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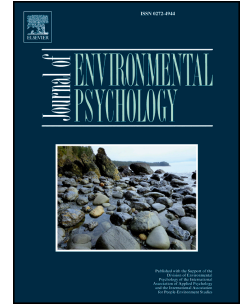
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Title

Moderating effects of pro-environmental self-identity on pro-environmental intentions and behaviour: A multi-behaviour study

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Moderating effects of pro-environmental self-identity on pro-environmental intentions and behaviour: A multi-behaviour study

Self-identity is considered as a useful additional predictor in the theory of planned behaviour (TPB). However, previous research generally assessed the impact of pro-environmental self-identity in relation to single behaviours and no studies considered its potential role in moderating the impact of other predictors on behaviour. The present research used a within-persons approach to examine effects across behaviours and a longitudinal design to assess the moderating role of self-identity in the prediction of intentions and behaviours, controlling for past behavior. Participants ($N = 240$) completed Time 1 questionnaires measuring TPB constructs in relation to five different pro-environmental behaviours. Two weeks later, participants ($N = 220$) responded to a questionnaire assessing self-reports of these behaviours during the intervening two-week period. Across pro-environmental behaviours the findings showed that pro-environmental self-identity significantly moderated the impact of perceived behavioural control on intentions and the effect of past behaviour on both intentions and behaviours.

Keywords: pro-environmental behaviour; sustainability; theory of planned behaviour; pro-environmental identity; within-person approach.

1. Introduction

During the last half-century, the increase in industrial production, resource extraction and private consumption, has exerted an amplified deleterious impact on the environment (e.g., Thøgersen, 2009). This is reflected in increased public attention to and awareness of the issue of the sustainability of the natural environment (e.g., Hynes & Wilson, 2016). This has become one of the major concerns of the 21st century; awareness of the need to adopt pro-environmental behaviour for a sustainable future is now widespread (e.g., Barr, Shaw, & Gilg, 2011), particularly in relation to the contribution of individual and household behaviours (Klößner, 2013). In fact, research has indicated that individual citizens can help environmental change through socially responsible behaviours, such as recycling (Environmental Protection Agency, 2012).

2. Using the theory of planned behaviour for explaining pro-environmental behaviours

The theory of planned behaviour (TPB; Ajzen, 1991) is a well-known theoretical extension of the theory of reasoned action (TRA; Ajzen & Fishbein, 1980) that has contributed to the explanation of the factors involved in various social behaviours, including pro-environmental behaviour. Briefly, the model asserts that attitudes, subjective norm and perceived behavioural control (PBC) are involved in the decision-making processes that determine intention formation and behavioural enactment.

The TPB model has demonstrated potent predictive power for several pro-environmental behaviours (e.g., Gatersleben, Murtagh, & Abrahamse, 2014; Sparks et al., 2014; Whitmarsh & O'Neill, 2010). Furthermore, researchers have shown that intentions can contribute to the prediction of environment-related behaviours. For example, Bamberg and Möser's (2007) meta-analysis indicated that, on average, intentions accounted for 27% of the variance in pro-environmental behaviours.

A criticism of the above TPB research is that most studies have employed cross-sectional designs, which represent a significant limitation because such designs are likely to inflate the correspondence between intention and behaviour (Hausenblas et al., 2008). Therefore, the present

work used a longitudinal study, within a multilevel design, which separately measured intention, attitude, subjective norms, PBC, past behaviour and future behaviour for several pro-environmental behaviours. Furthermore, we considered the role of pro-environmental self-identity as an additional predictor and moderator of these relationships within the TPB.

A further weakness of previous research has been the use of between-subject analyses to assess these effects even though the relationships of interest are within an individual. To overcome this problem we used a within-person approach to examine effects across several pro-environmental behaviours simultaneously. Analysing such data using multilevel modelling with random slopes allowed us to examine the relationships within individuals; this could be argued to be a more appropriate test of the relationships between TPB variables and behaviour (see Conner et al., 2016). It should be noted that pro-environmental self-identity was examined as a person-level variable in these analyses.

2.1. Self-identity as an additional variable

The literature on self-identity within the TRA and TPB (e.g., Dean, Raats, & Shepherd, 2012; Sparks & Shepherd, 1992) originated from the findings that a significant amount of variance in intentions and behaviours is not explained by TPB variables. Consequently, social researchers examined if individuals act in ways consistent with their sense of self and whether this might explain additional variance after controlling for TPB variables.

Self-identity reflects the enduring characteristics of an individual's self-perception (Sparks, 2000) and its inclusion within the TPB was originally inspired by identity theory (Stryker, 1987). Identity theory suggests that self-identity is composed of a collection of roles fulfilled by the person, which in turn induces an habitual action for supporting the validation of the self-concept (Stets & Burke, 2000). In this way, self-identity attempts to establish consistency between attitudes and actions (Christensen et al., 2004), inducing specific intentions. Therefore, the more relevant an identity is, the more it elicits identity-congruent behaviours (Laverie & Arnett, 2000).

Different studies have confirmed that self-identity is an important additional factor within the TPB for predicting both intentions and behaviours (e.g., Paquin & Keating, 2017), including studies that controlled for past behaviour (e.g., Carfora, Caso, & Conner, 2017a; Caso, Carfora, & Conner, 2016). For example, Rise, Sheeran and Hukkelberg (2010) in a meta analysis reported that self-identity explained a significant amount of additional variance in intentions controlling for past behaviour.

2.1.1. The role of self-identity in relation to pro-environmental behaviour

Studies within environmental psychology have revealed that individuals' sense of identity can predict intentions and action for pro-environmental behaviours (e.g., Sparks, Shepherd, & Frewer, 1995; Whitmarsh & O'Neill, 2010). In the literature, pro-environmental self-identity is conceived and measured in different ways, some based on theories of the self-concept and interpersonal relationships, others grounded in theories of identity (for details, see Walton & Jones, 2017).

Specifically, in the present research pro-environmental identity is conceptualized as a durable sense of oneself as interdependent with the natural world (Clayton, 2012), and it refers to the extent to which a person perceives that environmentalism is an important part of who s/he is (Stets & Biga, 2003). To illustrate, self-identity as a recycler can influence intentions related to recycling behaviour (Manetti, Pierro, & Livi, 2004) and self-identity as "green" consumers can predict intention to purchase organic foods (Sparks & Shepherd, 1992). Similarly, an energy-saving identity can explain intentions to conserve energy (Van der Werff, Steg, & Keizer, 2011).

Moreover, self-identity directly explains pro-environmental behaviours (e.g., Devine-Wright, 2009). The effect of self-identity on intentions and related pro-environmental behaviour was confirmed in a study on recycling behaviour (Nigbur, Lyons, & Uzzell, 2010) and in research concerning a range of pro-environmental behaviours (such as waste reduction and eco-shopping; Whitmarsh & O'Neill, 2010). More recently, Mancha and Yoder (2015) indicated that this construct predicted intention to protect the environment; Wang (2016) found that it was positively related to

individual consumer behaviour and civic behaviour pertaining to green food and beverage choices. In summary, pro-environmental self-identity may encourage individuals to form pro-environmental intentions and to engage in pro-environmental actions.

2.1.2. Self-identity as a moderator of TPB relationships

One criticism of the majority of studies on pro-environmental behaviours that have considered self-identity is their failure to control for the effects of past behaviour (e.g., Gatersleben et al., 2014). It is necessary to consider the independent effect of past behaviour, which is typically demonstrated to be the strongest predictor of future behaviour, explaining variance over and above the impacts of the TPB variables (see Ajzen, 1991; Conner & Armitage, 1998). Nevertheless, some studies have shown significant effects of self-identity even when controlling for past behaviour (e.g., Carfora, Caso, & Conner, 2016a).

A further criticism of many previous studies of self-identity within the context of the TPB is the failure to consider moderation effects. Thus, in the current research we assess the extent to which pro-environmental self-identity moderates the relationships between variables. Although self-identity might moderate any of the relationships, previous research that has looked at moderation effects has generally explored interaction effects with three variables.

First, interactions between self-identity and past behaviour on either intentions or behaviour have been explored. Identity theory (Stryker, 1987) would suggest that repetition of a behaviour leads to perceptions of the behaviour as an important part of the self-concept. This would suggest a positive interaction between self-identity and past behaviour in predicting intentions and behaviour. However, the evidence in this regard is mixed. Charng et al. (1988) reported such a positive interaction regarding intentions to donate blood donation. However, Åstrøm and Rise (2001) failed to find a significant interaction for predicting healthy eating intentions and Terry, Hogg and White (1999) did not find a significant interaction for recycling behaviour. Other studies (Conner & McMillan, 1999; Dean et al., 2012; Smith et al., 2007) have found significant negative interactions

between past behaviour and self-identity for explaining intentions. No studies have reported tests of the interaction between self-identity and past behaviour on subsequent behaviour.

Second, interactions between self-identity and perceived behavioural control on intentions have been explored in a couple of studies. For example, Terry et al. (1999) reported that PBC was more strongly related to intentions when group identification about household recycling was low compared to high (i.e., a negative interaction). Similar relationships between PBC and intentions were reported by Cheng and Chu (2014). No studies have reported tests of the interaction between self-identity and PBC on subsequent behaviour.

Third, the interaction between intentions and self-identity in explaining behaviours has also been considered in one study. Gardner, de Bruijn and Lally (2012) found no significant interaction between intention and self-identity in explaining binge-drinking behaviour in UK students.

In the present research we explored all possible interactions between pro-environmental self-identity and TPB variables (plus past behaviour) in predicting either intentions or behaviour. However, given that previous research had particularly observed or tested interactions between self-identity and past behaviour, PBC or intentions, these were the focus of our attention.

2.2. The present research

In summary, the present study aimed to assess the role of pro-environmental self-identity within the TPB addressing some of the criticisms of previous studies (e.g., Gatersleben et al., 2014; Nigbur et al., 2010). Specifically, it sought to examine the interaction of pro-environmental self-identity with other TPB predictors plus past behaviour in explaining intentions and pro-environmental behaviours. In particular, this aim was pursued by considering multiple pro-environmental behaviours using within-subjects analyses across multiple behaviours and a longitudinal design.

3. Methodology

3.1. Participants and procedure

Participants were recruited in Southern Italy to a web-based survey via an online advertisement posted on the pages of different social networks. An inclusion criterion was that participants make household decisions, i.e. the individuals who deal with the economic management of their house. At baseline we received 240 completed questionnaires; at two weeks follow-up 220 questionnaires were returned completed, even though participants received no incentive for taking part. The final sample ($N = 220$) included more females (80.3%) than males (19.7%); participants were aged between 18 and 87 years ($M = 43.34$ years; $SD = 15.80$). The preponderance of women participants is to be expected given that in Italy females tend to take more household decisions. The participants' educational level was rather high (20.3% had primary school education, 54.5% had secondary school education and 25.2% had university education). Most self-classified as either married (46.8%) or single (34.2%), while the remainder were divorced (9.9%), cohabitants (4.5%) or widowers (4.5%). Finally, householders generally selected medium (71.2%) or low (21.2%) family income categories, rather than high (7.7%).

3.2. Measures

The TPB constructs were assessed based on Ajzen's (1991) recommendations and prior research examining the TPB as applied to pro-environmental behaviours (e.g., Graham-Rowe Jessop, & Sparks, 2015; Whitmarsh & O'Neill, 2010). At Time 1 (T1) participants responded to a questionnaire tapping the same TPB components for each of five pro-environmental behaviours: reducing food waste, food waste recycling, food packaging recycling, not buying too much food, and food purchase planning. Behaviour was also assessed at Time 2 (T2) two weeks later.

Intention to engage in each pro-environmental behaviour was assessed as the mean of two items (e.g., 'I intend to reduce the amount of food that gets thrown away from my household over the next seven days'; strongly disagree (1) to strongly agree (7); adapted from Conner et al., 2016). Higher values indicated stronger intention. The range of Cronbach's alphas was from .70 to .89 across behaviours (mean $r = .85$, $p < .001$).

Attitude towards each pro-environmental behaviour was assessed as the mean of four items for ('For me to reduce the amount of food that gets thrown away from my household over the next seven days would be'; extremely harmful (1) to extremely beneficial (7), extremely worthless (1) to extremely valuable (7); extremely unenjoyable (1) to extremely enjoyable (7), extremely unpleasant (1) to extremely pleasant (7); adapted from Conner et al., 2016). Higher values indicated more positive attitude. The range of Cronbach's alphas was from .81 to .87 across behaviours.

Subjective Norm for each pro-environmental behaviour was assessed as the mean of four items (e.g., 'I think that most people who are important to me would approve of my reducing the amount of food that they throw away from my household over the next week'; strongly disagree (1) to strongly agree (7); adapted from Conner et al., 2016). Higher values indicated stronger norm. The range of Cronbach's alphas was from .63 to .89 across behaviours.

Perceived Behavioural Control (PBC) for each pro-environmental behaviour was assessed as the mean of four items (e.g., 'In the next week, if it was entirely on me, I'm sure I will be able to reduce the amount of food that gets thrown away from my household', strongly disagree (1) to strongly agree (7); adapted from Conner et al., 2016). Higher values indicated stronger PBC. The range of Cronbach's alphas was from .75 to .83 across behaviours.

Pro-environmental self-identity was assessed as the mean of four items (e.g., 'I think of myself as an environmentally-friendly consumer'; strongly disagree (1) to strongly agree (7); adapted from Whitmarsh & O'Neill, 2010). Higher values indicated stronger pro-environmental self-identity ($\alpha = .83$).

Self-reported Behaviour was assessed with one item for each pro-environmental behaviour (e.g., 'On how many days in the past week have you reduced the amount of food that gets thrown away from your household?'; never (0) to everyday (7); adapted from Conner et al., 2016). Behaviours at T1 and at T2 were respectively considered as measures of past and future behaviours.

3.3. Analyses

SPSS (version 21, SPSS) and HLM (version 7, SSI; Raudenbush & Bryk, 2002) were used to conduct the analyses. Preliminary analyses were run with SPSS. Those participants who did not respond to T2 questionnaire were excluded. No significance differences in age and gender were found by ANOVA and Chi-square tests between those who responded to both T1 and T2 and those who were excluded ($ps > .09$).

For regressions to predict intention and self-reported behaviour, the data were comprised of a total of 1110 person-behaviour data points spread across the 220 participants who were included in the analyses. Hierarchical Linear Modeling (HLM) was used to test the relationship both between TPB components (attitude, subjective norm and PBC) plus past behaviour and intention, and between TPB components plus past behaviour and behaviour, and the role of pro-environmental self-identity as a level 2 moderator of these relationships. A two-level hierarchical structure was used to organize the data. Random effects were used to allow variation across participants. Level 1 was organized to test the within-person variation, Level 2 to analyze the between-person variability.

Level 1 predictor variables were past behaviour, PBC, attitude and subjective norm for predicting intentions, whereas they were intention, PBC, attitude, subjective norm and past behaviour for predicting future behaviour. These variables were centered around the group mean. The level 2 predictor (i.e., pro-environmental self-identity) was centered around the grand mean. In relation to the prediction of participants' intentions, an intercept-only model was the baseline model. Model 1a included attitude, PBC and subjective norm as predictors of intention. Model 1b added the Level 1 variable of past behaviour. Model 1c added the cross-level interactions between intention predictors (attitude, subjective norm, PBC and past behaviour) and level 2 variable (self-identity). Model 1d included only the significant cross-level interaction (between past behaviour and self-identity, and PBC and self-identity).

In relation to predictions of reported behaviour, an intercept only model was the baseline model. Model 1a included intention and PBC, the main direct predictors of behaviour within the TPB. Model 1b added the other TPB variables (attitude and subjective norm). Model 1c added the

Level 1 variable of past behaviour. Model 1d added the cross-level interactions between all Level 1 predictors and Level 2 variable (self-identity). Model 1e included only the significant cross-level interaction (between past behaviour and self-identity).

From the analysis with robust standard errors, the deviance statistic was used to indicate model fit and Chi-squared test of the change in deviance statistic compared to a baseline intercept-only model to consider significant improvement of fit. Unstandardized coefficients, standard errors, *t*-ratio and *p*-value were reported for each predictor. Preacher's procedure (Model 3; retrieved from <http://www.quantpsy.org/interact/hlm2.htm>.) was used for decomposing the significant interaction term for obtaining simple slopes.

4. Results

Examining means and standard deviations revealed that the measures were not unduly skewed and had reasonable variability.

4.1. Predicting pro-environmental intentions

In relation to predictions of intentions (Table 1), multilevel modelling found that attitude, subjective norm, and PBC significantly explained pro-environmental intentions, $\chi^2(11) = 2601.59$, $p < .001$. In Model 1a, PBC was the strongest predictor and all variables were significant. Including past behaviour, $\chi^2(16) = 2552.74$, $p < .001$ (Model 1b) significantly reduced the deviance statistic compared to Model 1a and all predictors were significant. For testing the moderation effects of self-identity, the inclusion of the cross-level interactions between all Level 1 predictors and Level 2 self-identity variable (Model 1c) significantly reduced the deviance statistic compared to Model 1b, $\chi^2(16) = 2505.29$, $p < .001$. In addition to a stronger positive effect for self-identity, there was a significant moderating effect of pro-environmental self-identity for past behaviour and PBC. In Model 1d the non-significant cross-level interactions between all Level 1 predictors and Level 2 self-identity variables were excluded, resulting in a significant reduction of the deviance statistic compared to Model 1c, $\chi^2(16) = 2498.59$, $p < .001$. The pattern of findings was substantively unchanged with significant positive effects for PBC, self-identity, subjective norm, attitude and past

behaviour plus a significant positive interaction between self-identity and past behaviour and a significant negative interaction between self-identity and PBC (Table 1).

Table 1.

Multilevel analysis of predictors of pro-environmental intentions including cross-sectional and cross-level analyses

Predictors	B	SE	<i>t-ratio</i>	<i>p-value</i>
Model 1a				
Intercept β_{00}	-.00	.06	-.07	.94
PBC β_{10}	.46	.04	10.23	<.001
Attitude β_{20}	.17	.05	3.49	<.001
Subjective norm β_{30}	.16	.04	4.09	<.001
Model 1b				
Intercept β_{00}	-.00	.06	-0.07	.94
Past behaviour β_{10}	.10	.02	4.69	<.001
PBC β_{20}	.39	.04	8.9	<.001
Attitude β_{30}	.11	.05	2.42	.02
Subjective norm β_{40}	.13	.04	3.48	<.001
Model 1c				
Intercept β_{00}	-.00	.05	-.08	.94
Past behaviour β_{10}	.09	.02	4.55	<.001
PBC β_{20}	.39	.04	8.95	<.001
Attitude β_{30}	.11	.04	2.41	.02
Subjective norm β_{40}	.14	.04	3.68	<.001
Self-identity β_{01}	.36	.05	7.13	<.001

Cross-level**Interactions with****Self-identity in****Model 1c**

Past behaviour β_{11}	.05	.02	2.41	.02
PBC β_{21}	-.09	.04	-2.41	.02
Attitude β_{31}	-.06	.04	-1.39	.16
Subjective norm β_{41}	-.01	.03	-.39	.70

Model 1d

Intercept β_{00}	-.00	.05	-.08	.94
Past behaviour β_{10}	.09	.02	4.58	<.001
PBC β_{20}	.39	.04	8.89	<.001
Attitude β_{30}	.11	.04	2.49	.01
Subjective norm β_{40}	.14	.04	3.63	<.001
Self-identity β_{01}	.35	.04	8.31	<.001

Cross-level**Interactions with****Self-identity in****Model 1d**

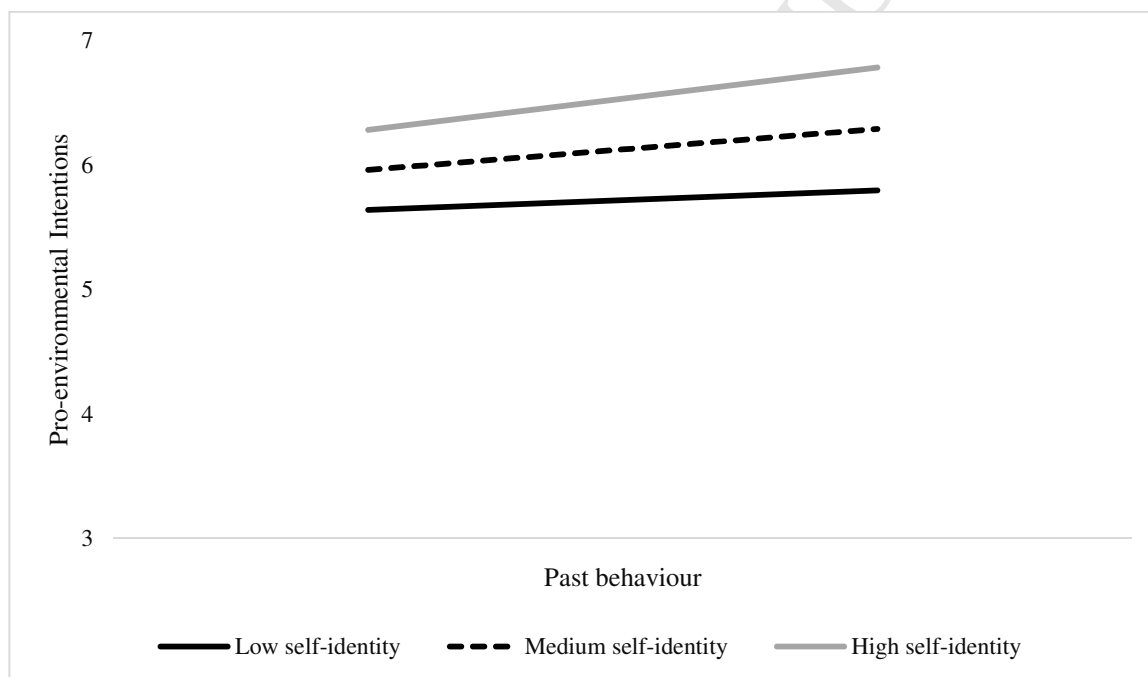
Past behaviour β_{11}	.04	.02	2.42	.01
PBC β_{21}	-.12	.03	-3.42	<.001

Note. B = unstandardized coefficient. SE = Standard Error. Model 1a, deviance statistic (11) = 2601.59; Model 1b, deviance statistic (16) = 2552.74; Model 1c, deviance statistic (16) = 2505.29; Model 1d, deviance statistic (16) = 2498.59.

Decomposition of the first interaction term showed that the effect of past behaviour on intention increased as pro-environmental self-identity increased (Figure 1), i.e., a positive interaction. The impact of past behaviour on intention was significant at all levels of self-identity, however it was weakest when self-identity was lowest ($M - 1SD$; $B = .29, p < .001$), stronger at moderate levels of self-identity (M ; $B = .34, p < .001$), and strongest at highest levels of self-identity ($M+1SD$; $B = .39, p < .001$).

Figure 1.

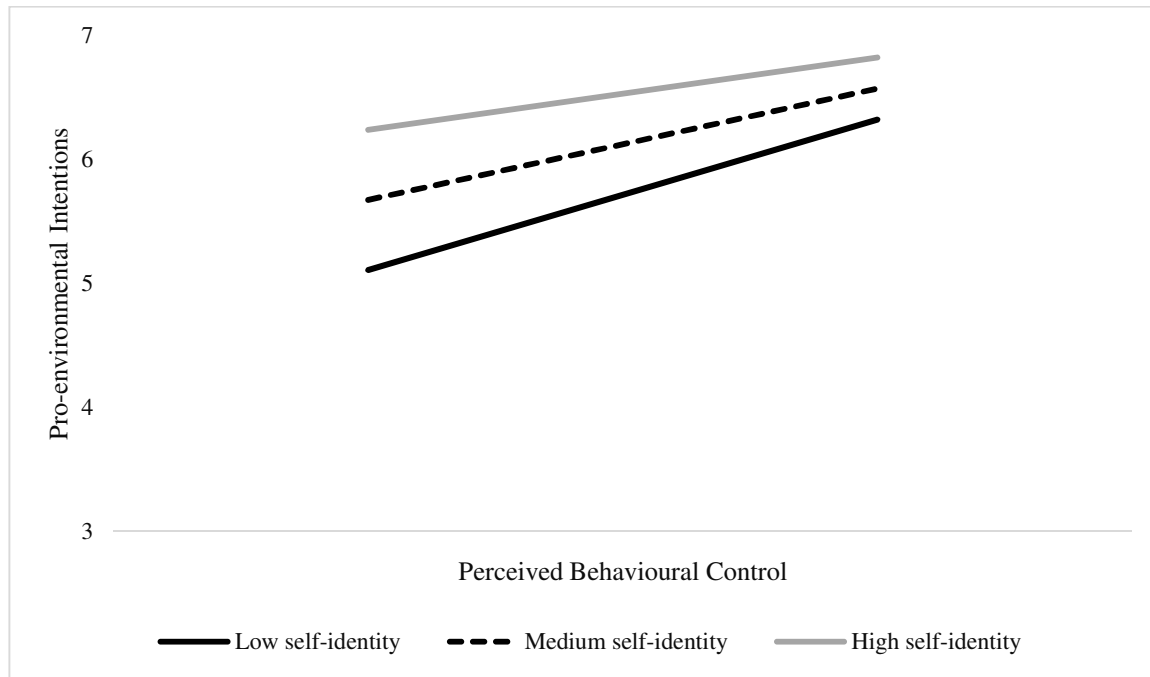
Simple slopes for reported past behaviour on pro-environmental intention by pro-environmental self-identity.



Decomposition of the second interaction term showed that the effect of PBC on intention increased as pro-environmental self-identity decreased (Figure 2), i.e., a negative interaction. The impact of PBC on intention was significant at all levels of self-identity. However, it was strongest when self-identity was lowest ($M-1SD$; $B = .52, p < .001$), weaker at moderate levels of self-identity ($M-1SD$; $B = .39, p < .001$) and weakest when self-identity was highest ($M-1SD$; $B = .25, p < .001$).

Figure 2.

Simple slopes for perceived behavioural control on pro-environmental intentions by pro-environmental self-identity.



4.2. Predicting pro-environmental behaviours

In relation to predictions of behaviours (Table 2), multilevel modelling found that intention and PBC significantly explained future pro-environmental behaviours, $\chi^2(8) = 4198.19, p < .001$. In Model 1a, PBC was the strongest significant predictor, followed by intention.

Adding attitude and subjective norm (Model 1b) significantly reduced the deviance statistic compared to Model 1a, $\chi^2(16) = 4186.29, p < .001$. In Model 1b attitude and PBC were the strongest predictors of behaviour, followed by intention; subjective norm was not significant. Including past behaviour, $\chi^2(16) = 4133.15, p < .001$ (Model 1c), significantly reduced the deviance statistic compared to the Model 1b. In this model, intention lost its predictive power, while past behaviour was the strongest predictor, followed by attitude and PBC. For testing the moderation effects of pro-environmental self-identity, the inclusion of self-identity plus the cross-level interactions between each TPB predictors of behaviour plus past behaviour with pro-environmental

self-identity (Model 1d) significantly reduced the deviance statistic compared to Model 1c, $\chi^2(16) = 4115.35$, $p < .001$. Significant moderating effects of self-identity were only found for past behaviour (the self-identity by intention interaction did not approach significance, $p = .16$). In Model 1e the non-significant cross-level interactions between all Level 1 predictors and Level 2 self-identity variables were excluded, resulting in a significant reduction of the deviance statistic compared to Model 1d, $\chi^2(16) = 4103.93$, $p < .001$. The pattern of findings was substantively unchanged with significant positive effects for self-identity, past behaviour, attitude, subjective norm plus a significant positive interaction between self-identity and past behaviour (Table 2).

Table 2.

Multilevel analysis of predictors of pro-environmental behaviours including cross-sectional and cross-level analyses

Predictors	B	SE	<i>t</i> -ratio	<i>p</i> -value
Model 1a				
Intercept β_{00}	5.07	.08	59.47	<.001
Intention β_{10}	.28	.07	3.79	<.001
PBC β_{20}	.43	.08	5.01	<.001
Model 1b				
Intercept β_{00}	5.07	.08	59.47	<.001
Intention β_{10}	.17	.08	2.19	.03
PBC β_{20}	.31	.08	3.68	<.001
Attitude β_{30}	.31	.08	3.87	<.001
Subjective norm β_{40}	.11	.072	1.48	.14
Model 1c				

Intercept β_{00}	5.07	.08	59.47	<.001
Past behaviour β_{10}	.28	.04	6.77	<.001
Intention β_{20}	.07	.08	.91	.36
PBC β_{30}	.21	.09	2.40	.02
Attitude β_{40}	.23	.08	2.92	<.001
Subjective norm β_{50}	.01	.07	.21	.08

Model 1d

Intercept β_{00}	5.07	.08	64.29	<.001
Past behaviour β_{10}	.27	.04	6.74	<.001
Intention β_{20}	.06	.08	.76	.45
PBC β_{30}	.20	.09	2.33	.02
Attitude β_{40}	.24	.08	3.03	.01
Subjective norm β_{50}	.02	.07	.28	.77
Self-identity β_{01}	.42	.06	6.80	<.001

Cross-level**Interactions with****Self-identity in****Model 1d**

Past behaviour β_{11}	.08	.03	2.54	.01
Intention β_{21}	-.10	.07	-1.42	.16
PBC β_{31}	.03	.07	.40	.69
Attitude β_{41}	-.04	.06	-.67	.50
Subjective norm β_{51}	.05	.08	.60	.55

Model 1e

Intercept β_{00}	5.07	.07	64.29	<.001
Past behaviour β_{10}	.27	.04	6.56	<.001
Intention β_{20}	.08	.08	.97	.33
PBC β_{30}	.21	.09	2.43	.01
Attitude β_{40}	.24	.08	3.11	.01
Subjective norm β_{50}	.02	.07	.25	.80
Self-identity β_{01}	.41	.06	6.75	<.001
Cross-level				
Interactions with				
Self-identity in				
Model 1e				
Past behaviour β_{11}	.06	.03	2.30	.02

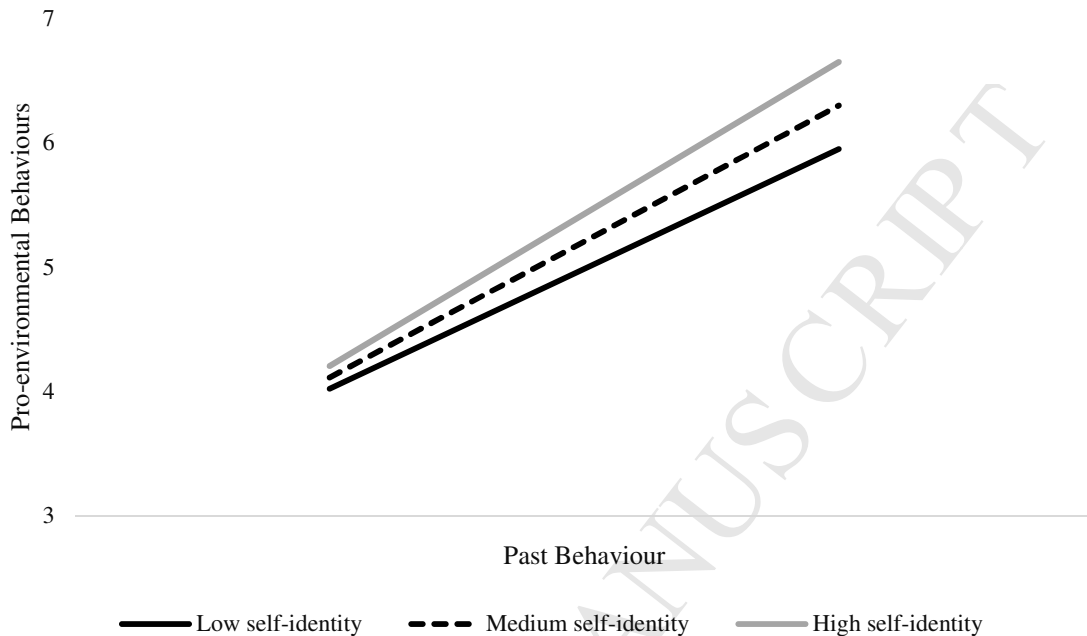
Note. B = unstandardized coefficient. SE = Standard Error. Model 1a, deviance statistic (7) = 4198.18; Model 1b, deviance statistic (16) = 4186.29; Model 1c, deviance statistic (16) = 4133.16; Model 1d, deviance statistic (16) = 4115.35; Model 1e, deviance statistic (16) = 4103.93.

Decomposition of the significant interaction term showed that the effect of past behaviour on behaviour increased as self-identity increased (Figure 3), i.e., a positive interaction. The impact of past behaviour on behaviour was significant at all levels of pro-environmental self-identity, however it was lowest when self-identity was weakest (M-1SD; B = .55, $p < .001$), higher at moderate levels of self-identity (M; B = .63, $p < .001$), and strongest at highest levels of self-identity (M+1SD; B = .70, $p < .001$).

Figure 3.

Simple slopes for reported past behaviour on self-reported pro-environmental behaviours by pro-

environmental self-identity.



5. Discussion

Using a within-persons approach, the present research aimed to examine the interaction of pro-environmental self-identity with other TPB predictors (plus past behaviour) for explaining intentions and behaviours related to different pro-environmental behaviours. In summary, the findings showed that pro-environmental self-identity significantly moderated the effect of PBC on intentions and the impact of past behaviour on both intentions and behaviours.

In detail, we would suggest that the present findings add significantly to the existing literature in three ways. First, the current results confirmed the importance of individuals' self-perception about pro-environmental concerns. In the literature it has been found that specific self-identities - such as self-identity as a recycler (Trudel, Argo, & Meng, 2016) or as "green" consumers (Sparks & Shepherd, 1992) - predicted various pro-environmental intentions and pro-environmental behaviours (e.g., recycling; Nigbur, Lyons, & Uzzell, 2010). However, the present findings are the first evidence of the simultaneous impact of pro-environmental self-identity across

different pro-environmental behaviours. In fact, the current results showed that pro-environmental self-identity exerted main effects on both pro-environmental intentions and behaviours. Importantly, the present findings focussed on relationships between variables within individuals and across behaviours, using the multi-level approach with random slopes that allows testing the variation across individuals in fitting the model. This type of analysis comes closer to the logic of the theories of planned behaviour and reasoned action that were originally conceived of as models of how individuals make decisions based on their cognitions about a behaviour. In contrast the traditional between-subjects tests of the theory of planned behaviour/reasoned action in effect test whether persons with, for example, stronger intentions are more likely to perform the behaviour compared to persons with weaker intentions. This multi-level approach has been employed in a number of multi-behaviour tests of the theory of reasoned action (Conner et al., 2015, 2016). The multi-level approach has the advantage of simultaneously examining different behaviours in the same model, considerably increasing the power of the analyses. It also has the disadvantage of not giving results for individual behaviours. The present work contributes to the literature on pro-environmental behaviours by demonstrating that pro-environmental self-identity is an important determinant of such behaviours and the intentions to perform such behaviours even when considered alongside other predictors from the TPB (and also past behaviour).

Second, the present work extends the previous literature in showing the important role of the PBC in a within-individual perspective. Our findings suggested that PBC played a decisive role in driving pro-environmental intentions. Specifically, congruent with the existing literature (e.g., Webb, Benn, & Chang, 2014), pro-environmental behaviours were based more strongly on PBC than the other TPB predictors (including intentions), even when controlling for past behaviour. This is in contrast with results of the Klöckner (2013) meta-analysis, which showed that the strongest predictor of pro-environmental behaviour was intentions, followed by past behaviour and PBC. In the present analyses, when controlling for past behaviour and other TPB constructs, the impact of PBC on behaviours became lower and intention lost its significant predictive power. Interestingly,

attitude directly predicted pro-environmental behaviours, even when controlling for past behaviour, contrary to the findings of Terry et al. (1999). A number of studies have noted the direct effect of attitudes on behaviours independent of intentions (McEachan et al., 2016).

Third, the present study added to the literature by exploring the moderating effects of self-identity. Specifically, the current findings showed that, in line with Charng and colleagues' research (1988), past behaviour became significantly stronger predictors of intention and behaviours as self-identity became stronger. This result supports the assumptions of identity theory, suggesting that the self-concept drives intentions and behaviour for repeated behaviours. Moreover, similar to the findings of Terry et al. (1999), the present work found that the predictive role of PBC on intentions was reduced as self-identity increased. This outcome is contrary to the Cheng and Chiu (2014) findings, which showed that higher self-identity was associated with stronger intentions (to enrol in business ethics courses) when PBC was stronger. It might be that the perception of personal control in engaging pro-environmental behaviour was more relevant for Italian householders who did not define themselves as strongly pro-environmentalist; and vice-versa, those who affirmed their pro-environmental identity with appropriate behaviour, accorded less importance to the eventual factors that might facilitate or impede planned pro-environmental behaviours. Similar to Gardner et al. (2012), we found no evidence that self-identity moderated the intention-behaviour relationship.

5.1. Limitations and future directions

The present research has two limitations (which also affect much similar research in this area). First, the findings related to a small self-selected sample of Italian householders and, therefore, they may not be generalizable beyond this. Second, past and future behaviour were assessed with self-report measures, such that it would be useful to replicate the current research with objective behaviour measures. Nevertheless, these limitations are counterbalanced by two important strengths: the longitudinal design, which allowed us to investigate the translation of intention to behaviour, and the use of within-person analyses using multi-level modeling.

Future research could usefully consider the role of affective factors that could determine intention to engage pro-environmental behaviour (see Hinds & Sparks, 2008) and the extent to which these may be partly reflected in measures of self-identity. For example, more attention should be paid to considering the different roles of affective and instrumental attitudes or anticipated regret in eliciting behaviours (e.g., Carfora, Caso, & Conner, 2016b; Carfora, Caso, & Conner, 2017b). In this regard, Rhodes et al. (2014), showed that the effect on intention to recycle was greater via instrumental attitude compared to the impact on intention via affective attitude. Finally, future research on Italian householders could consider how social visibility could impact on their pro-environmental behaviours, since a recent American study showed that the strength with which social identities predict pro-environmental behaviours depends on whether they are visible to others (Brick, Sherman, & Kim, 2017).

The hope of curbing individuals' habitual behaviour that leads to environmental damage could perhaps be bolstered via interventions promoting pro-environmental self-identity, acknowledging the interdependence among environmental behaviours. For example, as suggested by Hinds and Sparks (2009), environment-related identity is connected to experience of the natural environment. In this regard, some authors (e.g., Chawla & Derr, 2012; Cheng & Monroe, 2012) showed that a closer relationship with the natural environment increases pro-environmental self-identity and consequently its pro-environmental behaviours. Thus, a stronger pro-environmental identity may be promoted with an environmental education program (Prevot et al., 2016). Moreover, future research could assess whether messaging interventions (e.g., Caso & Carfora, 2017) and mobile marketing strategies (e.g., Lombardi et al., 2016) could be useful for strengthening pro-environmental self-identity.

Finally, a more detailed assessment of how pro-environmental self-identity exerts its effects would be useful; further basic work needs to be done at a theoretical level in this regard. Does such an identity point to role expectations or normative standards, for example (cf. Terry et al., 1999)?

Does such an identity make salient certain kinds of commitment (cf. Lacasse, 2016)? Does such an identity act as some kind of decision heuristic (cf. Case, Sparks, & Pavey, 2016)?

6. Conclusion

Our findings extend the existing literature, not only in indicating that pro-environmental self-identity can be an important predictor of intentions and behaviour, but also that self-identity can moderate the effect of PBC on intentions and the effect of past behaviour on intentions and future behaviour. The research points to numerous pathways whereby promoting pro-environmental self-identity might help promote pro-environmental action.

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Highlights

- Identity was considered as a factor which drives pro-environmental behaviours.
- Effects of pro-environmental self-identity was tested with a within-subjects approach.
- The moderating role of self-identity in predicting environmental behavior was tested.
- Self-identity moderated the impact of perceived behavioural control on intentions.
- Self-identity moderated the effect of past behaviour on intentions and behaviours.