Running Head: PREDICTING HOUSEHOLD RECYCLING

The role of self perceptions in the prediction of household recycling behavior in Australia

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Abstract

This study examined the role of self-perceptions, within a theory of planned behavior (TPB) framework, in the prediction of householders' recycling intentions and behavior. To examine additional self-perception constructs, both the personality factor of conscientiousness (as well as its lower order facets) and measures of self-identity were assessed in addition to the standard TPB predictors of attitude, subjective norm and perceived behavioral control (PBC). Participants from the general community ($N = 200$) completed TPB, conscientiousness, and self-identity items. Two weeks later, 148 participants reported their recycling behavior for the previous fortnight. Structural equation modeling found some support for the standard TPB with attitude and subjective norm (but not PBC) predicting recycling intentions and intentions (but not PBC) predicting recycling behavior. In addition, self-identity as a recycler but not conscientiousness (or its lower order facets) emerged as a significant predictor of recycling intentions although not as a significant determinant of actual recycling behavior. The findings of the present study highlight the importance of considering role-related perceptions in the development of pro-recycling campaigns.

Household recycling rates in Australia are currently extremely high with only 1% of households reporting that they do not engage in some form of recycling (Australian Bureau of Statistics (ABS), 2006). A substantial proportion of households, however, are not recycling or reusing specific recyclable materials including aluminium (19%), steel cans (30%), glass (10%), plastic bottles (10%) and paper/cardboard/newspapers (9%) (ABS). These statistics would suggest that not all eligible material is being recycled in some households and that it is important to continue to understand people's decisions to recycle household waste. Many studies have been conducted to identify the factors that are associated with individuals' decisions to engage in recycling behavior (for a review, see Schultz, Oskamp, & Manieri, 1995). More recently, Do Valle, Rebelo, Reis, and Menezes (2008) suggested that the Theory of Planned Behavior provides a useful basis for modeling recycling decisions. Indeed, many recycling studies have supported the utility of this theory in predicting people's recycling intentions and behavior (e.g., Boldero, 1995; Cheung, Chan, & Wong, 1999; Mannetti, Pierro, & Livi, 2004; Taylor & Todd, 1995; Terry, Hogg, & White, 1999; White et al., 2009). As such, we adopted the Theory of Planned Behavior in the current study to understand the recycling decisions of a sample of community residents in Queensland, Australia.

In brief, the Theory of Planned Behavior (TPB; Ajzen, 1991) proposes that intention (i.e., readiness to act) to perform a behavior is the most proximal determinant of behavior. Intention, in turn, is predicted by three constructs: attitudes (positive or negative evaluations about performing the behavior), subjective norms (perceived pressure and expectations of important others to perform or not perform the behavior) and perceived behavioral control (PBC; perceived control over performing the behavior; also thought to be a direct predictor of behavior) (Ajzen, 1991). A meta-analysis of 185 tests of the TPB provided significant support for the model, with intention accounting for 27% of the variance in behavior (with a further

2% of variance attributable to PBC), and attitudes, subjective norms, and PBC explaining 39% of the variance in intention (Armitage & Conner, 2001).

Despite its success in predicting both intentions and behavior, many researchers have proposed revisions of the TPB to include variables that may increase the predictive ability of the model (Conner & Armitage, 1998). A number of the proposed additions to the model focus on self perceptions that relate to enduring qualities or characteristics that people ascribe to themselves that may impact on behavioral decision-making. In this vein, variables such as personality traits (i.e., enduring emotional, interpersonal, experiential, attitudinal and motivational styles, McCrae & John, 1992) and self-identity (i.e., the extent to which performing a particular role behavior is an important component of an individual's self concept, Hogg, Terry, & White, 1995; Stryker, 1987) have been examined.

Despite the TPB's original contention that personality factors should only exert an indirect effect on intentions via beliefs, attitudes, norms, and control (Ajzen & Fishbein, 2005), there is increasing support for the direct impact of personality on intentions and behavior within a TPB framework (Norman & Conner, 2005) in the health (e.g., Conner & Abraham, 2001) and exercise domains (e.g., Rhodes, Courneya, & Hayduk, 2002). There is evidence also to suggest that self-identity adds significantly within the TPB across a variety of domains to the prediction of both intentions (e.g., Fielding, McDonald, & Louis, 2008; Nigbur, Lyons, & Uzzell, 2010; Sparks & Shepherd, 1992; Theodorakis, 1994) and behavior (e.g., Bissonnette & Contento, 2001; Nigbur et al., 2010; Theodorakis, 1994). In their review, Conner and Armitage (1998) found that self-identity accounted for, on average, an additional 1% of the variance in intentions over and above the standard TPB predictors.

In the context of household recycling, general personality factors (e.g., responsibility) have been examined (Simmons & Widmar, 1990); however, the contribution of the personality traits in the five-factor model (openness, conscientiousness, extraversion,

agreeableness, and neuroticism; McCrae & Costa, 1987) have not been considered in this context within the framework of an established decision-making model. Given previous findings linking sense of responsibility to recycling, it is likely that, of the personality traits in the five-factor model, it is conscientiousness (i.e., characterized by adherence, responsibility, planning, dependability and self-discipline; Costa, McCrae, & Dye, 1991; McCrae & John, 1992) that may be the most relevant to the performance of consistent recycling behavior. In support of a potential role for conscientiousness in decision-making about environmental behaviors, Fraj and Martinez (2006) found that those people reporting higher levels of conscientiousness were more likely to purchase ecologically friendly products. Further, research in other domains has established that it may be the specific lower order facets of the five personality factors that are important in determining people's behavior given that global estimates do not allow much precision in demonstrating which forms of a trait domain are most characteristic of a person or behavior (e.g., Rhodes et al., 2002; Rhodes, Courneya, & Jones, 2005). For instance, Rhodes et al. (2002) found support for extraversion's lower order facet of activity as a direct influence on exercise behavior. Thus, in the current research, we focus specifically on the role of conscientiousness, and its lower order facets of order, dependability, and goal-striving, in recycling decisions.

In contrast to personality factors, the role of self-identity in the prediction of recycling intentions is well established. Terry et al. (1999) showed that self-identity as a recycler predicted intentions to recycle after the standard TPB variables were taken into account. Mannetti et al. (2004) also found support for the role of self-identity, as assessed by identity similarity (comprising the relationship between responses to perceptions of a typical recycler and descriptions of oneself), in a TPB-based study predicting differentiated collection and refuse disposal for 230 Italian householders. Although the influence of self-identity on recycling decisions has been explored previously, to our knowledge, no studies have used the

TPB as a basis to test the influence of personality traits (specifically conscientiousness) as well as self-identity on individuals' decisions to recycle household waste.

In the single study which used the TPB including both influences of self-identity (i.e., perceptions of oneself as a 'good student') and personality traits from the five-factor model to predict examination performance, Phillips, Abraham, and Bond (2003) found that self-identity and conscientiousness had a direct effect on examination performance intentions. These findings suggest that it may be beneficial to consider both personality and identity in their contribution to conceptualizations of self in the TPB model, especially for behaviors other than academic performance which involve a person being committed to overcome potential barriers such as laziness, lack of time, and inconvenience (Boldero, 1995; Schultz et al., 1995).

The aim of the present study, then, was to assess the role of the self-perception constructs of both conscientiousness (and its lower order facets of order, dependability, and goal-striving) and self-identity within the TPB to predict householders' recycling intentions and behavior. In accordance with the TPB we expected that people's recycling intention would be influenced by their attitudes, subjective norms, and PBC (H_1), and that intention and PBC would predict self-report recycling behavior (H_2). In addition to the standard TPB predictions, we were interested in the role of the self-perception constructs of personality (specifically, conscientiousness and its lower order facets), not previously examined in this context, as well as self identity, on people's recycling intentions and behavior. We hypothesized that the more conscientious the individual (or, in the case of the lower order facets, the more orderly, dependable, and goal-striving the individual), the more likely they were to intend to recycle and engage in recycling (H_{3a}) and the more individuals perceived recycling to be an important part of their self concept, the stronger their recycling intentions

and behavior (H_{3b}). Finally, as an often included construct in TPB and recycling studies, we expected past recycling behavior to influence recycling intentions and behavior also (H_4).

Method

Participants

Participants were 200 members of the general public aged 17 to 78 years ($M_{\text{age}} = 33.89$, $SD = 15.00$; 56.5% female), recruited by advanced level undergraduate social psychology students and higher degree research students at a major Australian university. Most participants were single (49%) or married/defacto (43%). Based on accepted occupation groupings (ANZSCO, 2006), participants were classified as: students (27.9%), professionals (19.8%), clerical/administrative workers (19.3%), managers (7.6%), technicians/trade workers (6.6%), sales workers (5.6%), community/personal service workers (4.6%), home duties (4.1%), pensioner/retired (2.5%), laborers (1.5%) and unemployed (0.5%).

Design

Prior to conducting the study, ethical clearance was granted from the University's Human Research Ethics Committee. The study used a prospective design with two waves of data collection. Wave 1 involved a questionnaire assessing TPB variables and self-identity measures as they related to recycling, and an assessment of conscientiousness. Wave 2 involved 74% of the original 200 participants ($N = 148$) contacted 2 weeks later to complete a self-report measure of their recycling behavior during the previous fortnight.

Measures

The target behavior was performing curbside household waste recycling. Based on local council guidelines (Brisbane City Council, 2005), household recycling was operationalized as *putting out for recycling all paper/cardboard, glass, aluminium/steel products, cartons and plastic products that can be recycled*. To maximize congruence between the prediction and criterion variables, the variables were measured at the same level

of specificity in terms of context, action and time (Ajzen, 1991). All TPB items and self-identity were scored using 7-point Likert scales unless specified otherwise and 5-point Likert scales were used to score the conscientiousness items. Some reversed items were included to reduce response bias. These items were subsequently recoded so that scale items were in the same (positive) direction (Table 1 presents means, standard deviations, and scale reliabilities).

Three items assessed *Intention*: “I intend to engage in household recycling during the next fortnight”, 1 *strongly disagree* to 7 *strongly agree*; “I *do intend* 1 to *do not intend* 7 to engage in household recycling during the next fortnight”; “It is likely that I will engage in household recycling”, 1 *strongly disagree* to 7 *strongly agree*. Four items on 7-point semantic differential scales assessed *Attitude*: “For me, to engage in household recycling during the next fortnight would be: 1 *unpleasant* to 7 *pleasant* ;1 *good* to 7 *bad* ;1 *negative* to 7 *positive*; 1 *favorable* to 7 *unfavorable* ”. Three items measured *Subjective Norm*: “Most people who are important to me would approve of my engaging in household recycling”, 1 *strongly disagree* to 7 *strongly agree*; “Most people who are important to me think that my engaging in household recycling would be”, 1 *desirable* to 7 *undesirable*”; “Those people who are important to me would want me to engage in household recycling”, 1 *strongly disagree* to 7 *strongly agree*. Four items assessed *Perceived Behavioral Control (PBC)*: “I have complete control over whether I engage in household recycling”; I am confident that I could engage in household recycling”; “There are numerous events outside of my control which could prevent me from engaging in household recycling”; “It would be difficult for me to engage in household recycling”, all scored from 1 *strongly disagree* to 7 *strongly agree*. *Self-identity* as a recycler was measured using two items, including one reversed item (Terry et al., 1999): “To engage in household recycling is an important part of who I am”, 1 *no, definitely not* to 7 *yes, definitely*; “I am not the type of person oriented to engage in household recycling”, 1 *completely false* to 7 *completely true*”. *Conscientiousness* was assessed using the 12-item

conscientiousness scale (with four reversed items) from the Revised NEO Personality Inventory (Costa & McCrae, 1992). Response options were 1 *strongly disagree* to 5 *strongly agree*. An example item is “I try to perform all the tasks assigned to me conscientiously”. For the lower order facets of conscientiousness, five of these 12 items measured order, four items assessed dependability, and three items assessed goal-striving (see Rhodes et al., 2002; Saucier, 1998). One item measured *Past recycling behavior*: “During the past two weeks, to what extent did you engage in household recycling (i.e., put out for recycling all paper/cardboard, glass, aluminium/steel products, cartons and plastic products that can be recycled)?”, scored 1 *a small extent* to 7 *a large extent*. At Time 2, to measure *Recycling behavior*, respondents indicated how much of their household garbage that can be recycled was put out for recycling during the past 2 weeks; 1 *none at all*, 2 *hardly anything*, 3 *about 25% of the recyclable material*, 4 *about half of the recyclable material*, 5 *about 75% of the recyclable material*, 6 *almost everything*, 7 *everything*. To increase the measure’s reliability, a memory prompt asked participants to indicate the amount of recycling undertaken for each specific waste product (provided in the definition of garbage that can be recycled) in the previous fortnight.

Insert table 1 here

Results

Initially, the correlational relationships between the measured variables, intentions and behavior for household recycling were examined (Table 1). The predictor and criterion variables were all positively and significantly intercorrelated (with the exception of attitude and conscientiousness). Past behavior and self-identity emerged as the strongest correlates of intention, and intention and past behavior were the strongest correlates of recycling behavior. The hypothesized relationships between the study’s variables were explored using structural equation models (SEM) generated by AMOS 6.0. Evaluation of the model was determined by

fit statistics, path coefficients and R^2 values (to establish predictive power). The TPB predictor variables were allowed to co-vary and past behavior was allowed to predict the standard TPB constructs.

This initial model was not a good fit to the data, $\chi^2(11) = 10.220, p < .001, CFI = .79, TLI = .46, RMSEA = .26$. Modification indices suggested improvements to the model with the inclusion of paths from past behavior to self-identity and conscientiousness and between self identity and both attitude and conscientiousness. The model was rerun to include the suggested modifications. The analysis indicated that this final model was a good fit to the data, $\chi^2(7) = 1.253, p = .27, CFI = .996, TLI = .99, RMSEA = .042$. Modification indices did not suggest any improvements to the model. The final model indicated that attitude, subjective norm, self-identity and past behavior had direct effects on intention (conscientiousness and PBC did not), with intention and past behavior (but not PBC, self-identity, or conscientiousness) predicting behavior. In addition, past behavior directly predicted all of the TPB variables, self-identity and conscientiousness (see Figure 1). The final model explained 73% and 49% of the variance in recycling intentions and behavior, respectively. When the initial model was re-run with the lower order facets of conscientiousness (i.e., order, dependability, and goal-striving) replacing the global measure of trait conscientiousness, the initial model did not provide an adequate fit to the data, $\chi^2(24) = 9.412, p < .001, CFI = .66, TLI = .35, RMSEA = .24$, nor did the revised model described above, $\chi^2(16) = 6.700, p < .001, CFI = .84, TLI = .56, RMSEA = .20$.

Insert figure 1 here

Discussion

Despite nationwide statistics indicating that most people engage in recycling, participants in the present study reported, on average, that they only recycled about 75% of recyclable material within a fortnight time period, suggesting that there is still a substantial

proportion of eligible materials not being recycled. Thus, examination of the important factors underpinning recycling decisions continues to be warranted. The aim of the present research was to assess the role of the self-perception constructs of conscientiousness and self-identity in the prediction of household recycling intentions and behavior from a TPB framework.

The findings of the present study support most of the predictions of the standard TPB framework. Some support for H₁ was provided as attitudes and subjective norm significantly predicted householders' recycling intentions (but not PBC) indicating that a person's positive attitudes towards recycling and their perception of pressure to perform recycling from important others influenced their intentions to recycle. In some support for H₂, intentions (but not PBC) emerged as a significant predictor of recycling behavior. The absence of significant findings for PBC is not surprising as there is only mixed support for the contribution of PBC in the context of recycling with evidence that it does not always predict intentions (e.g., Boldero, 1995) or behavior (e.g., Boldero; Cheung et al., 1999; Terry et al., 1999). In general, the results of the present study provide further support for the utility of the TPB as a model of behavioral prediction (Armitage & Conner, 2001) and concur with other studies examining the utility of the TPB in the context of recycling (Cheung et al.; Terry et al.).

In support of H₄, past behavior influenced people's intentions to recycle and their self-reported recycling behavior. Given the frequency with which individuals have the opportunity to engage in recycling (given the available curbside collection program), it is unsurprising that past behavior had a mediated effect via all of the extended TPB predictors. This effect was especially evident for self-identity, supporting the assumption that past behavior informs the development of a role identity (e.g., Lee et al., 1999). In addition, past behavior impacted upon conscientiousness (consistent with Conner & Abraham, 2001), suggesting a relationship between the formation of a recycling habit and general levels of conscientiousness.

As the unique focus of the present study, for the additional variables capturing self-perceptions, it was identity as a recycler that was impactful upon intentions to recycle (H_{3b}), rather than the global personality trait of conscientiousness (or its lower order facets of order, dependability, and goal-striving) (H_{3a}). The predictive ability of self-identity concurs with those researchers who have established support for self-identity in the recycling context (Terry et al., 1999; Mannetti et al., 2004). However, it should be noted that, in the present study, self-identity impacted on intentions, but not on behavior itself, suggesting that it may not serve as a proximal determinant of people's actual recycling actions and, instead, inform their plans. The correlation between self-identity and behavior was high, though ($r = .55, p < .001$), indicating that the influence of self-identity on behavior may have been overshadowed by the presence of other strong predictors such as people's intentions and their past behavior.

The lack of finding for conscientiousness is in contrast to previous research suggesting an effect of personality factors on environmental behaviors (Fraj & Martinez, 2006; Shultz et al., 1995) and specifically the role of conscientiousness as an additional direct predictor of intentions within the TPB model (e.g., Conner & Abraham, 2001; Phillips et al., 2003). Further, although other researchers have found support for examining the lower order facets of personality in other domains (e.g., Rhodes et al., 2002; Rhodes et al., 2005), this study did not find any support for the conscientiousness facets of order, dependability, and goal-striving in determining people's recycling decisions. It may be that a measure of conscientiousness or the lower order facets as they specifically relate to the performance of environmental behaviors (including recycling) may prove more useful in predicting recycling behaviors than global estimates of conscientiousness (see also Ajzen, 2005). Finally, it may be that conscientiousness is more influential for repeated behaviors in contexts that are volatile, unfamiliar, or unknown (see Conner et al., 2007), descriptions unlikely to be true in the case of performing recycling for most people.

The findings in support of the TPB, including the role of self-identity, in the context of recycling have applied implications. The identification of multiple contributing factors in determining recycling intentions points to the need for strategies utilizing a comprehensive approach incorporating attitudinal, normative, and identity factors to encourage the recycling of maximal amounts of eligible recyclable material. Pro-recycling campaigns should aim to foster positive attitudes towards recycling all eligible materials and should promote the notion that significant referents would want the individual to recycle all possible refuse. Consistent with the increasing number of suggestions in research exploring the link between identity and environmentally friendly behaviors (e.g., Castro, Garrido, Reis, & Menezes, 2009; Nigbur et al., 2010), recycling campaigners should consider the encouragement of a recycler identity whereby the importance of recycling is central to the individual's self concept. Despite the evidence for self-identity as a promising avenue to bring about behavior change in the recycling context, a key focus of recycling campaigns, behavior change interventions, and randomized control trials has been on normative influences (e.g., encouraging the householder to consider what neighbors are doing) (e.g., Timlett & Williams, 2008). As Castro et al. (2009) rightly point out, decisions to recycle which are informed by a recycler identity cannot be maintained by a focus on what others are doing; rather, the focus of future campaigns needs to be on the individual's self concept and recycling goals regardless of whether neighbors or other community members are recycling or not. Thus, effective strategies may involve making a recycler identity salient in attempts to promote the recycling of all eligible refuse. Reminders of one's recycler identity could be achieved by strategies such as distributing fridge magnets and rubbish bin stickers emphasizing the recycler identity of the individual (e.g., "I'm a recycler who recycles *all* of my recyclable rubbish").

The limitations of the present research should be noted. Despite efforts to obtain a heterogeneous community sample, a substantial proportion of the participants were students

or professional and clerical workers. The snowballing recruitment method might have resulted in a sample bias as the individuals recruiting may have approached people with similar perceptions and behaviors to their own. In addition, the average age was somewhat younger than that of the general population. Future studies, then, should seek to gain a more diverse community sample. The present study included an assessment of the conscientiousness personality trait only. It is possible that other personality factors (e.g., agreeableness) and potentially their respective lower order facets may impact upon recycling decision-making. Further examination is needed to assess all Big 5 (McCrae & Costa, 1987) personality characteristics and potentially more of the lower order facets of these personality traits also (Rhodes et al., 2002). In addition, although using established sub-scales for the lower order facets of conscientiousness (e.g., Saucier, 1998), the reliability coefficient for dependability was somewhat low. Further, self-report measures were utilized in the present study and more objective measures (including observational), especially of recycling behavior, would be advantageous, particularly given previous research suggesting the potential for self-report measures of recycling behavior to be exaggerated (e.g., Perrin & Barton, 2001). Finally, it may be fruitful to examine other factors (e.g., acknowledgement of environmental problems, social and local community norms) that have emerged as important influences on people's recycling decisions in other studies to assess their impact with a TPB framework. Logistical issues such as the location of bins and frequency of waste removal, as well as people's knowledge of recyclable items and delineation of recycling responsibility within one's household structure may also prove beneficial to examine.

Overall, the present research found some support for the standard TPB predictors in that attitude and subjective norm predicted intention to recycle, and intention predicted recycling behavior. In addition, people's perceptions of their identity as a recycler impacted more on their recycling decisions than stable, global traits reflecting their general

conscientiousness suggesting that pro-recycling campaigns should emphasize people's identity as a recycler in efforts to encourage optimal levels of household waste recycling.

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Table 1

Bivariate Correlations, Means, Standard Deviations, and Cronbach's Alpha Reliabilities for Recycling

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Past behavior	-										
2. Attitude	.48***	-									
3. Subjective norm	.45***	.29***	-								
4. PBC	.45***	.35***	.31***	-							
5. Conscientiousness	.31***	.08	.19*	.18*	-						
6. Order	.30***	.06	.12	.17*	.89***	-					
7. Dependability	.26***	.14	.20*	.20*	.78***	.51***	-				
8. Goal-striving	.19*	.01	.19*	.08	.77***	.51***	.53***	-			
9. Self-identity	.66***	.47***	.41***	.34***	.22**	.18*	.23**	.14	-		
10. Intention	.80***	.56***	.55***	.43***	.19*	.18*	.22**	.06	.68***	-	
11. Behavior	.66***	.45***	.43***	.37***	.18*	.13	.28**	.05	.55***	.66***	-
<i>M</i>	5.33	5.78	5.87	5.73	2.77	2.54	2.93	2.92	4.98	5.93	5.14

									Predicting household recycling 21		
<i>SD</i>	1.81	1.20	1.00	1.01	.53	.74	.52	.64	1.59	1.36	1.57
<i>α</i>	-	.86	.80	.73	.83	.74	.55xx	.68	(.68***)	.89	-

Note. * $p < .05$. ** $p < .01$. *** $p < .001$. PBC = Perceived behavioral control

Figure 1. Final model fitted to the data for recycling behavior ($N = 143$)

* $p < .05$. ** $p < .01$. *** $p < .001$.