

Locus of control, problem-solving skills appraisal as predictors of waste prevention behaviors

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Given that waste generation is a devastating problem, it is necessary that we advance our knowledge about the etiology of waste prevention behaviors. Accordingly, this study sought to increase the existing literature of waste prevention behaviors by examining the relationships among the locus of control, problem-solving confidence, approach-avoidance style, personal control style and participant's age with waste prevention behaviors. Two hundred and forty participants (126 Women, and 114 men) from Putra University (Universiti Putra Malaysia) completed the Locus of Control of Behavior Scale, Waste Prevention Behaviors, Problem-Solving skills Appraisal and Socio-demographic questions. The Structural Equation Modeling (SEM) estimated individuals with internal personal control, effective problem-solving confidence, internal locus of control and approaching styles were more likely to pursue waste prevention behaviors. In addition, men were better than women at problem-solving confidence, approaching style, while women were better than men at internal locus of control, and personal control style. Therefore, these findings reinforce the importance of personality traits in waste prevention behaviors.

Keywords: locus of control, problem-solving skills appraisal, waste prevention behaviors

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Introduction

The increasing amount of waste being generated as a consequence of the rapidly developing economies in developed and developing countries has become a crucial concern for nations and governments (Barr, 2007; Budhiarta, Siwar, & Basri, 2011; Davies, 2003; Swami, Chamorro-Premuzic, Snelgar, & Furnham, 2011). Thus, increasing waste and pollution become as a serious concern for local and national authorities worldwide (Swami et al., 2011). In Malaysia, for example, Ministry of Housing and Local Government reported that the amount of solid waste produced is estimated to be approximately 17.000 tons; however, only 1 to 2 per cent of the waste is recycled, and the rest is sent to landfill and open dumping (Budhiarta et al., 2011). On average, the quantity of waste produced per capita is about 0.85 kg per day, while the figure for per citizen is about 1.7 kg per day (Budhiarta et al., 2011; Sivapalan,

Muht, Abd, Kamaruzzaman, & Rakmi, 2002). It is predicted that, if the urgent action is not taken, the quantity of waste would rise to around 31.000 tons by 2020 (Manaf, Samah, & Zukki, 2009). Manaf et al. (2009) reported that 80% of the waste in Malaysia is comprised of plastic, paper, and food. It is widely acknowledged that although the packaging industry and economic factors affect waste reduction, the role of the individual in waste prevention is undeniable (Barr, 2007; Knussen, Yule, MacKenzie, & Wells, 2004; Vicente & Reis, 2008). Generally, the solution to reduce waste is divided into two categories: (a) Reducing consumption, and (b) Reusing, reselling or sharing products (Oskamp, 2000). It is readily acknowledged that individual characteristics play an important role in waste prevention (Kurisu & Bortoleto, 2011). This is in line with Oskamp's request from psychologists to play a more active role in promoting behavioral modifications that contribute to the conservation of the environment. Therefore, we have witnessed an increase

in psychological research concerning the conservation of the environment. For example, Barr (2007) identified the situational variables, environmental attitudes, and psychological traits as substantial factors in waste prevention behavior. Situational variables are related to the behavioral context, socio-demographic factors, environmental and behavioral knowledge, and the personal experience of the behavior that influences decision making (Barr, 2007, p. 438-439). Environmental attitude is related to an individual's orientation towards, or concern for, the preservation, restoration, or improvement of the environment. Research in this area suggests that individuals who are more open to change and who are more altruistic are more likely to be environmentally-friendly behavior (Barr, 2007). Previous studies have shown that individuals with environmental concerns are more likely to pursue pro-environmental behavior (Dunlap, Van Liere, Mertig, & Jones, 2000; Swami et al., 2011). There are various psychological factors related to pro-environmental behaviors. For example, individuals who are high in self-efficacy are more likely to pursue pro-environmental behaviors (Barr, 2007). In another study, Stern, Dietz, & Guagnano (1995) reported that egoistic individuals are less likely to pursue pro-environmental behaviors.

Previous studies have found that past behaviors and intentions predict the current or future waste prevention behaviors (Carrus, Passafaro, & Bonnes, 2008; Markowitz, Goldberg, Ashton, & Lee, 2012). For example, Swami et al. (2011) highlighted the role of psychological traits in household waste management behaviors; they found that positive associations existed between conscientiousness and older age with better household waste management. In the same vein, self-efficacy has been identified as an important contributing factor for predicting recycling behavior (Barr & Gilg, 2005; Chan, 1998). In addition, Ojedokun (2011) found that altruism and internal locus of control were powerful predictors of pro-environmental behavior in Nigerians. However, studies about waste prevention behavior are extremely limited. Waste prevention behavior has been defined as people's purchasing behavior that is difficult to change, and their preference to use personal and reusable items instead of disposable items. Some studies have involved garbage reduction in their scope, whereas recycling activities have become a part of the daily routine behavior for residents (Kurusu & Bortoleto, 2011).

Limitation and the present study

Although the available literature has identified a few situational and psychological factors of pro-environmental behavior, in our view, these studies are limited to the confined range of psychological variables that have been investigated. In particular, most studies on psychological antecedents with pro-environmental behaviors have been done on (e.g., self-efficacy, subjective norms, consciousness, openness to experience and egoistic behavior) that make theoretical models, such as Markowitz et al. (2012) and Barr (2007) theory of waste management behaviors. In our opinion, the extant literature on waste prevention behaviors could be extended through a specific focus on personality traits, and cognitive styles that underscore consistency in environmental attitudes. Another rationale for this choice is that problem-solving styles and locus of control assist behavioral modification to contribute better waste prevention behaviors. In addition, it has not been studied in Malaysia.

Therefore, this study endeavors to investigate this void in the literature by concentrating on problem-solving styles, locus of control as predictors of waste prevention behaviors.

Consequently, the current study was conducted as the primary research on personality traits and cognitive styles with waste prevention behaviors, particularly, the association of waste prevention behaviors with the locus of control, and problem-solving skills appraisal. It is obvious that the influence of the psychological variables on waste prevention behaviors is not exhaustive; however, these variables assist in increasing our understanding of personality traits and cognitive styles in respect of waste prevention behaviors. The reasons for choosing the variables are briefly explained, below.

First, we examined the association between the locus of control and waste prevention behaviors. Individuals with an internal locus of control are more likely to believe that they can control affairs in their life. Conversely, individuals with an external locus of control are more likely to believe that external powers, such as destiny, chance and luck, influence affairs in their lives (Rotter, 1990). Individuals with an internal locus of control typically show personal responsibility, participatory skills, problem-solving skills, desirable choices, persistence, self-efficacy and altruism (Burroughs & Mick, 2004; Corbett, 2005; Joo, Joung, & Sim, 2011; Ojedokun, 2011). In addition, research findings have shown that individuals with an internal locus of control are more likely to show pro-environmental behavior (Ojedokun, 2011). When individuals have control over the environment and the self, the environment and the self could be changed to the best condition. Previous studies have reported that an external locus of control may lead to frustration, which may contribute to an environmentally destructive behavior (Mehrabian & Diamond, 1971; Ojedokun, 2011). Therefore, the perception of locus of control may be different in attitude towards the environment and in taking action that prevents waste. It seems conceivable that an internal locus of control would be positively associated with better waste prevention behaviors. Thus, we hypothesize that an internal locus of control is positively correlated with waste prevention behaviors.

Second, we examined the association between problem-solving skills appraisal and waste prevention behaviors. In fact, several studies have shown that cognitive and emotional status and coping styles have pervasive influences on decision making; therefore, individuals with effective problem-solving skills show better environmental decisions (Vining, 1987, 1992). With our best knowledge, if any, limited studied have been done on the relationship between problem-solving skills appraisal with environmental decision-making. D'Zurilla & Goldfried (1971) defined the problem as "an experience or a group of experiences, events or conditions that an individual must react to effectively in his/her environment" (p. 12). According to the definition, individuals encounter to various problems in their lives, and the problem varies from person to person. Therefore, there are individual differences among people by encoding of information, perception and respond to stimulants. According to this definition, everyday people encounter to numerous problems. On the other hand, the solution was defined as a specific answer created from problem solving styles to the specific event (D'Zurilla & Nezu, 2010). D'Zurilla & Nezu (2010) defined "problem-solving as a self-directed cognitive-behavioral process." There is a distinction between problem-

solving skills appraisal and problem-solving skills. The former was defined as one's perception about personal problem-solving style and identify abilities and skills to solve problems in their lives (Heppner, Pretorius, Wei, Lee, & Wang, 2002). Heppner and Petersen (1982) developed the Problem-Solving Inventory (PSI) measure to assess an individual's report of perceived problem-solving. The problem-solving inventory (PSI) is based on the five-stage, sequential problem-solving model process (D'Zurilla & Goldfried, 1971) that was prominent at the time. However, Heppner and Petersen (1982) noted that factor analysis of the PSI generated a model that comprised three factors: problem-solving confidence, approach-avoidance style, and personal control. Problem-solving confidence has been defined as having self-assurance while facing a wide range of problems and trusting in one's own ability in facing the problems. The problem-solving confidence is similar to Bandura's description of self-efficacy, referring to a person's ideas about capacity to do what is required to reach a stated goal (Bandura & Locke, 2003). Social cognitive theory (Bandura & Locke, 2003) additionally describes how increased skill mastery heightens sense of self-efficacy, provides confidence needed to continue and, even, do better. The studies have shown that problem-solving confidence positively associated with self-efficacy (Heppner & Baker, 1997). From a conceptual viewpoint, it seems plausible that problem-solving confidence would be positively correlated with waste prevention behaviors. The approach-avoidance style has been defined as a tendency to approach or avoid facing problems (Heppner & Baker, 1997). The approach-avoidance style resonates with Dollard and Miller's (1950) motivational construct of approach-avoidance. Dollard and Miller explained that some people have tendencies to either tackle problems head-on or may withdraw from confrontation, choosing instead to use the flight versus fight response to the stimulus. Parto (2011) found that approaching style is more likely to associate with self-efficacy, assertiveness, and mental health. To the extent that waste prevention behaviors require an approaching style. In this study, we hypothesize that approaching style is positively associated with waste prevention behaviors. Personal control has been defined as one's ability to control his/her emotions and behavior while facing problems (Heppner & Baker, 1997). The personal control is consistent with Rotter's (1966) theoretical conceptualization of control which assesses emotional responses during the problem-solving process. Several studies have shown positive associations existed among internal personal control style with altruism, empathy, conscientiousness, optimism, happiness, flexibility, self-management and social responsibility (Chinaveh, 2010; Fitzpatrick, Schumann, & Hill-Briggs, 2013). It seems conceivable that internal personal control would positively associate with the waste prevention behaviors. Thus, we hypothesize personal control is positively correlated with the waste prevention behavior. Finally, apart from the locus of control behavior, problem-solving confidence, approach-avoidance style, and personal control style, which are explained above, we hypothesize that older women report better waste prevention behavior.

Method

Participants

Participants in this study comprised 126 female and 114 male students from Universiti Putra Malaysia (age from 17-

46 years, $M \pm SD = 25.53 \pm 5.37$). The racial breakdown of participants was Malay (43.7%), Chinese (28.2%), Indian (20.3%), and Others (7.8%). In addition, in terms of marital status, (55.6%) were single, (35.3%) were married, and (9.1%) were separated or widowed.

Procedure

Seven classes were chosen randomly from different faculties at Universiti Putra Malaysia, and data were collected during one of the regularly scheduled classes. The questionnaires were distributed among 270 students, but 240 questionnaires were received from the students. They completed questionnaires included Waste Prevention Behaviors, Locus of Control of Behaviour Scale, and Problem Solving Inventory.

Materials

Waste Prevention Behaviors (WPB; Kurisu & Bortoleto, 2011). This section comprises 18 items that measure waste prevention behaviors. All questions are based on a 5-point Likert scale from 1 (Never), 2 (Rarely), 3 (Sometimes), 4 (Often), and 5 (Always). The higher score indicates greater waste prevention behaviors, and vice versa. The waste prevention behaviors include shopping behaviors, which is relatively difficult to change, and routine behaviors, such as prefer to use personal items instead of disposable items, garbage reduction, and utilization of reusable items (Swami et al., 2011), for example, "I buy things that are produced with as little packaging as possible"; "I use my bag when going shopping, rather than one provided by the shop"; "I try to repair things before buying new items"; "I reuse paper for writing notes"; "I donate old items to other possible users"; "I try not to buy needless products" and "I bring my cup." In the present study the reliability was $\alpha: .76$. In addition, the convergent validity (AVE) of WPB was $\alpha: .51$, and, the construct reliability (CR) of AES was $\alpha: .703$.

Locus of Control of Behavior Scale (LCB; Craig et al., 2009). This section contains 17 items that measure the locus of control. All questions are based on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Total scores can be calculated by reverse coding items 2, 3, 4, 6, 9, 10, 11, 12, 14, and 17 and then summing all the items. The total score is from 0 to 85 – a higher score indicates an external locus of control and a lower score indicates an internal locus of control. The LCB had a good internal consistency from $\alpha: 0.75$ to 0.79 (Taiwo, Olapegba, & Adejuwon, 2005). In the present study, the reliability LCB was $\alpha: .73$, the convergent validity (Average Variance Extracted) was 0.56 , and the construct reliability (CR) was 0.70 .

Problem-Solving Inventory (PSI; Heppner, 1988). This inventory comprises 32 items that measure the perceptions of one's problem solving beliefs and style in facing problems and difficulties in one's daily life (Heppner, 1988). All the questions are based on a 6-point Likert scale from 1 (strongly agree) to 6 (strongly disagree). This questionnaire contains three factors: (a) Problem-solving confidence (for example, I encounter new circumstances, I have enough confidence to manage problems that might arise) with eleven items (5, 10, 11, 12, 19, 23, 24, 27, 33, 34, 35). Total scores can be calculated by reverse coding items 11 and 34, and then summing all items. A lower score in PSC indicates a higher problem-solving confidence, and vice versa; (b) Approach-Avoidance (for example, when making a decision, I compare the outcome of every option and weigh them against others)

with sixteen items (1, 2, 4, 6, 7, 8, 13, 15, 16, 17, 18, 20, 21, 28, 30, 31). Total scores can be calculated by reverse coding items 1, 2, 4, 13, 15, 17, 21, and 30, and then summing all items. A higher score in AAS is associated with an avoiding coping style rather than an approaching coping style, and a lower score is associated with an approaching coping style rather than an avoiding coping style; (c) Personal control (for example, when my first efforts to solve a problem fail, I become uneasy about my ability to handle the situation) with five items (3, 14, 25, 26, 32). Total scores can be calculated by reverse coding all items, and then summing all items. A lower score in PC indicates more internal personal control in facing difficulties in one's daily life, and vice versa. Heppner (1988) suggesting that the factors are interrelated and independent; therefore, in this study, three factors were evaluated separately. The PSI had a good internal consistency with an average α : .80 for PSC, and AAS, and .75 for PC (Heppner & Wang, 2003; Heppner, 1988). A wide range of studies have shown that this questionnaire has good validity (Heppner & Wang, 2003). In the present study, the reliability of PSC, AAS, PCS were α : .87, .73, .71, respectively, and the convergent validity (Average Variance Extracted) were 0.58, 0.53, and 0.51, respectively. The construct reliability (CR) were 0.77, 0.74, and 0.71, respectively.

Demographics. A self-report questionnaire was provided to obtain demographic information, such as sex, age, race, and marital status.

Analysis

Missing data for parcels and items (range from .68% to 3.24%) were addressed with the series mean method in SPSS software. The data were considered to be normal because the skewness values were from -.78 to .95, and the kurtosis values were from -1.25 to .88 for all variables. Byrne (2010) stated that if the skewness value is between -2 to +2, and the kurtosis value is between -7 to +7, the data are considered to be normal. For model fit, the goodness of fit indices – chi square/degree of freedom ratio (CMIN/DF), the comparative-fit index (CFI), the goodness-of-fit index (GFI), and the Tucker-Lewis Index (TLI) – were used. The indices have to be equal or greater than 0.90 (Kline, 2010). Furthermore, when the root mean squared error of approximation (RMSEA) is between 0.03 and 0.08 (Kline, 2010), the model has an acceptable goodness of fit. In addition, the group value SEM was used for comparison between the male and female groups. The AMOS 20 software was used for analyzing the data.

Results

Descriptive statistics

As can be seen from the Table 1, inter-correlation among the waste prevention behaviors, locus of control, problem-solving confidence, approach-avoidance style, personal control style, age, standard deviations, and the means are reported.

Table 1. Inter correlation, mean, standard deviation between study variables

	1	2	3	4	5	6
(1) Problem-Solving Confidence	-	.153*	.221**	.171*	-.212**	0.111
(2) Approach-avoidance style		-	.112*	.193**	-.16*	0.08
(3) Personal Control			-	.314*	-.19**	0.119
(4) Locus of control				-	-.26**	.114
(5) Waste prevention behaviors					-	.153
(6) Age						-
M	33.22	48.89	18.18	44.15	50.13	25.54
SD	9.72	17.53	4.33	15.80	15.37	5.36

Note: **p<.001, *p<.05.

Goodness of fit

The model included waste prevention behaviors, locus of control, problem-solving confidence style, approach-avoidance style, personal control style and age as an observed variable. The model showed good fit indices (CMIN/DF= 2.86, p<.01, CFI= .935, GFI= .914, TLI= .90, RMSEA= .068). According to Kline (2010) the model provided an acceptable fit for our sample.

Structural model

The model included locus of control, problem-solving confidence style, approach-avoidance style, personal control style, and age as exogenous variables, and waste prevention behaviors as an endogenous variable. As can be seen from the Figure 1, age had no significant effect on waste prevention behaviors; while locus of control, approach-avoidance style, personal control style, problem-solving confidence style had significant effects on waste prevention behaviours. It can be

seen from the data in Figure 1, that approaching style was associated with better waste prevention behaviors, and greater personal control, whereas internal locus of control behaviors were associated with better waste prevention behaviors. In addition, greater problem-solving confidence style associated with better waste prevention behaviors. These variables explained 28.0% of the variance in waste prevention behaviors. In addition, positive inter-correlations existed between study variables in this study (Figure 1).

Discussion

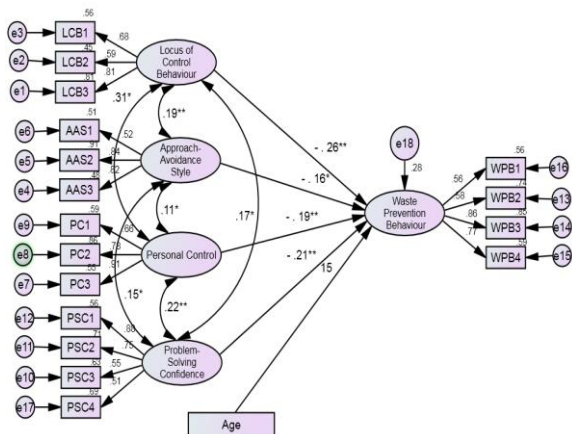


Figure 1. Path analysis of all the study variables

Tests of group differences

Invariance test of measurement model. The comparison between the unconstrained model and the measurement residuals model showed that the unconstrained model with ($\Delta \chi^2 (329.13)$, $df = 166$, $p < 0.01$, $RMSEA = 0.060$, $CFI = 0.903$, $GFI = .891$, $NFI = 0.901$), and the measurement residuals model with ($\Delta \chi^2 (368.82)$, $df = 203$, $p < 0.01$, $RMSEA = 0.058$, $CFI = 0.891$, $GFI = .863$, $NFI = 0.785$) were significant; however, the unconstrained model was better than the measurement residuals model, because chi-square was smaller (Davis, 2008; Hair, Black, Babin, Anderson, & Tatham, 2010). According to the measurement residuals model ($\chi^2 = 54681$, $df = 37$, and $p < 0.05$) in “The Assuming model Unconstrained to be correct”, The findings showed that the impact of likely differences across gender was significant.

Invariance test of structural model. As can be seen from the Figure 2, women showed greater internal locus of control, personal control, and waste prevention behaviors, whereas men showed greater approaching style, and problem-solving confidence style.

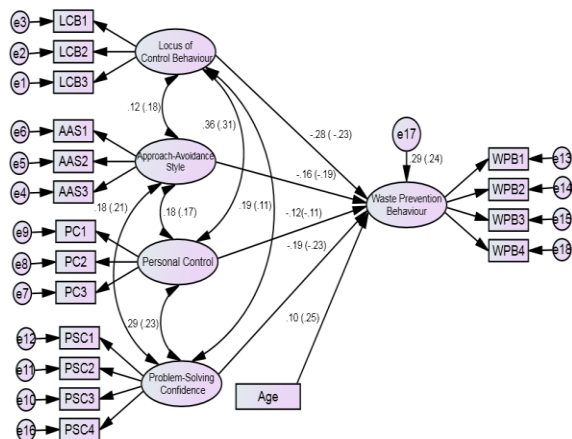


Figure 2. Standardized estimates of multigroup for female, and male. Note: for all estimates $p < .05$, except age is not significant; Results for female are reported first, and results for male are in parenthesis.

The findings of this study propose that personality traits, and cognitive styles are helpful predictors for waste prevention behaviors. Locus of control, problem-solving confidence, approach-avoidance style, personal control style and age explained 28.0% of the variance in waste prevention behaviors. In particular, our findings demonstrated that effective problem-solving confidence, approaching style, personal control style and internal locus of control significantly predicted better waste prevention behaviors.

The findings showed that a positive association existed between internal locus of control with waste prevention behaviors. Several studies have shown that locus of control is associated with personal responsibility, effective problem solving skills, desirable choices, persistence, self-efficacy and altruism (Burroughs & Mick, 2004; Corbett, 2005; Joo et al. 2011; Ojedokun, 2011). To the extent that waste prevention behavior is a social responsibility and individuals with an internal locus of control depict greater respect for human and societal rights, individuals with an internal locus of control are more motivated to engage in waste prevention behaviors (Ojedokun, 2011). In addition, the findings of our results demonstrated that women showed more internal locus of control than men. This finding is in agreement with (Lim, Teo, & Loo, 2003).

The present study also showed that problem-solving confidence is significantly and positively associated with waste prevention behaviors. Several studies have shown that problem-solving confidence is associated with self-efficacy, self-esteem, self-management, optimism, personal responsibility, conscientiousness, and positive emotions (Fitzpatrick et al. 2013; Heppner & Wang, 2003; Treffinger, Selby, & Isaksen, 2008). Therefore, individuals with problem-solving confidence style are more motivated to engage in waste prevention behaviors, and more respected to human rights. Moreover, our results showed that men's scores were higher on problem-solving confidence than women.

Another significant point to note is that approaching style is significantly and positively associated with waste prevention behaviors. A number of studies have shown that approaching style is associated with self-management, efficient collaborative skills, good judgments, and decision making skills, altruism, empathy, conscientiousness, optimism, happiness, and social responsibility (Heppner & Baker, 1997; Ojedokun, 2011; Swami et al. 2011; Taiwo et al. 2005; Thoma, Friedmann, & Suchan, 2013; Treffinger et al. 2008; Vining, 1987). To the extent the waste prevention behaviour requires self-management, efficient collaborative skills, good judgments, social responsibility, and decision making skills. Therefore, individuals with approaching style are most likely pursue the waste prevention behaviors. Moreover, our findings showed that man's scores were higher on approaching style than women.

Also, the findings showed that personal control style is significantly and positively associated with waste prevention behaviors. A number of studies have shown that approaching style is associated with self-management, effective collaborative skills, good judgments, and decision making skills, altruism, empathy, conscientiousness, optimism, happiness, and social responsibility (Heppner & Wang, 2003; Ojedokun, 2011; Thoma et al. 2013). Therefore, individuals with internal personal control style are more likely to engage

in waste prevention behaviors, and more respected to human rights. Moreover, our results showed that women's scores were slightly higher on internal personal control style than men.

Overall, the findings of our study rightly emphasize the personality traits, and cognitive styles when examining waste prevention behavior. It is noteworthy that most of the environmental protection frameworks (Barr, Gilg, & Ford, 2001; Barr & Gilg, 2007; Bortoleto, Kurisu, & Hanaki, 2012) have given little consideration to personality traits and cognitive styles in their models. For instance, according to Schwartz's theory (1977), environmental waste is explained using four features: personal and social norms, awareness of consequences, and denial of responsibility (Bortoleto et al., 2012). Schwartz hypothesized that personal norm is influenced by social norms, and that these factors only affect environmental behaviors when an awareness of the consequences is specified, and denial of responsibility is inactivated (Bortoleto et al., 2012). However, psychological factors, such as personality traits and cognitive styles in this theory were not considered. The inclusion of psychological variables in the pro-environmental behavior models could improve the efficiency of these models.

The findings of our study could be useful for policy-makers, teachers and parents to train children and adolescents to improve their problem-solving skills and internal locus of control. Therefore, individuals with these skills not only have an environmentally friendly behavior, but they could also maintain and improve mental health.

The most important limitation lies in the fact that respondents may overstate their answers in the self-report questionnaires for reasons of social desirability; therefore, future research could attempt to measure behaviors using peer-report and direct observation methods. Therefore, future research could examine the other psychological traits and cognitive styles with waste prevention behaviors. This is because personality traits and demographic characteristics have a considerable influence on waste prevention behaviours. For example, future studies could examine spiritual intelligence and well-being with waste prevention behaviours. Of course, it might be helpful to expand on the pro-environmental models that exist in the environmental literature, and it might be useful to improve the efficacy of the environmental prevention models. In addition, policymakers should also consider psychological factors in planning for reducing waste generation.

Lastly, waste prevention behavior can help to avoid wasting economic efficiency, and it is also useful to prevent the non-renewable resource depletion and environmental destruction.

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