Recycling habits, recycling attitudes and beliefs and awareness of individual consequences in brazilians living in Portugal

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Josefa Silvoneide de Lima Gondim
PhD in Marketing and Strategy, University of Aveiro, Portugal

Nilton Soares Formiga
PhD in Social Psychology, Professor/Researcher at Potiguar University/ Ecosystem Ânima

Gisele de Ávila Soares Marques
Student and scholarship holder IC, at Potiguar University/ Ecosystem Ânima

Akaliny Araújo Martins da Silva
Student and scholarship holder IC, at Potiguar University/ Ecosystem Ânima

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1 INTRODUCTION

Many constructs based on the research on habits, could be explored in order to explain recycling habits, however, in the present paper it is intended to analyze the importance of the following variables: attitudes and beliefs in recycling (ACR) and awareness of individual environmental consequences (CCI). This study decided to investigate these constructs due to the evidence in the literature on the topic, which points to their positive association influencing habitual recycling behaviors (Meng *et al*., 2019; Abd'Razack, Medayese, Shaibu, & Adeleye, 2017; Rodrigues & Girandola, 2017; Halvorsen, 2012).

Among the concepts that serve as a basis for a better understanding about habits, there are those that define them as already established behaviors which have a tendency to repeat past actions; others, which postulate them as processes, having their beginnings from contextual cues; and still others that see habits as direct responses to situational cues (Gardner & Lally, 2018; Verplanken & Roy, 2016; Verplanken, Walker, Davis, & Jurasek, 2008). Studies are also found that define habits as repetitive behaviors, which happen with a certain frequency, are provided with automaticity, and take place in stable contexts (Verplanken & Sui, 2019; Gardner & Lally, 2018).

Thus, it can be inferred that the fact that a habit is a repetitive behavior also makes it difficult to control, because habitual, and therefore already established, behavior makes little use of consciousness, which entails automaticity of action (Verplanken & Orbell,

2003); and that given that habit is a behavior dependent on contextual cues, it is understandable that habitual behaviors are persistent, even if individuals lack conscious motivation to perform them (Gardner & Lally, 2018).

Specifically regarding the studies that investigated the recycling habit, different constructs and environments were analyzed. In Rodrigues and Girandola's (2017) investigation, the role of past behavior, attitudes and beliefs, along with the justification for non-behavior were analyzed in the context of self-reporting. In 2018, authors Whitmarsh, Haggar, and Thomas; used the Theory of Planned Behavior (TPB), which is composed of the constructs - attitude, social norm, and perceived behavior control; associated with identity, personal norms, and recycling information to predict recycling behavior in home, work, and holiday environments.

Regarding attitudes, these can be understood as a positioning of the subject as to their favorability or unfavorability about a given behavior or action, and is aligned with the behavioral intention (Xu, Ling, Lu, & Shen, 2017). Thus, the attitude of recycling has a positive association with the moral duty and responsibility to be participatory regarding the separation and disposal of household waste, but for this, it is necessary the pre-existence of an individual belief on the issue of recycling, which puts the individual in a situation to position himself against or in favor of the actual practice (Ajzen, 1991; Xu, Ling, Lu, & Shen, 2017).

Some studies point out that the recycling attitude that an individual possesses, is able to predict behavior, if and only if, based on that individual's positive past recycling behavior (Knussen, 2008; Saphores & Nixon, 2014). For Meng et al. (2019), willingness to participate in recycling (behavioral attitude), environmental awareness, and social responsibility are factors that influence an individual's recycling behavior.

And with regard to individual environmental consequence awareness (CCI), the assessment of environmental awareness stands out, which, is understood to be the concerns and perceptions of individuals about environmental challenges and problems (Chen et al., 2019); but also, conceptualized in terms of the importance the subject places on their behavior to develop a safe and healthy environment (Umuhire & Fang, 2015).

It follows from the study of the aforementioned authors that the ICC and the Recycling Habit (RH) are associated, because they are considered directly proportional elements, since the authors point out that the greater the environmental awareness of the individual, the more prone he is to environmental preservation.

In the same direction, Bezzina and Dimech (2011) and Oyekale (2017), recognize that CCI is associated with increased citizen participation in local recycling, and agree that efficient public management regarding household waste recycling, should consider CCI as a potential influencer of behavior, since it considers psychological and moral factors at the time of action. Still in the same line of thought, Meng et al. (2019) state that environmental awareness, social responsibility, and behavioral attitudes play an influential role on individuals' recycling behavior. With this, this paper aims to evaluate the relationship between recycling habits from attitudes and beliefs in recycling and awareness of individual environmental consequences in Brazilian families living in Portugal.

2 METHODOLOGY:

2.1 SAMPLE

The sample was of the non-probabilistic type and by convenience, which would include people of Brazilian nationality and older than 18 years old. The sample 'n' was evaluated in the statistical package GPower 3.1, considering the statistical criteria [probability of 95% ($p < 0.05$), the magnitude of the sample effect ($r \geq 0.50$) and a standard of hypothetical power ($\pi \geq 0.80$)] that guaranteed that the sample with 352 people was adequate for the study, having its statistical indicators being ($n = t \geq 1.98$; $\pi \geq 0.95$, p-value 0.01) reliable; with this, the sociodemographic data were as follows: all participants were Brazilian, with 78% female, 31% aged 26 to 35 years, 47% with the licensed educational level, 58% were married. Regarding professional activity, 18% were still students, but 13% worked in the health area and 23% had other professional occupations. As for the time they have lived in Portugal, there was a very disperse distribution, but it was observed that 13% have lived in the country for three years, 8% for two years, and 7% for one year.

2.2 ETHICAL PROCEDURES AND SURVEY ADMINISTRATION

As for the ethical procedures of the research, the criteria established by the Helsinki declaration for research with human beings were followed, and then the instruments were sent to the respondents through an electronic form available online on the GoogleDocs page, which was shared on social networks of groups of Brazilians living in Portugal for a period of 30 days. Participation was solicited informing them that the objective of the study would be to evaluate recycling habits, and that the study would be

voluntary, with virtual signature of the Informed Consent Form (ICF). We ensured the anonymity of the answers and that they would be treated as a whole and not in the particularity of each subject. Thus, an average time of 10 minutes was enough for the activity to be completed.

2.3 INSTRUMENTS

With regard to the constructs administered, the participants responded to the following instruments:

Recycling Habits Scale (HRS) - The Self-Report Habit Index (SRHI) was developed by Verplanken and Orbell (2003) and is based on the main characteristics of the habit, such as repetition, control, little use of awareness, personal identification, and efficiency of the behavior. The scale contains the following statement: "Behavior X is something that...", read X as the behavior to be studied (e.g., recycling behavior) and is formed by 12 items, but, of these, we chose to select 5 items from the scale precisely because it presents tautologies in its expressions, as well as some of the items do not meet the research objective. The participants had to indicate their answer on a five-point Likert scale (where "1 = strongly disagree" and "5 = strongly agree").

Recycling Attitudes and Beliefs Scale (EACR) - The Recycling Attitudes and Beliefs Scale (EACR) refers to a scale that aims to assess the individual's perception of what they believe is right to do with regard to recycling. This scale was constructed based on authors such as Bezzina and Dimech (2011) and contains 6 items. Respondents were asked to answer the items on a five-point Likert scale (with "1=Strongly Disagree" and "5 = Strongly Agree").

Individual Consequence Awareness Scale (ECCI): the individual consequence awareness scale (ECCI) aims to assess the individual's perception regarding the importance of being aware of the consequences of recycling for the environment. This scale was based on authors such as Bezzina and Dimech (2011), and Ofstad, Tobolova, Nayum, and Klöckner (2017), and is composed of 3 items. Respondents were asked to answer the items on a five-point Likert scale (with "1=strongly disagree" and "5=strongly agree").

Data Analysis

SPSS software, version 24.0, was used to tabulate the data and perform the data analysis. In addition to descriptive statistics (mean, standard deviation, frequency), a principal component analysis (*PC*) was performed, taking as criteria the *KMO* equal to or

greater than 0.70 and the *Bartlett's Test of Sphericity (*chi-square, χ^2) significant ($p < 0.05$) (Tabachnick & Fidell, 2001; Dancey & Reidy, 2006). As well, Kaiser's (eigenvalue equal to or greater than 1) and Cattell's (graphical distribution of eigenvalues, aiming to distinguish those spare) criteria tend to maximize the number of factors to extract decided (Dancey & Reidy, 2006). The internal consistency was also calculated through Guttman's Lambda 2 and the ICC of the factor resulting from each scale (Hair Jr. et al., 2009). It was also applied the Anova test with the purpose of analyzing the variances with the presented hypotheses and the multiple linear regression test, which is an analysis method involving a single dependent metric variable, considered to be related to two or more independent metric variables (Hair et at., 2009).

3 CONCLUSION:

Once data collection was completed, the statistics referring to multicollinearity and *outliers* revealed acceptable statistical indicators, respectively, correlation of 0.23 to 0.54, which had r $\geq$ 0.90 and the *Kolmogorov-Smirnov* (KS) indicator, 1.45 and p-value < 0.29. In the factorial analyses, the calculations, considering the principal axes method (PAF), Oblique rotation, saturation $\geq$ 0.30, eigenvalues $\geq$ 1 (Kaiser criterion), the distribution of the graphic slope with the cut-off point above 1.00 (Cattell criterion) (O'Connor, 2000; Hayton *et al*, 2004; Dancey & Reidy, 2006), revealed that the three measures (recycling habits, recycling attitudes and beliefs, and Awareness of individual consequences), showed the adequacy of the correlation matrix for all scales: recycling habits (KMO = 0.77 and Bartlett's Test of Sphericity,^{2} /gl = 287.21/3, p < 0.001), attitudes of recycling beliefs (KMO = 0.74, Bartlett's Test of Sphericity,^{2} /gl = 757.92/15, p < 0.001) and awareness of individual consequences (KMO = 0.77 and Bartlett's Test of Sphericity,^{2} /gl = 287.21/3, p < 0.001). It is noteworthy that Guttman's Lambda 2, as an estimate of reliability of scales, intended for the evaluation of measures formed by few items (Formiga, Souza, Costa, Gomes, Fleury & Melo, 2015), as well as, the ICC (intraclass correlation) that assess reproducibility (Hutz, Bandeira, Trentini, 2015; Pasquali, 2011) indicated scores above 0.70, which were within the required statistical parameter.

Based on these empirical assumptions, we calculated a multiple regression analysis using the *Enter* method. The fact that this method was chosen is due to the originality of the study, in which the prediction of recycling attitudes and beliefs and of

the awareness of the individual consequence on recycling habits was hypothetically established. Considering recycling habits as a total score, in table 1 it is possible to observe that there are non-significant results. Although there is an indicator of multicollinearity of the prediction (i.e., the VIF) in the required range (< 5.00), still, the proposed model was not significant.

Table 1 - Multiple regression of the effects of the dependent variables on the independent variable

Predictors	Criteria variable: Recycling habits# (HR)					
	Average (p.d.)	B	IF	Beta	t (> 1,96)	VIF
Intercept	---	-5,03	2,81	---	-3,77*	---
Recycling Attitudes and Beliefs (RCA)	23,92 (2,60)	0,70	0,22	0,18	3,32*	1,42
Individual consequence awareness (ICC)	14,04 (1,42)	0,68	0,12	0,33	5,75*	1,42
Regression Coefficient (R^2)	0,20					
Explained Variance ($_{Adjusted}R^2$)	0,20 (20%)					
Model	F (2/356) = 45.38, p < 0.01					

*p < 0.01;# Total HR Score; VIF = Factor Variance Inflation

In the results highlighted in the table above, it is possible to observe that the predictive 'Betas' were positive and significant, both for attitudes and beliefs, and for awareness of the individual consequence. The multicollinearity evaluation observed in the VIF (defined in Portuguese as: Inflation of Factor Variance) should not present scores ≥ 5, because it would imply in the low quality of the estimated empirical model (Hair, Tatham, Anderson & Black, 2005); thus, in the aforementioned table, it was observed that the VIF was 1.42 (p < 0.01). With regard to the significance of the predictive model and the variance explained of this ($_{adjusted}R^2$ = 0.20, i.e., explaining 20% of the variance) with statistical indicators that ensure the influence of this variable in the model [R^2 = 0.20; adjusted R^2 = 0.20, F (2/356) = 45.38, p < 0.01].

From the predictive scores, which revealed an acceptable model, an ANOVA was performed, associated with the *Scheffé post-hoc* test, in order to evaluate the differences in mean scores in the dependent *versus* independent variables (see table 2). With this, it was observed that the mean scores were significant both for the direct effect having ACR and CCI, specifically, presenting higher means in the high score of both constructs; as for the ACR versus CCI interaction effect, also significant, for high ACR and high CCI in relation to recycling habits. In the *Scheffé* test, it was observed that in the interaction

result, ACR versus CCI, the mean scores were distinct, in which, confirmed that, as a function of HR, higher ACR and higher CCI for the respondents (c>b>a).

Table 2: Differences between the means in the constructs according to the habits of recycling

Construct	Levels	Average	d.p.	Statistics		
				F Friedman	gl	p-value
ACR	Bass	1,97	0,09	9,78	2	0,01
	Moderate	1,81	0,07			
	High	2,35	0,05			
JRC	Bass	1,54	0,06	15,38	2	0,01
	Moderate	2,19	0,08			
	High	2,54	0,04			
ACR *versus* ICC	Bass	1,76[a]	0,15	5,10	4	0,01
	Moderate	2,23[b]	0,09			
	High	2,56[c]	0,04			

Notes: HR = Recycling Habits; ICC = Individual Consequences Awareness; ACR = Recycling Attitudes and Beliefs.

According to the empirical findings of this article, it is possible to state that both scales were reliable, since they presented factorial organization, represented by the factorial scores where the measures evidenced a valid item-factor relationship regarding their content and construct; the scale used to measure recycling habits (EHR) consists of the assumption of self-perception of the main characteristics of the habit, where repetition of the behavior, control, diminished use of awareness, self-identification, and efficiency of the behavior are observed. The scale of awareness of individual consequences (ECCI), seeks to evaluate the individual's perception of awareness of the consequences of recycling for the environment. The scale on attitudes and beliefs on recycling (ACR), on the other hand, is an instrument whose objective is to evaluate the individual's perception on what he/she believes is or is not correct to do regarding recycling.

Thus, it is understood that, from the moment the subject has a positive attitude towards recycling, it will probably result in a better development of a behavioral awareness that may influence the individual in a repetitive behavior of the action, i.e., the recycling habit. Such reflection corroborates several studies, such as Meng et al. (2014), where the authors show that the willingness to participate in recycling (behavioral attitude), and environmental awareness, influence recycling behaviors; Ofstad (2017), reveals that when a behavior is recognized as positive and useful, that is, when an attitude is favorable, this behavior will be marked in memory and will probably be repeated.

The aforementioned studies show that, between attitude and behavior, there is one more element, namely awareness, which, in turn, drives the individual to action, which is

also in relation to the research of Tsalis, Amarantidou, Calabró, Nikolaou, and Komilis, (2018), where the authors show that the attitude and belief in relation to recycling as influential factors in the participation of local campaigns. Thus, it is understood that the subject's action cannot exist without first having a favorable attitude added to an individual awareness regarding the importance of this action. Such reflection also corroborates with Forward (2019), where the author shows, from an investigation on the use of public transportation, that being favorable and believing that a certain behavior is the best alternative, leads the subject to a state of awareness or acceptance that that behavior is the right one.

From the moment an individual is aware of the consequences of his behavior and opts for friendly actions, such as recycling, which has good results, this individual tends to repeat such behavior responsibly and frequently. Thus, it is possible to infer that individual awareness influences the habitual behavior of individuals, and this inference finds theoretical support, as in Díaz Meneses and Beerli Palacio (2006), where the authors stated that habitual recycling behaviors present in themselves a recycling awareness; in Abd'Razack et al. (2017), where awareness is seen as a key element when it comes to strengthening the habit of maintaining a clean environment.

In sum, the findings of this study have a logical theoretical orientation, which suggests that attitudes and beliefs about recycling arouse in the subject an awareness of the consequences of his actions, which will lead him to a habitual behavior of separation and disposal of his waste. This study aimed to contribute to the evaluation of the formation of recycling habits in Brazilians living in another country, having as evaluative constructs Recycling Attitudes and Beliefs, and Awareness of Individual Consequences. Given that the initial explanatory model proposal was not confirmed, an alternative direction was reflected upon, which, directed towards a mediation model between ACR, CCI and HR, which, proved to be assessable, reliable, and within a theoretical logic.

The findings of this research have implications for both practical application and theoretical appreciation. For theory, it contributes not only to information regarding individuals' usual recycling behaviors, but also to a better understanding of the recycling behaviors of the immigrant public. As a practical application, it contributes both to the development of campaigns targeting the participation of citizens, be they native or foreign, and to the formulation of public policies, which are aimed at seeking the efficiency and effectiveness of the population's recycling behaviors.

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