interest in looking further into the incidence of the variables that determine the performance of responsible ecological behavior, our intention in this study is to compare the TPB, as a general behavior-predicting model, with one of the specifically designed models for studying environmental behavior, the VBN model, regarding the environment, but in this case, and for this comparison, using a sample of a different nature to those that are most frequently used. To be more specific, the objective of this study was to analyze the degree of fit and the predictive capacity that each model showed for the "separating glass from the rest of the rubbish for recycling purposes" behavior in a sample of Spanish housewives.

Method

Participants in the Study

The participants in this study, in the first time interval (T_1), were 154 housewives, although this number was reduced to 120 in the second phase of data collection (T_2). Therefore, the response rate obtained in T_2 was 77.9%. The housewives were

selected by visiting several women's associations and parish centers. The housewives' average age was 50.63 years (*SD* = 12.423), with the minimum age being 28 and the maximum age being 82.

Procedure

The questionnaires were administered at two different time points (T_1 and T_2). In T_1, the main questionnaire was administered, and after 20 days (T_2), a second questionnaire was administered in which the housewives were asked to indicate the frequency with which they had carried out the behavior in question. This measure was taken as a measure of future behavior. Participation in the study was voluntary and the questionnaires were anonymous.

Furthermore, when the first phase (T_1) was finished, the participants were thanked for their collaboration without telling them about the plan to carry out another survey 20 days later, so as not to influence the second measurement (T_2). To make it easier to locate the housewives in T_2, they were asked to give a telephone number in the first measurement. Therefore, the questionnaire in the second phase (T_2) was administered by telephone, ensuring both the person's anonymity and to obtain a higher response rate (Salinas, Calvo, & Aguilar-Luzón, 2004).

Measuring Instruments

The first questionnaire (T_1) was made up of two sections. The first section included the TRA/TPB predictor variables: attitude toward behavior, subjective norm, perceived behavioral control, and intention. The second section included the variables considered in the VBN model: values, beliefs of the NEP, moral norm, AR, and specific environmental beliefs (AC). The follow- ing were also included as sociodemographic variables: sex, age, marital status, maximum level of education reached, and whether they worked outside of the home or not. The second questionnaire (T_2) measured the frequency with which they had separated glass from the rest of their rubbish over the previous 20 days.

TPB Model Measurements

The authors of the TPB point out that both attitude and subjective norm may be measured directly or indirectly, as both methods are equally recom- mended (Ajzen, 1991; Fishbein & Ajzen, 1975). To this effect, Cheung, Chan, and Wong (1999) point out that both measuring systems may be suitable for research into environmental behavior. In this study, we have

chosen to use a direct measurement of attitude toward the separating glass from the rest of the rubbish behavior, whereas in the case of subjective norm, we have used an indirect measurement.

Attitude toward behavior. The direct measurement of attitude was carried out by means of the following item: "What is your attitude towards your separating glass from the rest of your rubbish for recycling purposes over the next twenty days?" using a Likert-type 7-point response scale, with values ranging from -3 to indicate a *totally unfavorable* attitude to +3 to indicate a *totally favorable* attitude.

Subjective norm. This variable was measured indirectly and it was obtained by means of two items. The first (general subjective norm, GSN) was written as follows: "In general, please indicate the degree in which people who mean a lot to you would approve or disapprove of you separating glass from the rest of your rubbish for recycling purposes over the next twenty days." They had to respond to this item on a 7-point Likert scale that ranged from -3 (*they would totally disapprove*) to +3 (*they would totally approve*). Second, the participants were asked the degree in which they would be willing to bear in mind what those important or significant people would think about their behavior when separating glass

from the rest of their rubbish for recycling purposes over the following 20 days. This item, the MC, was followed by a 7-point scale ranging from 1 (*not willing*) to 7 (*totally willing*). The subjective norm was measured by multiplying the direct score of both items (GSN ¥ MC), thus obtaining a single score for each housewife.

Behavioral intention. Just one item was used to measure behavioral intention: "Over the next 20 days (I intend to do it, I know it will happen, I know I will do it, I want to do it), I will separate glass from the rest of the rubbish for recycling purposes," followed by a 7-point scale, with values ranging from 1 (*highly unlikely*) to 7 (*highly likely*).

Perceived behavioral control. Operationally, to measure this variable we used four items (a = .80) taken from different studies based on the TPB (e.g., Bagozzi & Kimmel, 1995; Madden, Ellen, & Ajzen, 1992; Manstead & Parker, 1995). For each of these four items, Likert-type 7-point response scales were used as follows: (1) "Separating glass from the rest of my rubbish for recycling purposes over the next twenty days will be . . ." (very easy–very difficult for me); (2) "If I wanted to separate glass from the rest of the rubbish for recycling purposes

over the next twenty days, I would do so without any problem" (strongly disagree–strongly agree); (3) "How much does this behaviour depend on you alone, on your own willpower (how much control do you have over this behaviour)?" (no control–complete control); and (4) "Things that may happen, that may be beyond your control and that may prevent you from separating glass from the rest of the rubbish for recycling purposes over the next twenty days will be . . ." (very few–many). In this study, we have used a single score obtained by summing up the scores from these four items once the scores from items 1 and 4, which were in the inverse, had been inverted.

VBN Model Measurements

Value orientation. Following the classification of values identified in pre- vious studies (Stern & Dietz, 1994; Stern, Dietz, & Guagnano, 1995; Stern, Dietz, & Kalof, 1993), three value orientations are found at the basis of proenvironmental behaviors. First is the biospheric value (Vbio) orientation, which is theoretically defined as those guiding principles in a person's life that represent their concern for nonhuman species and the biosphere as a whole. It comprises five values, three

taken from the Schwartz value inventory (SVI) ("unity with nature," "a world of beauty," and "protecting the environment") (Schwartz, 1992), and the two remaining values ("preventing pollu- tion" and "respect for the earth") that were added by Stern et al. (1999).

Second is the social/altruistic value, defined as those guiding principles in a person's life that represent their concern for other people's well-being. It is made up of four values taken from the SVI (Schwartz, 1992). These values are: "a world of peace," "equality," "social justice," and "helping others."

The last dimension or cluster of values considered in this study was the egocentric or egoistic group, theoretically defined as those guiding principles in a person's life that represent their concern for themselves. The values that make up this orientation have also been taken from the SVI (Schwartz, 1992). In this case, four values have been considered: "authority," "social power," "healthy," and "influential."

The housewives were given a list containing these 13 values and they were asked to assess the extent to which each value was important as a guiding principle in their lives. The

theoretical definition of each value was provided, followed by a Likert-type 9-point response format, with values ranging from -1, indicating that the principle is "contrary to my values," to +7, indicating that the value was considered to be of "utmost importance." Operationally, each of the three dimensions is obtained by adding the direct scores given by the participants to each value cluster. Thus, we have obtained three scores, one for each value orientation. These 13 values together presented an internal consistency coefficient of .81, compared with the a = .65 obtained by the authors of the VBN model.

NEP beliefs. Stern et al. (1999) and Stern (2000) define this variable as those general visions on the world depicted in people's expressed beliefs about their relationships with the environment and nature. The NEP (Dunlap & Van Liere, 1978) originally had a total of 12 items, but the scale's most recent modification includes three more (Dunlap et al., 2000). The VBN model considers 5 out of the 15 items included in this scale. The response format used was a Likert-type 7-point scale, with values ranging from -3 (*strongly disagree*) to +3 (*strongly agree*). The five items from this scale were adapted and translated into Spanish to be applied in this study (see Chart 1). A global score is obtained in this scale, which may be

considered an index of the degree of awareness or concern regarding the environment. The Cronbach's alpha for the NEP additive scale obtained by Stern et al. (1999) was .73, whereas in our study, a = .39.

Chart 1

Beliefs (New Ecological Paradigm)

1. The so-called ecological crisis facing humankind has been greatly exaggerated (reversed).
2. The earth is like a spaceship with limited room and resources.
3. If things continue on their present course, we will soon experience a major ecological catastrophe.
4. Humans are severely abusing the environment.
5. The balance of nature is strong enough to cope with the impacts of modern industrial nations (reversed).

Specific beliefs regarding the environment: awareness of consequences. Theoretically, this variable has been defined from the VBN model, as indicated by Schwartz (1973, 1977): awareness, or not, of the consequences of carrying out a behavior, in this case an environmental behavior. To assess this variable, the nine items used by the authors of the VBN model and included in the General Awareness of Consequences (GAC) scale (Stern et al., 1995) were added to the main questionnaire, in which a distinction is made between the

environmental conditions that can affect oneself, others, or the biosphere as a whole. The response format used with this scale was a Likert-type 7-point system, with the following values: 1 ("it really won't be a problem"), 4 ("it will be a slight problem"), and 7 ("it will be a major problem"). All the items were adapted and translated into Spanish from the original version that presented an alpha of .88 (Stern et al., 1995). In our study, a = .89. The total score of the scale was calculated by adding the direct scores to each of the nine items it was made up of.

Ascription of responsibility. One of the theoretical variables that the model proposed by Stern et al. (1999) and Stern (2000) considers is the AR. This variable, taken from the model of normative influence on altruism (Schwartz, 1977), is defined as the degree in which a person feels responsible for the consequences of his or her behavior regarding the environment. A single item taken from Gärling et al. (2003) was used to measure this variable: "Every citizen must take responsibility for the environment." The response format used was a Likert-type 7-point scale, with values ranging from -3 (*strongly disagree*), to +3 (*strongly agree*).

Personal norm. This variable, defined as the feeling of moral obligation associated with behavior (Schwartz, 1977), has been obtained through summing up the scores allocated to three items that were adapted from those used by Beck and Ajzen (1991). These items were written as follows:

1. PN1: "It would be morally incorrect for me NOT to separate glass from the rest of the rubbish for recycling purposes over the next twenty days."
2. PN2: "If I DID NOT separate glass from the rest of the rubbish for recycling purposes over the next twenty days, I would feel guilty."
3. PN3: "What degree of moral obligation do you feel with regard to separating glass from the rest of the rubbish for recycling purposes over the next twenty days?"

The items were followed by a Likert-type 7-point scale, with values ranging from -3 (*minimum moral obligation*) to +3 (*maximum moral obligation*). The alpha obtained with these three items was .88.

Questionnaire Time 2 (T_2)

Future behavior. This variable was operationalized using a single question posed in the following way: "Twenty days have passed since you answered the first questionnaire. Over the last 20 days, how often have you separated glass from the rest of the rubbish for recycling purposes?" This item was followed by a 4-point scale that was arranged by category ("never"; "hardly ever"; "sometimes"; "usually").

Data Analysis

With regard to the objective of this study, to verify the degree of adaptation and the predictive power of each of the models applied to environmental behavior, a *path analysis* was carried out using structural equations. The LISREL 8.30 (Scientific Software International, Inc. Chicago) statistics package was used for this analysis. This type of analysis was chosen for its proven validity in other empirical studies that had been carried out with similar approaches (Gärling et al., 2003; Kaiser et al., 2005; Oom Do Valle et al., 2005).

Results

Adaptation of the VBN Model to Behavior: Separating Glass From the Rest of the Rubbish for Recycling Purposes

For each of the relationships established between the model's variables, a structural equation was carried out from the correlation matrix between the model's observable variables. Table 1 shows the correlation matrix between the VBN model's observed variables. Correlation matrices have been used because they enable us to understand the relationships that are established between the constructs of the models to be interpreted. In our case, we have worked with observable variables, as the relationships between them have been quantified from the direct scores that were obtained.

The results indicate that, according with the usual criteria (Fan, Thompson, & Wang, 1999; Hu & Bentler, 1995), the VBN model does not fit to our empirical data (c^2 = 66.92; *df* = 18; *p* = .0000; goodness of fit index [GFI] = .88; normed fit index [NFI] = .70; incremental fit index [IFI] = .76; root mean square error of approximation [RMSEA] = .153).

New equations were estimated in the search for a model that better fit the empirical data. In order to add paths between the variables in the model proposed by Stern et al. (1999), we looked at the modification indices pro- vided by the LISREL software output. These indices suggested 8 new paths and 16 error covariances. We selected the five paths that we considered to be theoretically interpretable. This new model significantly improved the fit, although the goodness of fit statistics remained significant (c^2 = 23.50; *df* = 13; *p* = .036). In this second model, the modification indices suggested to add the path to AR from Vbio and an error covariance. Adding the aforementioned path, this alternative model offers acceptable GFIs to the data (see Chart 2). The makeup of the variables in this alternative model to the VBN is shown in Figure 3.

Adaptation of the TPB to Behavior: Separating Glass From the Rest of the Rubbish for Recycling Purposes

A system of structural equations has been established from the correlations matrix between the observable variables of the TPB model, expressing the relationships between the variables. Table 2 shows the matrix of correlations between the variables

that are considered in the planned behavior model. The results indicate that the TPB model may be accepted from an empirical point of view (c^2 = 2.06, *df* = 2, *p* = .35730; GFI = .99; NFI = .99; IFI = 1.00; RMSEA = .016), as acceptable fit rates are obtained for this model.

Table 1

*Pearson's Correlations Between the Behavior-Predicting Variables According to the Value–Belief–Norm Model (*n = *120)*

Variables	1	2	3	4	5	6	7	8
1. Biospheric values	—							
2. Social/altruistic values	.621**	—						
3. Egocentric values	.294**	.052	—					
4. New Ecological Paradigm	.123	.191*	-0.239**	—				
5. Awareness of consequences	.304**	.422**	.032	.399**	—			
6. Ascription of responsibility	.360**	.324**	.042	.407**	.457**	—		
7. Personal norm	.390**	.305**	.006	.308**	.487**	.538**	—	
8. Behavioral intention	.068	.048	-.128	.150	.233*	.402**	.273**	–

*$p \leq .05$. **$p \leq .01$.

Chart 2

Adjustment Statistics Obtained with the VBN Model, Alternative VBN Model, and the TPB Model

Goodness of fit index (GFI) criterion	Interpretation and recommended acceptance levels	Observed values		
		VBN model	Alternative VBN model	TPB model
Absolute fit measures				
GFI	Ranges from 0 (no fit) to 1 (perfect fit); values higher than .9 suggest a good fit	.88	.97	.99
RMSEA	Values lower than .08 indicate good model fit	.153	.036	.016
Incremental fit measures				
AGFI	Ranges from 0 (no fit) to 1 (perfect fit); values higher than .8 suggest a good fit	.75	.92	.95
NFI	Ranges from 0 (no fit) to 1 (perfect fit); values higher than .9 suggest a good fit	.70	.94	.99
IFI	Ranges from 0 (no fit) to 1 (perfect fit); values higher than .9 suggest a good fit	.76	.99	1

VBN = value–belief–norm; TPB = theory of planned behavior; RMSEA = root mean square error of approximation; AGFI = adjusted goodness of fit index; NFI = normed fit index; IFI = incremental fit index.

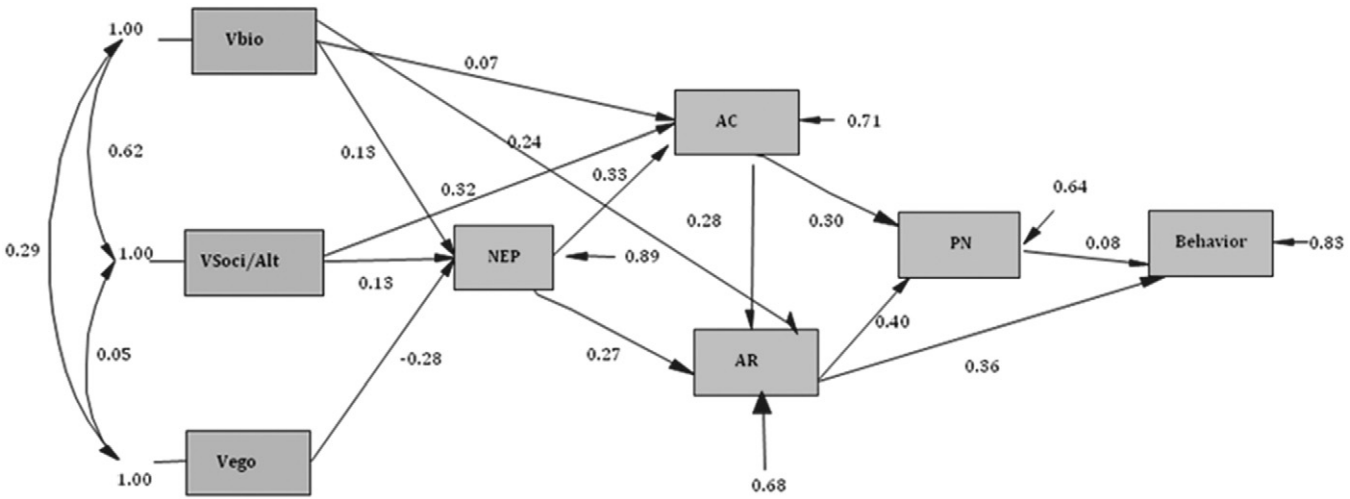

Figure 3. Components of the alternative model (value–belief–norm). c^2 = 13.83, *df* = 12; *p* = .31155; root mean square error of approximation (RMSEA) = .036.

Table 2

*Pearson's Correlations Between the Behavior-Predicting Variables According to the Theory of Planned Behavior Model (*n = *120)*

Variable	1	2	3	4	5
1. Attitude toward behavior	—				
2. Subjective norm	.305**	—			
3. Perceived behavioral control	.422**	.226**	—		
4. Behavioral intention	.564**	.268**	.534**	—	
5. Future behavior	.316**	.261**	.558**	.509**	–

**$p \leq .01$.

Comparison of the TPB Model and the VBN Model's Degrees of Fit

If we compare the value of c^2 obtained in both models, together with the rest of the statistics, we find that, contrary to what we expected, the TPB model is accepted, whereas the VBN model is rejected. It is commonly accepted that the value of c^2 is an optimal statistic for sample sizes between 100 and

200 participants. Given that the number of participants in our case falls within that interval (n_{T2} = 120), it should provide a sufficiently adequate measurement, as confirmed, among others, by the value of the RMSEA, which, in the case of the TPB model, is .016, while the VBN model gives a value of .153. It is considered that when the RMSEA value obtained is less than .08, the model presents a good level of fit, whereas a higher value indicates that the theorized model does not present a level of fit adapted to the empirical data (Oom Do Valle et al., 2005). We can see that the value reached in this statistic for the VBN model is much higher than .08. Chart 2 shows the GFIs obtained for both models side by side, indicating the values that have conventionally been accepted as good indicators of the fit between the theoretical and the empirical models. In short, we can say that the GFIs found for the VBN model suggest that the relationships between the variables prescribed by the model's original authors are not met. Consequently, and according to our results, we can point out that the TPB fits to the empirical data better than the VBN model regarding the environment.

Given that the alternative model to the VBN improved the original model fit, we felt it relevant to compare this alternative model with the TPB model (Fishbein & Ajzen, 1975). As

shown in Figures 3 and 4, the values obtained for the indices of fit indicate that although the alternative model improved the degree of fit to the original model (VBN), the TPB model still showed better goodness of fit (see Chart 2).

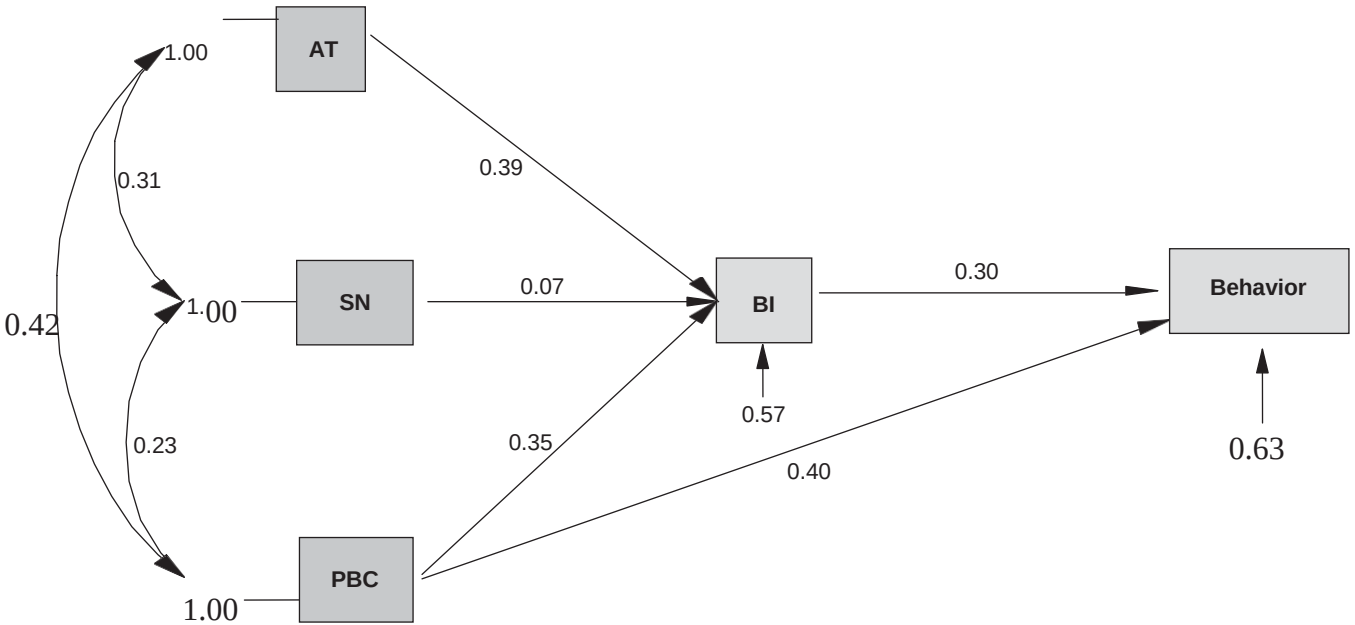

Figure 4. Factors determining behavior according to the theory of planned behavior. $c^2 = 2.06$, $df = 2$; $p = .35730$; root mean square error of approximation (RMSEA) = .016. AT = attitude toward behavior; SN = subjective norm; PBC = perceived behavioral control; BI = behavioral intention.

Comparison of the TPB Model and the VBN Model's Predictive Capacity

According to our results, from the TPB model, the intention to carry out a behavior in the future is explained by the attitude toward that behavior (b = .39) and the perceived behavioral control (b = .35), where attitude is the component that contributes the most to explaining the intention variance. The contribution of subjective norm to behavioral intention variance is minimal and it also lacks any statistical significance (b = .068) (see Figure 4 and Table 3). Altogether, the model's three components explain 43% of the intention variance. However, when we move on to explain behavior, the proportion of variance explained by the TPB components is lower (37%). In this case, behavior is explained by intention (b = .30) and perceived behavioral control (b = .40).

Furthermore, the variable that determines behavior, according to the VBN model's authors, is the feeling of moral obligation or PN, so we would expect this variable to explain much of the behavior variance (see Figure 5). The results in our study have shown that the percentage of variance explained by PN is minimal (R^2 = .075; b = .27). Table 4 shows the structural equations carried out for the VBN model.

Table 3

Structural Equations Adjusted to the Components of the Theory of Planned Behavior for Intention and for Behavior

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BI = .39 x AT + .068 x SN + .35 x PBC

S (.080) (.074) (.078)

t 4.95 0.92 4.52

$\boldsymbol{R^2}$ = **.43,** σe^2 = .57 (*SE* = .075; *t* = 7.62)

Behavior = .30 x BI + .40 x PBC

S (.087) (.087)

t 3.40 4.61

$\boldsymbol{R^2}$ = **.37**, σe^2 = .63 (*SE* = .082; *t* = 7.62)

BI = behavioral intention, AT = attitude toward behavior, SN = subjective norm, PBC = perceived behavioral control, *SE* = standard error.

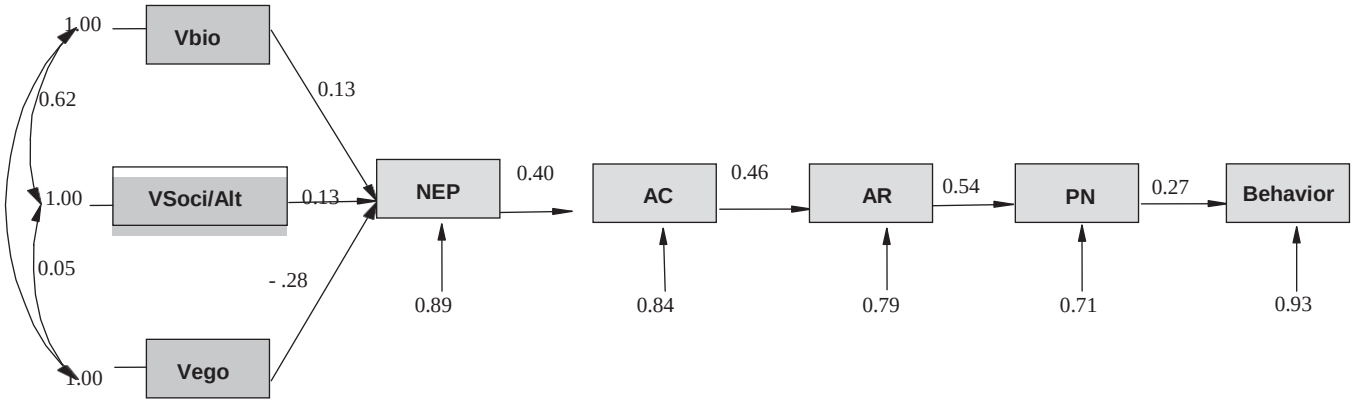

Figure 5. Components of the value–belief–norm theory. c^2 = 66.62, *df* = 18; *p* = .00000; root mean square error of approximation (RMSEA) = .153. Vbio = biospheric value; VSoci/Alt = social/altruistic values; Vego = egocentric values; NEP = New Ecological Paradigm; AC = awareness of the consequences; AR = ascription of responsibility; PN = personal norm.

Table 4

Structural Equations Adjusted to the Components of the Value–Belief–Norm Model for Ecological Behavior

First equation: relationship between the value orientations (Vbio = biospheric values; VSoci/Alt = social/altruistic values; Vego = egocentric values) and the beliefs of the New Ecological Paradigm (NEP)
NEP = .13 x Vbio + .13 x VSoci/Alt – .28 x Vego
S (.12) (.11) (.093)
t 1.08 1.11 -3.04
R^2 = **.11**, σe^2 = .89 (*SE* = .12; *t* = 7.62)
Second equation: relationship between the beliefs of the NEP and the awareness of consequences (AC)
AC = .40 x NEP
S (.085)
t 4.69
R^2 = **.16**, σe^2 = .84 (*SE* = .11; *t* = 7.62)
Third equation: relationship between the AC and the ascription of responsibility (AR)
AR = .46 x AC
S (.083)
t 5.53
R^2 = **.21**, σe^2 = .79 (*SE* = .10; *t* = 7.62)
Fourth equation: relationship between the AR and the feeling of moral obligation or personal norm (PN)
PN = .54 x AR
S (.078)
t 6.87
R^2 = **.29**, σe^2 = .71 (*SE* = .12; *t* = 7.62)
Fifth equation: relationship between the feeling of moral obligation or PN and Behavior (separating glass from the rest of the rubbish for recycling purposes)
Behavior = .27 x PN
S (.089)
t 3.06
R^2 = **.075**, σe^2 = .93 (*SE* = .12; *t* = 7.62)

SE = standard error.

The results obtained regarding the alternative model to the VBN (Figure 3) indicate that the two variables showing a greater predictive capacity are PN (b = .08) and AR (b = .36). Although the results indicate that this alternative model (R^2 = .17) improves the predictive capacity compared with the original model, the TPB model (R^2 = .37) still shows a greater predictive capacity.

Discussion of the Results and Conclusions

The objective of this study was to test the TPB and the VBN model regarding the environment in explaining glass-separating behavior using a sample of Spanish housewives. The results of this study broadly support the postulates of the TPB and they do not appear to maintain the VBN model regarding the environment. In short, our results reveal that the TPB, despite being a more general model for predicting/explaining behavior, is more suit- able for explaining the studied ecological behavior than the model proposed by Stern et al. (1999) and Stern (2000), even though the latter is a more specific model aimed at environmental behavior. The relationships between the variables postulated by the authors of the TPB obtain better GFIs than those obtained by the VBN model. That is, according to our

results, when it comes to explaining both the intention and the behavior of separating glass from the rest of the rubbish, the TPB presents a goodness of fit to the empirical data, results that confirm those found by other authors (Aguilar- Luzón, 2006; Bamberg & Schmidt, 2003; Kaiser & Scheuthle, 2003; Kaiser et al., 2005; Mannetti et al., 2004; Oom Do Valle et al., 2005; Staats, 2003). In general, we can say that the results found were along the lines of those presented by Kaiser et al. (2005). According to these authors, the TPB model's capacity is greater than that of the VBN model, although they point out that, from a theoretical point of view, the TPB is an incomplete model, as it does not specify the directions the relationships follow between the con- structs that make up that model. That is, the relationship between attitudes, subjective norm, and perceived behavioral control does not appear to be very clear (McDonald & Ho, 2002). To this effect, following Ajzen and Fishbein (2005), we must point out that, first, although the attitudes, subjective norms, and control perceptions are conceptually independent constructs, "there may be a correlation between them, as the three components may be based on the same type of information" (p. 195). In fact, our results have shown the existence of said correlations between the three constructs, in accordance with the results obtained by Oom Do Valle et al.

(2005) or with those found by Mannetti et al. (2004). Nevertheless, new research developments should be approached, aimed at clarifying the type of relationship established between the aforementioned constructs.

Second, with reference to the VBN model regarding the environment, Aguilar-Luzón, García, Monteoliva, and Salinas (2006) and Kaiser et al. (2005) indicate the low fit found for the relationships postulated by the model's authors, results which are in line with those obtained in this research study. Therefore, if we look at the results obtained in this and other studies with a similar approach, it could be said that the linearity prescribed by the VBN model's authors has not been confirmed (Aguilar-Luzón & García, 2006/2007; Collins et al., 2006; Kaiser et al., 2005). Nevertheless, it would be worth looking into whether that linearity is found under certain conditions regarding, for example, the size of the samples used or their characteristics. With the results obtained in this study, we have been able to verify that when a different configuration of the variables in the VBN model (alternative model) is set up, both the predictive capacity over conduct and the fit to the empirical data are improved. This new configuration of the VBN model implies different paths to those considered by the original

authors. The glass-recycling behavior is positively and significantly related to the PN. These results are in line with the VBN theory and the theory of norms activation (Schwartz, 1977). Numerous studies that have put this model to the test have found a significant relationship between the environmental behavior and the PN (De Groot, 2008; Gärling et al., 2003; Kaiser et al., 2005; Nordlund & Garvill, 2002; Steg et al., 2005; Stern et al., 1999). Furthermore, according to our results, the AR acts as a direct determinant of behavior. This result can be justified if we bear in mind that, according to the postulates of the theory of norms activation (Schwartz, 1977)—taken as the basis by the authors of the VBN model—the AR is related to our beliefs about the consequences of our actions.

Having a conscience about the possible consequences of our behavior and the AR, according to Schwartz (1970), leads to a behavior consistent with the norms that the person is going to define as most appropriate or important in a given situation. It is therefore logical to think that a path is established between AC and AR variables, which in turn explain the internalization of the PN and behavior. This result is in line with several studies. De Groot (2008) has verified in multiple occasions this

relationship *vis-à-vis* different behaviors. In the same way, Mustapha (2010), Steg et al. (2005), Kaiser et al. (2005), Abrahamse (2007), and Stern et al. (1999) have confirmed a significantly positive influence of the AR over PNs.

Moreover, the linearity of the VBN model that summarizes the influence of values and general beliefs over the perception of the relationship between Man and Nature (NEP) in the specific beliefs (AC) has to be expanded with the influence of these variables over the AR.

Our results show that the socio/altruistic and biospheric values affect directly and positively the beliefs related to the AC, the AR, and general beliefs (NEP). In this sense, we can consider that values influence PNs directly through beliefs (NEP, AC, and AR). These relationships have been checked in several studies about environmental behavior (Abrahamse, 2007; De Groot, 2008; Nordlund & Garvill, 2002; Steg et al., 2005; Stern et al., 1999).

In summary, it is worth pointing out that in this alternative model, two predictors of behavior would be used (PN and AR) against just the PN, as considered in the original formulation, which in part would explain the results

obtained.

Nevertheless, we believe that this question would require a more in-depth analysis, so these results should be taken with certain discretion. Further- more, and bearing in mind the predictive power of both models over glass- separating behavior, we expected the predictive capacity of the VBN model to be greater than that of the TPB model. However, according to the results, the components of the TPB model are used to explain a higher proportion of variance in intention and behavior than that explained using the VBN model. To be more specific, using the initial formula of the TPB model, we have found that from the entire set of attitudes toward behavior, subjective norm, and perceived behavioral control, 43% and 37% of individual differences between housewives' behavioral intention and behavior are explained, respectively, once the behavior intention and perceived behavioral control were taken into account. These results on the TPB corroborate those found in other studies, with regard to the model's predictive value on environmental behavior. Similarly, other authors have highlighted the role of behavioral intention and of specific attitudes toward behavior in explaining environmental behavior (Bamberg et al., 2003; Goldenhaur & Connell, 1993; Jones,

1990; Macey & Brown, 1983; Meyerhoff, 2006; Taylor & Todd, 1995). Our results partly coincide with those obtained by Cheung et al. (1999). These authors found that the intention to carry out recycling behavior in a sample of students was explained from the attitude toward behavior and the subjective norm. Their results specifically indicated that the percentage of variance explained for the behavioral intention was 52.6%, although the percentage of variance explained for behavior was just 21.1%. Kaiser and Scheuthle (2003) also found similar results. In accordance with these authors, when the contribution of attitude, subjective norm, and perceived behavioral control to explaining the intention of behaving in an ecological manner is considered, 81% of the variance is explained, although this percentage is reduced when explaining behavior. In this case, intention is the element that produces the highest contribution to explaining the variance (52%), which is similar to the results obtained in this research study. Similarly, Taylor and Todd (1995) noted that the recycling intention related positively to attitude and perceived behavioral control, but it related negatively to subjective norm. These authors obtained a variance percentage for behavioral intention that was much higher than ours (99% for recycling intention, compared with 43% according to our results). For their part, Kaiser et al.

(2005) indicated that 95% of the behavior variance could be explained using the components of the TPB model, a percentage which is also much higher than that obtained in our research. Nevertheless, and even though our results have been more modest in comparison with those obtained by the aforementioned authors, we have to point out that the TPB model can generally explain between 25% and 30% of the behavior variance (Ajzen, 1991). With regard to the proportion of variance in intention that is usually explained by means of the TPB theoretical framework, studies have obtained percentages between 32% and 39% (Armitage & Conner, 2001; Perugini & Bagozzi, 2004). Moreover, as can be seen in the aforementioned cases that are based on the TPB model, the percentage of variance explained for behavior is generally lower than that explained for behavioral intention (Hernández, 2004).

Furthermore, we must point out the lack of significance of subjective norm in explaining behavioral intention. Taking the postulates of the TPB as a starting point, we would expect subjective norm to make a significant contribution to explaining behavior. However, this result has not been con- firmed, which could perhaps be due to the very nature of the behavior

involved in this study. It seems that subjective norm conceptualized as “social norm” as regards the importance that people give to the opinions or beliefs of our relevant others—together with the extent to which we are willing to listen to those others—makes up a norm that, in the words of Ajzen (1991), will become more or less important when carrying out the behavior in question, according to the situation and the type of behavior. If we follow our results, in the case of housewives, the behavior of separating glass from the rest of the rubbish does not appear to be influenced by normative components, but rather it seems to relate to having a favorable predisposition toward the behavior, together with a perception that one has a high degree of control over said behavior. In fact, Chung and Poon (1996) point out that house- wives show more favorable attitudes toward recycling behavior than other members of the family unit. Our results largely coincide with those found in other studies, which have highlighted the contribution of perceived behavioral control and specific attitudes toward behavior compared with the limited predictive capacity shown by subjective norm (Bagozzi & Dabholkar, 1994; Knussen, Yule, MacKenzie, & Wells, 2004; Mannetti et al., 2004; Taylor & Todd, 1995). We have also found that the perceived behavioral control acts as a good predictor of behavioral

intention, although intention is the element that contributes most to explaining the behavior variance. These results are in keeping with those obtained by other authors (Boldero, 1995; Taylor & Todd, 1995; Tonglet, Phillips, & Read, 2004). This result may be interpreted by considering that the influence of perceived behavioral control over behavior has been picked up by intention. In this sense, we must take into account that, in general, many studies adopting the TPB as a study framework find that the influence of perceived behavioral control as a predictor of intention and behavior is greater for the former (Meyerhoff, 2006). These results could be explained in accordance with Ajzen (2002), because items that focus mainly on the perception of self-efficacy are frequently used to measure perceived behavioral control. However, as the author stresses, the perceived behavioral control is made up of both the perception or belief of self-efficacy and the person's perception of control over their performance of a behavior. Both elements are different, albeit related, constructs, so the contribution of one and the contribution of the other on intention and behavior are different. Therefore, we could interpret that the perceived behavioral control, assessed using the beliefs of self-efficacy, have a greater influence over intention than over behavior (Ajzen, 2002).

If we focus on the VBN model's predictive capacity, our results indicate that when PN has been considered as the variable determining environmental behavior, its contribution has been very much reduced. These results are contrary to those obtained by other authors. For example, Steg et al. (2005), taking the acceptability of energy policies as a dependent variable, have studied the relationships that the VBN model establishes between its variables by means of a step-by-step regression analysis. The results obtained by these authors have revealed that PN explains 29% of the variance in the acceptability of energy policies. The difference between our results and those obtained by Steg et al. (2005) may be explained if we consider the fact that we took the frequency of the glass-separating behavior as a dependent variable, whereas they did not measure behavior but rather they analyzed the degree in which one is willing to accept a series of energy measures and/or policies. That is, those authors considered measures that are closer to attitudinal construct than to behavior itself.

So the question is, why do our results show that the VBN model has a low predictive capacity? There may be several reasons for this. First, one factor that may be deciding these results is the low internal consistency obtained in the NEP

scale. Following the recommendations given by Stern et al. (1999), in this study we have used the 5 items selected by the aforementioned authors out of the 15 that make up the original scale (Dunlap et al., 2000). As these authors have pointed out, they analyzed the one-dimensional nature of the scale, following the procedure based on the Armor method (Stern et al., 1999, p. 87). They then selected the five items that they would go on to use in their study, probably basing their choice on the fact that these were the items that contributed most to the internal consistency of the scale. Given that the selection of the items is generally carried out in the same sample that is later used to test the theoretical model, it is reasonable to assume that the alpha coefficient obtained by the authors would be high. However, given that the internal consistency of these items may vary depending on different factors, such as the characteristics of the sample, it would be logical to think that the items obtaining a high internal consistency in the study carried out by Stern et al. (1999) would not achieve a high internal consistency in our study, given the different characteristics of the sample.

To this effect, another reason that may explain the low internal consistency of the NEP scale is that which refers to the

cultural level of the sample used. Our sample is made up of housewives with an average age of around 50 years and with a low level of education, whereas most studies have used samples made up of university students.

We also believe that our results regarding the VBN model's fit and predictive capacity should be taken with discretion, as even though the same scales have been used as those proposed by their authors to measure the variables in the model, in our case a different behavior from that used by the model's authors has been taken as a dependent variable.

Furthermore, we believe that our results may be explained along the lines put forward by Uzzell (2000) or, more recently, by García-Mira, Real, and Romay (2005), with regard to the concept of *environmental hyperopia*; that is, in accordance with these authors, we have to bear in mind that environmental problems are perceived as more serious the further away they are from the perceiver, and the sense of responsibility is lesser when faced with problems perceived on a global scale (García-Mira & Real-Deus, 2001), although the degree of involvement with behavior that helps to reduce or improve those problems may be scarce before the perception that the impact that the behavior has on itself is minimal. Therefore, we may classify

environmental problems and their consequences according to whether they are perceived as “global” or “local” (García-Mira et al., 2005). This distinction is crucial in understanding how we, as people, form our attitudes and how we value the consequences of our actions with regard to the environment (Uzzell, 2000; Uzzell, Rice, Ballantyne, & Podlucká, 1994). It would be worth asking our- selves if the behavior used in our study (glass recycling and its possible consequences) is perceived by housewives as a local problem, or something close to them, or whether it is considered to be part of a general or global environmental problem. To this effect, the variables that make up the VBN model mostly refer to the general aspects of the environment, although they relate to more specific behavior. For example, the NEP scale or the GAC scale includes beliefs about general questions regarding the environment, and they may be perceived as important without having any real effect on behavior. We are talking about the situation that often occurs where being aware of the existence or gravity of a global environmental problem may entail the feeling that one’s own behavior can do nothing to reach a possible solution to that problem, which could clarify the reduced contribution of general scales to explaining specific behavior.

The starting of a specific environmental behavior, as is the case with glass recycling in our study, entails consequences that are closer to the person in question than other behaviors and/or the perception of other, more distant, problems. Consequently, we believe that future research should look into the development of more specific models and measures for each environmental behavior. In other words, the fact that a person develops a certain environ- mental behavior, such as recycling glass, for example, does not imply that they get involved with other behaviors such as recycling paper or buying environmentally friendly products. In Corraliza and Berenguer's (1998) opinion, this suggests that, when it comes to assessing a certain environmental behavior, we use different and specific psychological mechanisms for each one, which may explain the characteristic heterogeneity of environmental behavior, both at a cognitive and a behavioral level. Therefore, once again, the need to use scales and/or measures that are specific to each behavior becomes apparent.

This fact could also reflect the common dilemma in existing literature regarding the inconsistencies between attitudes and behavior. To this effect, several studies have mainly indicated methodological reasons, such as the differences in the

specificity of the measurement (Heberlein, 1981; Kaiser et al., 1999; Oskamp et al., 1991; Van Liere & Dunlap, 1981; Vining & Ebreo, 1992) or the lack of agreement when defining the attitudinal concept. As Stern (1992) points out, considering environmental attitudes as a one- dimensional construct could be the cause of this lack of correspondence. Moreover, as several theorists studying the relationship between attitude and behavior have argued, the measure must be taken with the same level of specificity for both measures (Ajzen & Fishbein, 2005; Fishbein & Ajzen, 1975; González, 2003; Schuman & Johnson, 1976; Stern & Oskamp, 1987), a general principle that has also been confirmed in the study of pro-environmental behavior (Heberlein & Black, 1976; Weigel & Newman, 1976). In other words, many studies have used general attitude measures to relate them with specific behavior measures. However, the level of correspondence between behavior and attitude is higher when both are measured at the same level of specificity or generality (Ajzen, 2005; Bamberg, 2003; Kraus, 1995). Other reasons for the inconsistencies between attitudes and behavior refer to the already mentioned heterogeneity of environmental behavior (Stern & Oskamp, 1987); the accessibility of environmental attitudes (Bell, Greene, Fisher, & Baum, 1996); the influence of contextual factors (Corraliza & Berenguer,

2000; Corraliza, Berenguer, Muñoz, & Ojeda, 1994; Olli, Grendstad, & Wollebaek, 2001; Oskamp et al., 1991; Stern, 1992; Tanner, 1999); and the influence that other representational factors (which would have greater and more direct explanatory power) may have over environmental attitudes. The results obtained in some studies indicate that the environmental attitude construct must be understood as a mediator variable in its relationship with behavior (Hernández & Hidalgo, 2000), not so much analyzing the direct correlation between these attitudes and behavior as identifying the variables that mediate and regulate that correlation, such as moral norms.

Nevertheless, although the importance of PN in predicting different eco- logical behaviors has been indicated in different studies (Bamberg & Möser, 2007; Hopper & Nielsen, 1991; Kaiser et al., 2005; Menzel & Bögeholz, 2010; Mustapha, 2010; Nordlund & Garvill, 2002; Thøgersen, 1996), it is relevant to highlight the very low predictive capacity of PN for the housewives' behavior, which detracts empirical support from the premises of the VBN model.

It is worth pointing out that although our study reveals the reduced capacity of the moral norm in predicting glass-

recycling behavior, when this variable is taken together with the AR (see alternative model to the VBN), the prediction of behavior appears to improve.

Other authors (e.g., Kaiser et al., 2005) have suggested the suitability of considering moral aspects alongside the TPB components as predictors of environmental conservation behavior in students. Consequently, we believe that future research studies in this field should include moral elements in the TPB theoretical framework, and that these relations should be studied in samples other than students.

To conclude, from a psychosocial perspective, environmental behaviors have been defined as the set of behaviors related to values, beliefs, norms, and attitudes regarding the environment. Different researchers who are interested in analyzing this type of behavior have proposed different theoretical models, so in some cases, more general explanatory models have been used and applied to different types of behavior (including environmental), whereas in other cases, particular models have been designed to study environmental behavior.

In this study, we have analyzed and compared two of the

most used models in the prediction of environmental behavior: the TPB and the VBN model regarding the environment. To be more specific, we have analyzed the suitability of both models as a framework for explaining the behavior of separating glass from the rest of the rubbish. Moreover, to minimize the criticism that is frequently cast on this type of study, essentially with regard to the use of samples made up of students, this research study has been carried out with a sample made up of housewives.

The results of this study broadly support the postulates of the TPB, and they do not appear to maintain the VBN model. The TPB shows a greater fit and a greater power to predict behavior. More specifically, the results indicate that the components of the model—attitude toward behavior, subjective norm, intention, and perceived behavioral control—explain much of the variance in environmental behavior. In short, our results reveal that the TPB is more suitable for explaining the studied ecological behavior than the model proposed by Stern et al. (1999) and Stern (2000), even though the latter model is specifically aimed at environmental behavior. Nevertheless, our results are not conclusive, as the measures of fit and capacity to predict glass-recycling behavior appear to improve when

changes in the directions in which the variables in the VBN model are related are introduced. That is, this study provides a first approach toward an alternative formulation to the model proposed by Stern et al. (1999), which appears to improve the level of fit to the empirical data and to increase the percentage of variance explained for behavior. We believe that this question must be considered in future research, as it would help to minimize criticism of the VBN model as regards the linearity of its variables (Aguilar-Luzón et al., 2006).

Nevertheless, we do not want to close without highlighting some of the possible limitations of this study. To this effect, we believe it would be interesting for future studies to be designed with the purpose of comparing both models, using different samples. We are referring, for example, to an analysis of both models comparing students with housewives, so as to verify whether the fit and capacity to predict of each theoretical approach depends on the inherent characteristics of each sample. Furthermore, we believe that cultural differences should also be taken into account, so we consider that a greater number of cross-cultural studies should be carried out. Another of this study's possible limitation is the low rate of internal consistency found for some of the scales that were used (e.g.,

the NEP scale), so it would be advisable to use other measuring instruments related to the degree of environmental awareness.

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