

Comparing the Temporal Stability of Behavioural Expectation and Behavioural Intention in the Prediction of Consumers Pro-Environmental Behaviour

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Abstract

Pro-environmental behaviour is a salient concern in contemporary society. However, consumers often overstate their intention to purchase pro-environment products. Prior research has focused on intentions as a predictor of actual behaviour. This study directly compares two distinct predictors of behaviour, behavioural expectation (BE) and behavioural intention (BI), to explain whether differences in the way in which consumers' mental judgments are measured act as a barrier to understanding pro-environmental behaviour change. Findings confirm that BE has a higher temporal stability than BI, potentially accounting for the greater predictive ability of the former. One key reason for this finding is that subjects may overestimate their likelihood to act when responding to BI questions. Thus, this paper confirms that BE has a higher temporal stability than BI, and therefore, superior predictive ability. TRA/TPB researchers in particular should consider BE ahead of BI as an immediate predictor of pro-environmental and other behaviours.

Keywords Temporal stability; Behavioural expectation; Behavioural intention; Pro-environmental behaviour; TRA; TPB.

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Highlights

- Three studies were designed to compare the predictive ability of behavioural expectation (BE) and behavioural intention (BI).
- BE is more stable overtime compared to BI in predicting pro-environmental behaviour.
- External factors have limited influence on BE but significant influence on BI.

1. Introduction

In recent years, pro-environmental lifestyle choices are on the rise, as consumers increasingly express concern for the quality of the environment. It is a consistently found phenomenon since three decades ago across the globe, including the United States, where two-thirds of consumers believe the quality of the environment is deteriorating, compared to less than a quarter who believe that it is improving (Melillo et al., 2006). The number of consumers who assign environment as “extremely” important has also increased significantly from 31% (1998) to 49% (2006). In response, firms are increasingly investing considerable resources in environmentally friendly products and services. However, many of these products perform poorly. It appears that most consumers take into account opposing factors (e.g., cost-benefit, norms) before adopting a pro-environmental stance. Consumers face constant dilemma between sacrificing additional resources to pursue pro-environmental lifestyles and avoiding social pressure for not showing environmental concern. Their dilemma entices more conversation to better understand consumers’ environmentally conscious consumption (Tsarenko, 2013, Nguyen et al., 2016).

As a basis for further explanation, Gatersleben et al. (2002) highlight the inconsistency between consumers’ attitudes towards the environment and their actual pro-environmental behaviours. Specifically, consumers who report concerns about environmental issues do not necessarily purchase pro-environmental products. Kollmuss and Agyeman (2002) explain that attitude-behaviour measurement is a key indicator of the gap between consumers’ attitudes towards the environment and their actual pro-environmental behaviour. Constructs that are employed as predictors of pro-environmental behaviour (e.g., attitude and intention) often generate misleading results about subjects’ attitudes towards the environment. Consequently, a more accurate immediate predictors of pro-environmental behaviour is needed.

One construct that is widely used to predict pro-environmental behaviour is Fishbein and Ajzen’s (1974) *behavioural intention* (BI). BI has been incorporated in the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB) (Fishbein & Ajzen, 1974; Ajzen, 1991). The extension of TRA/TPB shapes various models that predict pro-environmental behaviour, including a popular environmental behaviour model developed by Hines et al. (1987). They conceptualise BI as an immediate determinant of pro-environmental behaviour that mediates the effects of cognitive and personality variables. However, a meta-analysis by Bamberg and Möser (2007) of 57 pro-environmental behaviour studies show that BI is able to explain only 27% of the variance in behaviour. These results suggest that BI may not be an ideal immediate predictor of pro-environmental behaviour. This also true for

another context (i.e., adoption of new technology), wherein BI demonstrated only a modest ability to predict the adoption (Bagozzi, 2007; Mahardika et al., 2018b).

The aim of this paper therefore is to offer an alternate perspective on the longitudinal application of TRA/TPB by comparing the temporal stability of BE and BI in the context of pro-environmental behaviour. Specifically, to compare the temporal stability of BE versus BI when the targeted pro-environmental behaviours are repetitive in nature *and* subject to impediments. Second, this study aims to determine whether the temporal stability of BE increases its ability to predict behaviour.

This paper will be of interest to practitioners and academics, particularly within the context of retailing. Tsarenko et al. (2013) note that retailers are increasingly striving to adopt and communicate their environmentally sustainable business practices and encourage corresponding consumer behaviour. However, they also note that consumers tend to overstate their willingness to purchase environmentally conscious products. In response, researchers have considered the determinants of pro-environmental consumption. For instance, Nguyen et al. (2016) propose a framework of the influence of biospheric values on the purchase of energy efficient appliances using TPB. The present study seeks to demonstrate that researchers who plan to use TRA/TPB should include BE in their framework, as it has been found to be a better predictor of actual behaviour than BI (e.g., Mahardika et al., 2018a; 2018b).

2. Literature Review and Hypothesis Development

2.1 Pro-environmental Attitude – Behaviour Gap

Based on Rajecki's (1982) observations, Kollmus and Agyeman (2002) identify four key causes of this attitude-behaviour gap: experience with environmental problems, social influences, the temporal stability of attitude, and the selection of pro-environmental predictors. These four causal factors are elaborated on below.

According to Smith and Swinyard (1983), consumers who have direct experience with environmental problems are more likely to have a consistent attitude-behaviour relationship than consumers with indirect experience (e.g., social advertisements about pollution). These authors also note that the accumulation of direct experiences tends to result in cognitive generalisations when forming mental judgments toward adopting the targeted behaviour. Direct experience offers more accumulated information that is required in the formation of a cognitive judgment, and therefore actual encounters with environmental problems tend to have a stronger effect on attitude than do verbal descriptions.

When forming attitudes toward the environment, consumers also tend to comply with prevailing social norms (Fransson and Gärling, 1999). For example, not accepting the widely-held social norm that individuals should be concerned about environmental degradation may incur peer sanction, resulting in the pre-development of *pro-environmental attitudes*. On the other hand, the same social norm is not applicable to *actual pro-environmental behaviour*. A person who is not exhibiting a pro-environmental behaviour (or lifestyle) is less likely to receive such social stigma because it is seen to be socially understandable (excusable) if a person does not adopt such a lifestyle. There is a general perception that adopting a pro-environmental lifestyle is expensive and requires a high level of commitment (Stern, 1992). As a result, people tend to overestimate their attitude (concern) toward environmental issues in order to conform to the social norm, and in such situations, they may tend to make inaccurate predictions about whether they are actually willing to demonstrate the actual pro-environmental behaviour (e.g., Hopper and Nielsen, 1991).

Attitudes toward the environment also change over time. Kollmus and Agyeman (2002) note that the consistency between attitude and pro-environmental behaviour diminishes as the time interval between the observation of an environmental problem and the observation of actual behaviour increases. These authors illustrate this effect by examining approval of nuclear power for electricity. Specifically, two years after the Chernobyl nuclear accident, the rejection of nuclear energy in Switzerland was at its highest possible level. However, ten years after Chernobyl, the level of rejection of nuclear energy among the Swiss decreased. This shows the tendency for attitude to change over time, mainly since people have a limited ability to capture foreseeable events that may affect the performance of actual behaviour.

The final cause is the selection of the immediate predictor of pro-environmental behaviour. That is, the effects of attitude on behaviour need to be mediated by a construct that can capture consumers' mental judgment regarding the demonstration of a particular behaviour. One of the more widely employed immediate predictors of behaviour is BI. Prior studies propose theoretical frameworks where BI mediates the attitude-behaviour relationship. Nevertheless, as discussed earlier, BI has certain limitations that may contribute to the supposed gap that exists between attitude and the enactment of pro-environmental behaviour. An alternative predictor of pro-environmental behaviour is therefore required to overcome the limitations of BI, such as BE (e.g., Mahardika et al., 2018a; 2018b).

2.2 The role of behavioural expectation as predictor of pro-environmental behaviour

BE is introduced by Warshaw and Davis as a distinct construct, although it has been confounded with BI by some researchers. Warshaw and Davis (1985a; 1985b) observe that some of BI's measurement items in previous studies are basically measuring BE. Items that measure BI such as "*do you intend to...*" or "*do you plan to...*" should be differentiated to items that measure BE such as "*do you expect to...*" or "*are you going to...*". For example, a young scholar is likely to answer "yes" when asked whether s/he *intends* to publish in a top tier journal. On the other hand, s/he may well answer differently when being asked whether s/he *expects* to publish in a top tier journal.

According to Warshaw and Davis (1985a), the formation of BI does not take into account impediments that may challenge a person's ability to actually perform the targeted behaviour. In other words, BI reflects a person's *desire* to perform a targeted behaviour that does not take into account their resources or ability to actually perform that behaviour. Consider, for example, an individual who has been asked: "*do you intend to purchase a pro-environmental product?*" The response will frequently be "yes" as it is becoming a widely accepted social norm that people should be concerned about the environment. However, s/he is not taking into consideration whether there will be foreseeable events that challenge her/his intention (e.g., whether s/he has the necessary resources and ability to carry out the intention).

Conversely, in the formation of BE, a person will take into account impediments that may challenge their ability to actually perform the targeted behaviour (Warshaw and Davis, 1985a). As such, BE reflects a thoughtful analysis about whether performing the targeted behaviour is *feasible*. For example, when answering the question "*do you expect to convert your car fuel system from gasoline to gas?*", a person will comprehensively analyse whether there will be foreseeable events that challenge her/his expectation (e.g., availability of gas station, price of converter, engine lifespan, etc.). Her/his BE will be high if s/he thinks s/he can overcome the foreseeable impediments, and will be low if otherwise. This cautious mental judgment tends to be discounted by a person responding to BI items.

BI has been employed as an immediate predictor of pro-environmental behaviour by Hines et al. (1987) in their widely used *Model of Responsible Environment Behaviour* (MREB). According to Kollmus and Agyeman (2002), MREB is an extension of the TPB, which although claimed to be more sophisticated, also has a limited ability to explain pro-environmental behaviour. The limitations of BI inherent in TPB are also found in MREB, specifically BI's weak predictive ability of pro-environmental behaviour. Bamberg and Möser (2007) conduct a meta-analysis of 57 pro-environmental behaviour studies that employ BI as an immediate predictor of pro-environmental behaviour, and reported that BI is only able to

explain 27% of the variance. This BI limitation is related to the subjects' tendency to overestimate their likelihood to perform certain pro-environmental behaviour when responding to BI questions due to social norms (Ajzen, 1985).

In the case of BE, respondents' tendency to take into account social norms is lower since the expectation focuses on her/himself rather than others (Warshaw and Davis, 1985b). Subjects who respond to BE questions should have a more modest (and probably more accurate) estimation of their likelihood to demonstrate pro-environmental behaviour. The difference is in the magnitude of social norms that are considered by subjects who form BE *or* BI judgments. Warshaw and Davis (1985b) contend that the formation of a person's BI judgments are generally based on the 'desirability' of the targeted behaviour, whereas BE judgments are generally based on the 'feasibility' of the targeted behaviour. In making an evaluation about whether or not a pro-environmental behaviour is desirable, subjects' behaviour is often influenced at least in part by others (social norms; Bamberg and Möser, 2007). This paper argues that subjects who respond to BE measures will demonstrate *less* desire to conform to social norms compared to subjects who respond to BI measures. Therefore, subjects' estimation of their BE to perform pro-environmental behaviour will be lower than their BI. Thus, we propose that:

H₁: The estimation of behavioural intention is higher than behavioural expectation for pro-environmental behaviour.

2.3 Pro-environmental orientation

Consumers can be categorised with respect to their pro-environmental orientation. Ideally, a person with high pro-environmental orientations should have a more consistent relationship between their pro-environmental attitude and their actual pro-environmental behaviour compared with a person with low pro-environmental orientations. The formation of a person's pro-environmental orientation is based on different values that s/he acquires (Fransson and Gärling, 1999; Stern, 1992). According to these values, a person who attains a high pro-environmental orientation should believe that: (1) there are cause-effect relationships between humans and the ecosystems, such that human activity should not exceed the capacity of the biophysical environment; (2) environmental quality has a direct relationship with the well-being of the society; (3) one should anticipate any negative consequences of having deteriorated the environment; and (4) environmental concern is a part of religious beliefs or post-materialistic values.

Meanwhile, a person who has a low pro-environmental orientation is less likely to acquire the aforementioned values. By examining the differences between people with high and low pro-environmental orientations, this paper seeks to explain the effects of pro-environmental orientation on the formation of BE versus BI. Subjects who respond to BE questions will think in terms of the feasibility (probability) of performing the targeted behaviour rather than in terms of social norms. This leads to a more modest estimation by BE subjects, which will be consistent between subjects with high or low pro-environmental orientation. Thus, we propose that:

H2a: Consumers' pro-environmental orientation has no effect on their behavioural expectation estimation. Therefore, consumers who have low pro-environmental orientation will have similar BE estimation compared to consumers with high pro-environmental orientation.

On the other hand, social norms prevent individuals with low pro-environmental orientation from making an honest estimation of their likelihood (BI) to perform a targeted pro-environmental behaviour (Newhouse, 1990). Fransson and Gärling (1999) argue that BI predicts pro-environmental behaviour better when the influence of social norms on individuals is limited. In this sense, subjects who respond to BI questions will be bounded by the generally accepted social norms to behave in the interests of environment. They will try to conform to the social norms first, without taking into account the probability of actually performing the targeted behaviour. This mental process may lead to an inaccurate estimation of their actual intention to perform the behaviour. Specifically, the effect is stronger for subjects with low pro-environmental orientation, since high pro-environmental orientation consumers will have lower estimation of their BI to perform certain pro-environmental behaviours. Thus, we propose that:

H2b: Consumers who have low pro-environmental orientation will overstate their behavioural intention estimation - in that their estimation will be higher compared to consumers who have high pro-environmental orientation.

2.4 Habitual pro-environmental behaviour

Any discussion on the predictive utility of BE versus BI should not overlook the fact that many behaviours with critical environmental impacts are developed through repetition and

habit (Kollmuss & Agyeman, 2002). As a context of comparison, habitual behaviour offers further insight into the formation of BE versus BI when behaviour is subject to impediment, in this case: habits. Habitual pro-environmental behaviour is a form of automatic and routine behaviour, which is being repeat without conscious thought since it is rewarding (i.e., economic reason; Dahlstrand & Biel, 1997).

Warshaw and Davis (1985b) argue that in the formation of BE, a person takes into account whether s/he has a habit that relates to the targeted behaviour. For example, a person will be less likely to switch off the light each time s/he exits an empty room if such action is not habitual. BE measures will likely trigger subject's awareness of having such habits, thus BE should be greater for someone who possess this habit than for someone who does not possess it. On the other hand, BI measures may be less likely to trigger such awareness (whether s/he has formed a habit to switch-off the light). In this case, there will be no difference in BI estimation between someone who is in the habit and someone who is not.

Steg and Vleg (2009) argue that not all pro-environmental behaviours are preceded by a subject's cognitive elaboration (reasoned behaviour), since there are cases where behaviour is habitual and formed through automated cognitive judgment. One of the key characteristics of habit is that it is driven by goal achievement. Behaviour is considered as a goal if the person who is going to perform it foresees impediments to this performance. In order to overcome the foreseeable impediments to behavioural performance, a person may choose to strengthen the mental association with the targeted goal behaviour through repetitive action. The repetitive action is likely to lead to the formation of habit. Hence, an encounter with a goal achievement situation will more likely activate habit compared to an encounter with a reasoned behaviour situation.

Warshaw and Davis (1985a) report that BE is a more robust predictor of goal than is BI, which in hindsight also indicates that BE is a better predictor of habitual behaviour than is BI. The authors contend that BI has a limited ability to take habit into account because BI questions are less likely to activate a person's awareness or consciousness about whether her/his habits conform to the targeted behaviour. In contrast, BE questions are more likely to activate an individual's awareness or consciousness about having a habit that conforms to the targeted behaviour being examined. Therefore, we propose that:

H3: Behavioural expectation is a better predictor of habitual pro-environmental behaviour than is behavioural intention.

2.5 The Temporal Stability of Behavioural Expectation

As discussed earlier, one of the key limitations of BI is that it changes over time such that its predictive ability diminishes as the time interval between the measurement of BI and behaviour increases. In this sense, BI will be more predictive when the actual behaviour is measured as soon as a person forms her/his BI judgments (Ajzen, 1985; 1991). Sheeran and Abraham (2003) define the temporal stability of BI as the extent to which BI persists over time regardless of whether there are impediments or whether it is challenged. For example, the stability of a person's BI toward adopting a pro-environmental lifestyle over time will be determined by his/her ability to foresee factors, such as commitment, that may preclude the adoption of such lifestyle. Thus, the temporal stability of BI decreases as the time interval between BI formation and pro-environmental action increases.

The temporal stability of BI may also determine its predictive ability (Armitage and Conner, 2001). Prior studies, for instance, have examined the role of temporal stability in defining BI's predictive ability (e.g., Sheeran et al., 1999; Conner et al., 2000) and find that the temporal stability of BI moderates the strength of the relationship between BI and behaviour such that higher temporal stability leads to greater predictive ability. On the other hand, the formation of BE judgments is based on anticipated changes in behavioural determinants, such as changes in intention due to impediments (Venkatesh et al. 2006; 2008). In this sense, BE should be more stable over time, increasing its predictive ability relative to BI. Indeed, Gordon (1989) observe that BE is a better predictor than BI when the interval between BE/BI and actual behaviour increases. Thus, larger time intervals would appear to have a more detrimental effect on BI's predictive ability than BE's.

Venkatesh et al. (2006) report that a longer time interval (higher anticipation) led to a stronger BE-behaviour relationship, but a weaker BI-behaviour relationship. However, both Gordon (1989) and Venkatesh et al. (2006) do not explore the notion of temporal stability of BE versus BI in their studies. Consequently, Gordon (1989) and Venkatesh et al's. (2006) conceptual propositions remain unverified and speculative. Thus, ours is potentially the first study to empirically verify the conceptual proposition about the temporal stability of BE versus BI.

Since BE has a higher ability than BI to account for impediments to behavioural performance, BE should be more stable over time and thus more predictive of behaviour than BI (Konerding, 2001). Indeed, Gordon (1989) observe at two time points (short and long intervals), subjects who responded to BE questions gave more consistent responses than subjects who responded to BI questions, thus, BE may be more stable over time than BI.

Venkatesh et al. (2006), who compared the role of anticipation in moderating the relationship between BE or BI and behaviour, find that a longer time interval (higher anticipation) increased the BE-behaviour relationship and reduced the BI-behaviour relationship, which explains why BE should be more stable over time than BI. Thus, we propose that:

H₄: Behavioural expectation is more stable over time than behavioural intention, and thus behavioural expectation is more predictive than behavioural intention on pro-environmental behaviour.

We test these hypotheses in the following studies. In Study 1, we examine subjects' estimation of their BE and BI judgments to perform certain pro-environmental behaviours (H1 and H2). In Study 2, we examine whether this different means of estimation will influence the predictive ability of BE and BI (H3). Finally, in Study 3, we examine the temporal stability of BE versus BI, and whether temporal stability enhances the predictive utility of either construct (H4).

3 Study 1

3.1 Participants, design and procedure

One hundred and twenty-six respondents (71 female) from Mechanical-Turk (M-Turk), a US based online panel, participated in a pro-environmental survey. The respondents were paid for the participation. In total, 126 respondents (71 female) were recruited. Of the 126 respondents, 71.4% are in the 18 – 35 years age group and 28.6% are over 35 years of age. In addition, 74.6% of the respondents have a monthly expenditure less than USD 2,500, whereas 25.4% of the respondents have a monthly expenditure more than USD 2,500.

The dependent variables were measured either using BE or BI for the two groups. Fifty-five participants were allocated to the BE group and the rest to BI. Participants responded to questions assessing the likelihood to purchase six pro-environmental products: *water saving shower head, recycled plastic grocery bag, biodegradable AAA battery, energy saving light bulb, electricity from environmentally friendly power generator, gas converter installation for car*. These six pro-environmental products were selected by following the guidelines from prior studies (e.g., Barr et al., 2005; Gupta and Ogden, 2009). Participants completed questions pertaining to their BI and BE to purchase these products. Participants also completed the New Environmental Paradigm (NEP) Scale so as to gain a measure of their pro-environmental orientation. NEP scales were operationalized using 15 items following

Dunlap et al. (2000). Agreement with the eight odd-numbered items and disagreement with the seven even-numbered items indicate high NEP (pro-environmental) responses (see Appendix 1).

3.2 Measures

BI and BE items were operationalised using guidelines proposed by Warshaw and Davis (1985b). BI and BE were measured on 7-point Likert scales and were adapted to fit the context of each of the six pro-environmental purchase behaviours examined. Three items ($\alpha = 0.94$) were used to assess BI. For instance, “*please indicate whether you intend to purchase a water saving shower head at \$100*”. Meanwhile, four items ($\alpha = 0.96$) were used to measure BE. For instance, “*please indicate how likely that you actually will purchase a water saving shower head at \$100*”. We conducted a factor analysis to examine the convergent and discriminant validity between BE and BI items, and found that the internal consistency reliabilities for all BE and BI items employed in our paper were greater than .70. However, a detailed report on this analysis is not provided due to the word limit constraint and because it concurs with results from prior studies (e.g., Venkatesh et al, 2006). The results are consistent with those of three studies that are presented in this paper.

3.3 Results

Table 1 specifies that in all six purchases, the mean scores of subjects’ BE judgment are lower than BI judgment, supporting H1. Four of the six product categories showed significant differences: “*water saving shower head at \$100*” ($M_{BI} = 4.48 > M_{BE} = 3.65; p < .05$), “*recycled plastic bag for groceries at \$1*” ($M_{BI} = 4.69 > M_{BE} = 3.40; p < .05$), “*biodegradable AAA battery for price 50% more expensive than non-biodegradable battery*” ($M_{BI} = 4.33 > M_{BE} = 3.63; p < .10$) and “*energy saving light bulb at price 30% higher than conventional light bulb*” ($M_{BI} = 5.47 > M_{BE} = 4.89; p < .10$). The two product categories where BE and BI judgments were not significantly different are more likely to be categorised as high-involvement purchase decisions in that they involve considerable financial commitment.

Table 2a shows that in absolute terms, participants who have high pro-environmental orientation have lower BI judgments in five product categories compared to subjects who

Table 1 Comparison of purchases' mean score between BE and BI

Purchases	M - BI (n = 71)	M - BE (n = 55)	BI > BE	t-value	H1
Purchase electricity from environmental friendly power generator (e.g. wind powered) at price 20% more expensive than normal price	3.41	3.13	Yes	0.83	Not supported
Purchase gas converter installation for your car at price \$1,500	2.91	2.76	Yes	0.47	Not supported
Purchase water saving shower head at price \$100	4.48	3.65	Yes	2.23**	Supported
Purchase recycled plastic bag for groceries at price \$1 each	4.69	3.40	Yes	3.43**	Supported
Purchase bio-degradable AAA battery at price 50% more expensive than non-bio-degradable battery	4.33	3.63	Yes	2.02*	Supported
Purchase energy saving light bulb at price 30% more expensive than conventional light bulb	5.47	4.89	Yes	1.76*	Supported

Note: Significant differences between BI and BE mean scores are based on independent sample t-test; * $p < .10$, ** $p < .05$

have low pro-environmental orientation (supporting H2b). Subjects were categorised according to high pro-environmental orientation and low pro-environmental orientation based on their response to the New Environmental Paradigm (NEP) scale, following Dunlap et al. (2000). The NEP scale consists of 15 items that have been randomised so that agreement with the eight odd-numbered items and disagreement with seven even-numbered items indicate high pro-environmental orientation. Of these five product categories, three show significant mean differences between the high and low pro-environmental orientation groups: AAA battery ($M_{\text{BIHO}} = 3.79 < M_{\text{BILO}} = 4.71$; $p < .05$); gas converter ($M_{\text{BIHO}} = 2.35 < M_{\text{BILO}} = 3.52$; $p < .05$), and electricity from environmentally friendly power plant ($M_{\text{BIHO}} = 2.99 < M_{\text{BILO}} = 3.87$; $p < .10$). Two product categories were not significant, as follows: “*energy saving light bulb*” and “*recycled plastic bag for groceries at \$1*”, which may be due to the fact that these pro-environmental products have been widely adopted by consumers.

On the other hand, Table 2b indicates that subjects with high pro-environmental orientation form higher BE judgments in five product categories compared to subjects with low pro-environmental orientation (supporting H2a). Of these five products, only one had significant mean differences between high pro-environmental orientation and low pro-environmental orientation consumers: “*purchasing energy saving light bulb*” ($M_{\text{BEHO}} = 5.24 > M_{\text{BELO}} = 4.35$; $p < .10$). This finding may be explained by the fact that for many participants, the purchasing of energy-saving light bulbs has become habitual.

Additionally, Fig. 1, Fig. 2, Fig. 3 show the estimated marginal means differences between BE and BI for subjects with high pro-environmental orientation versus subjects with low pro-environmental orientation. The graphical illustration clearly indicates that estimation of BE judgments for high and low pro-environmental orientation subjects were not significantly different. In contrast, BI estimation is significantly different between subjects with high and low pro-environmental orientation. Interestingly, subjects with low pro-environmental orientation consistently made higher estimations for BI judgments compared to the high pro-environmental group.

Table 2a Comparison of BI mean score between high pro-environmental orientation (HO) and low pro-environmental orientation (LO)

Purchases	M - HO (n = 37)	M- LO (n = 34)	HO < LO	t-value	H2b
Electricity from environmental friendly power generator (e.g. wind powered) at price 20% more expensive than normal price	2.99	3.87	Yes	1.92*	Supported
Gas converter installation for your car at price \$1,500	2.35	3.52	Yes	2.77**	Supported
Water saving shower head at price \$100	4.13	4.87	Yes	1.54	Not supported
Recycled plastic bag for groceries at price \$1 each	4.57	4.83	Yes	0.52	Not supported
Bio-degradable AAA battery at price 50% more expensive than non-degradable battery	3.79	4.91	Yes	2.49**	Supported
Energy saving light bulb at price 30% more expensive than conventional light bulb	5.50	5.44	No	0.13	Not supported

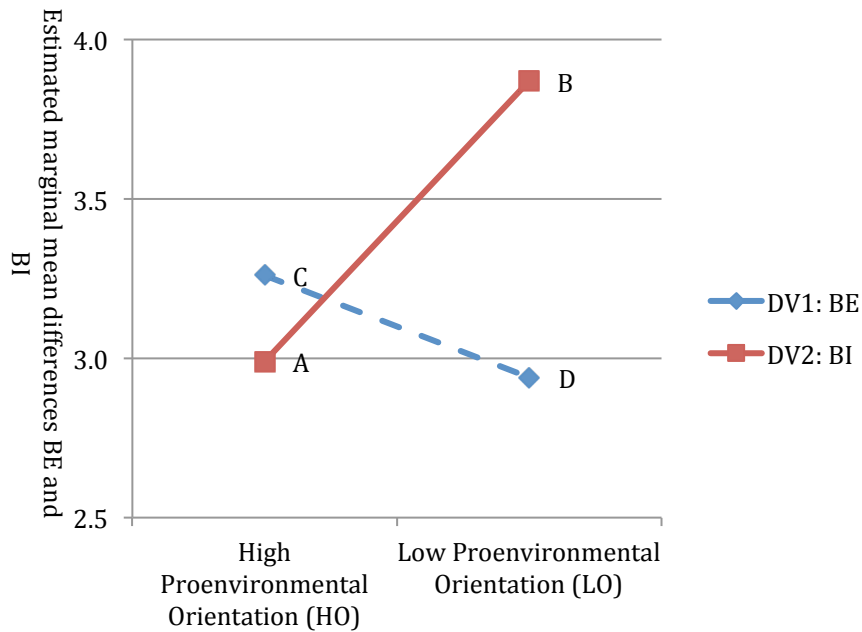
Note: Significant differences between BI and BE mean scores are based on independent sample t-test; * $p < .10$, ** $p < .05$.

Table 2b Comparison of BE mean (M) score between high pro-environmental orientation (HO) and low pro-environmental orientation (LO)

Purchases	M - HO (n = 33)	M - LO (n = 22)	HO > LO	t-value	H2a
Electricity from environmental friendly power generator (e.g. wind powered) at price 20% more expensive than normal price	3.26	2.94	Yes	0.63	Supported
Gas converter installation for your car at price \$1,500	2.64	2.93	No	0.59	Supported
Water saving shower head at price \$100	3.89	3.30	Yes	1.05	Supported
Recycled plastic bag for groceries at price \$1 each	3.54	3.20	Yes	0.59	Supported
Bio-degradable AAA battery at price 50% more expensive than non-degradable battery	3.80	3.39	Yes	0.79	Supported
Energy saving light bulb at price 30% more expensive than conventional light bulb	5.24	4.35	Yes	1.69*	Not supported

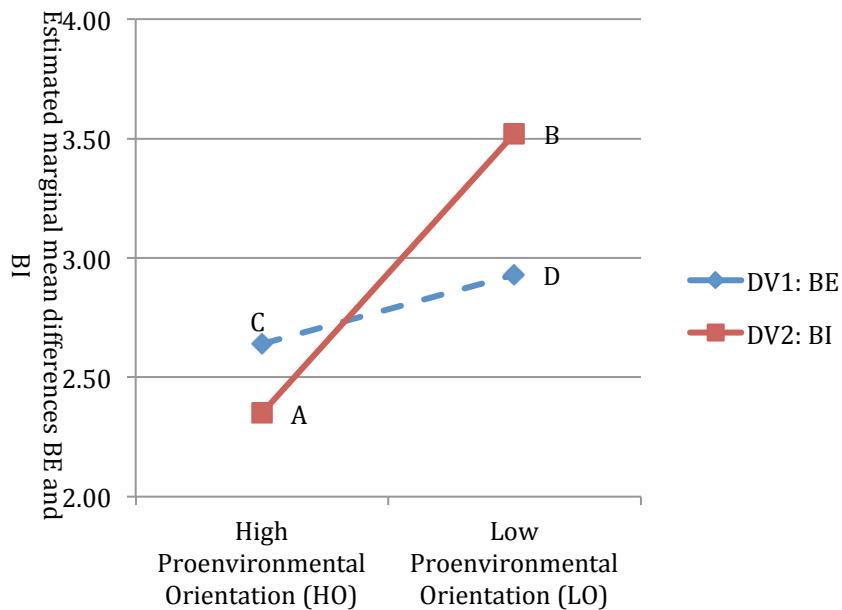
Note: Significant differences between BI and BE mean scores are based on independent sample t-test; * $p < .10$, ** $p < .05$.

Figure 1 Subjects' BE vs. BI estimation on eco-friendly electricity purchase



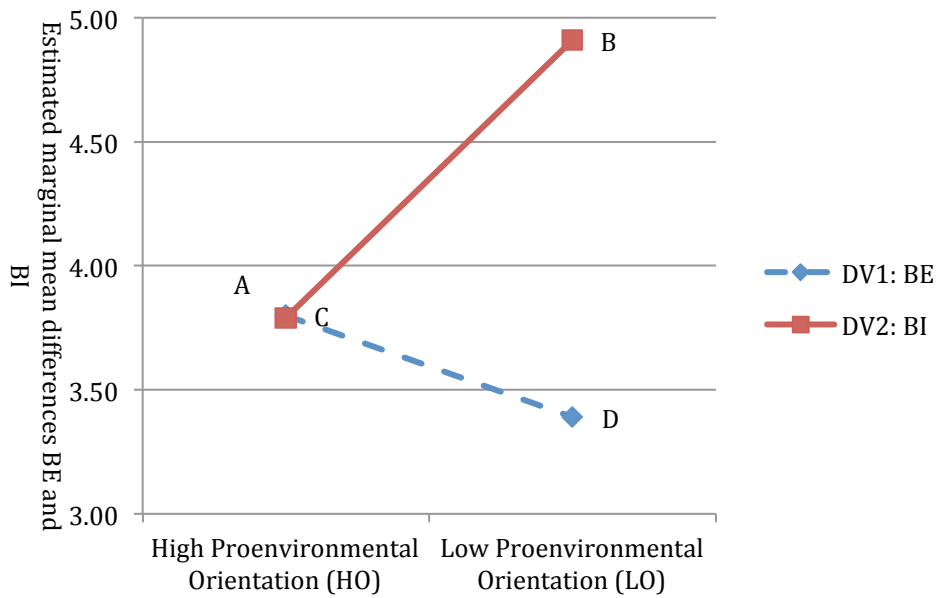
- A-B: ($M_{BIHO} = 2.99 < M_{BILO} = 3.87; p < .10$)
- C - D: ($M_{BEHO} = 3.26 > M_{BELO} = 2.94; p > .10$)
- A - C: ($M_{BIHO} = 2.99 < M_{BEHO} = 3.26; p > .10$)
- B - D: ($M_{BILO} = 3.87 > M_{BELO} = 2.94; p < .10$)

Figure 2 Subjects' BE vs. BI estimation on car gas converter purchase



- A-B: ($M_{BIHO} = 2.35 < M_{BILO} = 3.52; p < .05$)
- C - D: ($M_{BEHO} = 2.64 < M_{BELO} = 2.93; p > .10$)
- A - C: ($M_{BIHO} = 2.35 < M_{BEHO} = 2.64; p > .10$)
- B - D: ($M_{BILO} = 3.52 > M_{BELO} = 2.93; p > .10$)

Figure 3 Subjects' BE vs. BI estimation on bio-degradable battery purchase



- A-B: ($M_{BIHO} = 3.79 < M_{BILO} = 4.91; p < .05$)
- C - D: ($M_{BEHO} = 3.80 > M_{BELO} = 3.39; p > .10$)
- A - C: ($M_{BIHO} = 3.79 < M_{BEHO} = 3.80; p > .10$)
- B - D: ($M_{BILO} = 4.91 > M_{BELO} = 3.39; p < .05$)

In Study 1, we examine subjects' estimation of their BE and BI judgments to perform certain pro-environmental behaviours. This study provides a baseline for comparing the different conceptualisation of BE versus BI. The results show that subjects who respond to BE questions made more modest estimations of their likelihood to purchase pro-environmental products, whereas subjects who respond to BI questions made higher estimations of their likelihood to purchase said products. The modest estimation for BE subjects was consistent between subjects with high and low pro-environmental orientation. On the other hand, the higher estimation for BI subjects was not consistent between high and low pro-environmental orientation groups. However, in Study 1 we examined only the difference in the estimation of subjects' BE and BI judgments. Therefore, in Study 2 we examined whether this different means of estimation will influence the predictive ability of BE and BI.

4 Study 2

4.1 Participants, measures, design and procedure

One hundred and one respondents (32 female) from M-Turk participated in a pro-environmental longitudinal survey. The respondents were paid for the participation. The experiment were conducted in two waves. In the first wave, 222 respondents (142 females) were recruited. Respondents from the first wave of the experiment were invited to participate in the follow up experiment. Of 222 respondents from the first wave, 101 respondents (32 females) agreed to participate in the follow up study (second wave). Hence, the drop rate between the two waves is 54 percent. Of 101 valid respondents, 79.2% are in the 18 – 35 years age group and 20.8% are over 35 years of age. In addition, 76.2% of the respondents have a monthly expenditure less than USD 2,500, whereas 23.8% of the respondents have a monthly expenditure more than USD 2,500.

The dependent variable was either BE or BI for the two groups. The respondents were assigned to either the BE longitudinal survey or the BI (see Table 3). Specifically, 42 valid respondents received BE questions. Respondents completed a questionnaire at two time points. The questionnaire contained questions regarding respondents' likelihood to perform five habitual pro-environmental behaviours over the course of a weekend: (1) *unplug electronic devices that are not used*; (2) *purchase environmentally friendly product*; (3) *use own bag for groceries*; (4) *switch off light before leaving a room*; and (5) *reduce water usage*. The first questionnaire was distributed before the weekend (Tuesday, Wednesday, or Thursday) and the second questionnaire, which measure their actual behaviour, was

Table 3 Summary of Study 2 design

Questionnaire: Likelihood to perform the behaviour on weekend	Dependent Variables: BE and BI	Weekend	Self-report: Actual behaviour performed on weekend	Dependent Variables: BE and BI
Time 1: Before the weekend			Time 2: After the weekend	



Tue: Ques- tion- aire	Wed: Ques- tion- aire	Thu: Ques- tion- aire	Fri: No activity	Sat: Actual behaviour	Sun: Actual behaviour	Mon: Invitation for follow up study sent	Tue: Self- report	Wed: Self- report	Thu: Self- report
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distributed after the weekend (Monday, Tuesday, or Wednesday of the following week). The 3 items used to assess BI to perform habitual pro-environmental behaviour on the weekend were reliable ($\alpha = 0.88$). The equivalent 4-item BE scales were also reliable ($\alpha = 0.93$).

4.2 Results

The between-subjects correlation of BE-Behaviour and BI-Behaviour is presented in Table 4. The correlation differences between BE-Behaviour and BI-Behaviour were tested using the *Fisher z transformation test*. The BE-Behaviour correlation was found to be stronger than the BI-Behaviour correlation for four behaviours: “unplug electronic devices that are not used” ($r_{BE} = .50 > r_{BI} = .27, p < .10$, one-tailed), “purchase environmentally friendly product” ($r_{BE} = .72 > r_{BI} = .44, p < .05$, one-tailed), “use own bag for groceries” ($r_{BE} = .51 > r_{BI} = .18, p < .05$, one-tailed) and “switch off light before leaving a room” ($r_{BE} = .75 > r_{BI} = .30, p < .01$, one-tailed). However, significant differences in correlation magnitude were not observed for “reduce water usage”.

In an overall comparison of the five behaviours, BI-Behaviour correlations ranged from .18 to .45 with a mean value of .33, whereas BE-Behaviour correlations ranged from .50 to .75 with a mean value of .61. The average total correlation for all five behaviours is significantly different based on the Fisher z transformation test ($t(4) = 1.79, p < .05$, one-tailed). Based on the aforementioned results, hypothesis 3 is supported.

In Study 2, we examine the predictive ability of BE versus BI and confirmed that BE had greater predictive utility than BI. However, we did not examine the temporal stability of BE versus BI, and whether temporal stability enhances the predictive utility of either construct. Study 3 will examine this notion in the following section.

5 Study 3

5.1 Participants, design and procedure

Ninety participants (49 female) from M-Turk participated in a pro-environmental survey. The respondents were paid for the participation. Of the 90 valid respondents, 63.3% are in the 18 – 35 years age group and 36.7% are over 35 years of age. In addition, 72.2% of the respondents

Table 4 Comparison between correlations of BI-Behaviour (BI-B) and BE-Behaviour (BE-B)

Behaviours	Correlation (Spearman)		BE-B > BI-B	H3
	T ₁ - T ₂			
	BI-B N = 52	BE-B N = 49		
Unplug electronic devices that are not used	.27	.50	Yes*	Supported
Purchase an environmentally friendly product at supermarket	.44	.72	Yes**	Supported
Use own bags for groceries shopping	.18	.51	Yes**	Supported
Switch off light before leaving a room	.30	.75	Yes***	Supported
Reduce water usage	.45	.57	Yes	Not supported

Note: Significant differences between BI and BE correlations are based on Fisher z transformation test; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5 Summary of Study 3 design

Time 1		Time 2		Time 3		Time 4
Dependent Variables: BE and BI	Cognitive exercises	Dependent Variables: BE and BI	Cognitive exercises	Dependent Variables: BE and BI	Cognitive exercises	Actual behaviour
Likelihood to donate measured	Activity between measures	Likelihood to donate measured	Activity between measures	Likelihood to donate measured	Activity between measures	Actual donation observed

have a monthly expenditure less than USD 2,500, whereas 27.8% of the respondents have a monthly expenditure more than USD 2,500.

The dependent variables was measured either using BE or BI for the two groups. Specifically, 45 participants received BE questions. Participants were asked to indicate their intention or expectation that they would donate 10 percent of their participation reward money to a pro-environmental cause (“Compostable Shopping Bags”). This question was posed to participants at three separate time points (see Table 5). In Time 1, participants were not given any information about the campaign. They were only being asked about their BI or BE to donate to the campaign. In Time 2, participants were given some information about the compostable plastic bags, including the benefit of this bag to the environment. Finally, in Time 3, participants were given information about the company that produces the compostable bag. In between each time point, participants completed a set of cognitive exercises to erase the effect of the information about the compostable bag to which they had previously been exposed. The time interval between each BI or BE observation is 3-5 minutes (on average). In Time 4, participants’ actual behaviour (i.e., whether they ultimately donated 10 percent of their participation fee) was observed.

5.2 Measures

Measures of BE ($\alpha = 0.99$) and BI ($\alpha = 0.98$) were taken for the three time periods. These items follow the guidelines proposed by Warshaw and Davis (1985b) and Venkatesh et al. (2008). BI was measured using three items, each on a 9-point bipolar (+4 to -4) scale. For instance, “*I intend to donate 10 cents to the pro-environmental campaign*”. BE was measured using four items. For instance, “*I will donate 10 cents to the pro-environmental campaign*”. In addition, BE and BI stability were measured based on the within-participants Pearson correlation between repeated items employed at the three time points based on the guidelines advanced by Sheeran et al. (1999).

5.3 Results

The results indicate that BE is more stable than BI and thus more predictive (supporting H4). Results of ANOVA tests indicated that BI responses varied significantly across the three time points ($M_{BITime1} = 4.392$, $M_{BITime2} = 5.081$, $M_{BITime3} = 4.829$, $F = 5.467$ ($df = 2$), $p < .05$), confirming that BI changes over time. Conversely, no significant difference was identified

Table 6a Correlations for BI (N = 45)

Variables	1	2	3	4
(1) BI Time 1	nil	0.86**	0.85**	0.61**
(2) BI Time 2	0.86**	nil	0.88**	0.68**
(3) BI Time 3	0.85**	0.88**	nil	0.73**
(4) Behaviour (Time 4)	0.61**	0.68**	0.73**	Nil
Mean	1.60	4.39	5.08	4.83
SD	0.50	3.41	3.33	3.14

* $p < 0.05$; ** $p < 0.01$ **Table 6b** Correlations for BE (N = 45)

Variables	1	2	3	4
(1) BE Time 1	nil	0.96**	0.94**	0.79**
(2) BE Time 2	0.96**	nil	0.98**	0.80**
(3) BE Time 3	0.94**	0.98**	nil	0.83**
(4) Behaviour (Time 4)	0.79**	0.80**	0.83**	Nil
Mean	1.67	4.11	4.29	4.31
SD	0.48	3.45	3.45	3.41

* $p < 0.05$; ** $p < 0.01$

between subjects' responses to the BE questions across the three time periods ($M_{\text{BETime1}} = 4.111$, $M_{\text{BETime2}} = 4.289$, $M_{\text{BETime3}} = 4.311$, $F = 1.171$ ($df = 2$), $p > 0.10$), suggesting that BE does not change over time.

The temporal stability of BE and BI was also analysed using within-participants correlations (see Table 6a and 6b). The results from both tables indicate that BE is more stable than BI. Specifically, BE correlations between T1-T2, T2-T3 and T1-T3 are significantly higher than BI correlations ($r_{\text{BE1-BE2}} = .96 > r_{\text{BI1-BI2}} = .86$, $p < .05$, one-tailed; $r_{\text{BE2-BE3}} = .98 > r_{\text{BI2-BI3}} = .88$, $p < .01$, one-tailed; $r_{\text{BE1-BE3}} = .94 > r_{\text{BI1-BI3}} = .85$, $p < .05$, one-tailed). Finally, the results confirm that BE is a better predictor of donation behaviour than BI. BE correlations between T1-T4, T2-T4 and T3-T4 are significantly higher than BI correlations ($r_{\text{BE1-BE4}} = .79 > r_{\text{BI1-BI4}} = .61$, $p < .05$, one-tailed; $r_{\text{BE2-BE4}} = .80 > r_{\text{BI2-BI4}} = .68$, $p < .10$, one-tailed; $r_{\text{BE3-BE4}} = .83 > r_{\text{BI3-BI4}} = .73$, $p < .10$, one-tailed). Within-participants correlations between BE/BI and behaviour across the three time periods were examined using the Fisher z transformation test.

Interestingly, Table 6a also indicates that the strength of relationship between BI and behaviour increases as the time interval between BI and behaviour decreases ($r_{\text{BI3}} = .73 > r_{\text{BI2}} = .68 > r_{\text{BI1}} = .61$), and Table 6b shows similar results for BE ($r_{\text{BE3}} = .83 > r_{\text{BE2}} = .80 > r_{\text{BE1}} = .79$). However, the gap between the first observation (T1) and the last observation (T3) is wider for BI compared to BE. Hence, subjects who responded to the BE questions were less affected by the new information that was given in Time 2 and Time 3 than were those subjects who responded to BI questions.

6 Discussion

6.1 Theoretical implications

This study offers an overlooked perspective on the longitudinal application of TRA/TPB by comparing BE and BI as to immediate predictors of behaviour. Overall, the results confirm that BE is indeed more stable over time than BI, and therefore, a more accurate predictor of pro-environmental behaviour – thus confirming and extending previous studies on the value of BE (e.g., Venkatesh et al., 2006; Bagozzi, 2007; Mahardika et al., 2018a; 2018b).

Findings from Study 1 provide a baseline for comparing the different conceptualisations of BE versus BI. It was found that subjects who responded to BE made relatively more consistent estimations than did those subjects who responded to BI questions.

This consistency is further examined in Study 2, where we found the modest estimations (due to a more cautious judgment) in the BE group leads to higher predictive ability. The findings provide important implications for retailers and social marketers in understanding the barriers to adopting pro-environmental behaviours. Prior research suggests that influencing consumer awareness is a key element in behavioural change (e.g., Steg & Vlek, 2009). In the context of pro-environmental behaviour, consumers' awareness involves their ability to accurately calculate the cost and benefit of adopting a pro-environmental lifestyle and to take into account any foreseeable events that may impede the adoption of that lifestyle. BE enables retailing and social marketing researchers to measure consumers' awareness more consistently compared to BI, across various pro-environmental behaviours.

In addition, results from Study 3 show that external factors such as information have a limited influence on BE but significant influence on BI. Based on these findings, researchers using TRA/TPB should consider BE ahead of BI as immediate predictor of pro-environmental behaviour. For instance, Hsu et al. (2017) investigate the purchase intention of green skincare products using TPB. They note that country-of-origin and price sensitivity moderate the links between purchase intention and the three focal constructs in TPB. Based on the findings of this study, the moderating effects of country of origin and price sensitivity might be different towards BE. Similarly, Jaiswal and Kant (2018) advocate that green purchase intention as the fundamental predictor of green purchase behaviour. This might change when BE is introduced to the framework, in which it could better foresee the consistency between 'green attitude' and actual purchase.

6.2 Managerial implications

There are at least three areas of designed intervention that could be drawn from the results of this study. Among the key findings, we now understand that consumers appear to be more able to accurately predict habitual pro-environmental behaviour when responding to BE questions. Hence, to promote behavioural change for habitual pro-environmental behaviour, a designed intervention should focus on consumers' BE judgments rather than their BI judgments. Interventions need to focus on giving extra key information that helps to reduce consumers' perceived uncertainty or to clarify the extent of impediments that may prevent consumers from performing the targeted pro-environmental behaviour.

Another important finding indicates that consumers who have low pro-environmental orientation need to be approached differently to consumers with high pro-environmental orientation. Indeed, the former tend to overestimate their environmental concern when

responding to BI questions, since they are not aware of impediments that may challenge their eventual performance of the targeted pro-environmental behaviour. In order to increase consumers' awareness, retailers and social marketers can provide relevant information that will alert consumers about potential obstructions that may deter them from adopting pro-environmental behaviour. Marketers need to bring consumers 'back to earth' to make them realise that adopting pro-environmental behaviour will require some resources and commitment. It is an important baseline before marketer could designed an accurate intervention strategy to appeal them into making an actual purchase of green products/services.

Another key retailing and social marketing implication are related to the intervention strategy for at-risk consumers who are vulnerable to the environmental problem, such as those who are affected by polluted water but are unable or unwilling to respond to this issue. Pechmann et al. (2011) define at-risk consumers as "marketplace participants who, because of historical or personal circumstances or disabilities, may be harmed by marketers' practices or may be unable or unwilling to take full advantage of marketplace opportunities." In the formation of their cognitive judgments toward adopting specific pro-environmental behaviours, at-risk consumers are likely to take into account the environmental problem that they are experiencing in addition to the costs and benefits of adopting those behaviours. This in turn may influence their BI judgments in that at-risk consumers will no longer feel pressured to comply with the social norms about the environment as they see themselves as victims instead of agents of pro-environmental behaviour change. With BE conceptualisation in mind, marketers could offer a more relevant marketing communication approach for at-risk consumers.

6.3 Study limitations and further research

The present research is not without limitations. Self-report questions *may* give rise to response bias in that respondents may feel pressured to comply with generally accepted environmental norms. Future research could therefore seek to determine whether the current study findings persist when actual purchase or consumption behaviour (e.g., electricity bill or water bill) is examined. Further research should also consider the role other external factors such as facilitating conditions and risk, as well as internal factors such as experience and self-efficacy, play in the formation of BE judgments.

Second, not all individual correlations between BI-Behaviour and BE-Behaviour are significant. This could limit the generalisability of the results. It can be due to inaccurate self-

reporting (Study 2) or unfamiliarity with the green products being observed (Study 1). In Study 2, participants may have had difficulties recalling whether they performed habitual pro-environmental behaviours over the previous weekend. An alternate approach would therefore be to use diaries to record all pro-environmental behaviours that took place each day over a one-week period.

References

- Aarts, H., B. Verplanken, and A. Knippenberg. (1998). "Predicting behavior from actions in the past: Repeated decision making or a matter of habit?", *Journal of Applied Social Psychology*, Vol. 28, no. 15, pp. 1355-74.
- Ajzen, I. (1985). "From intentions to actions: A theory of planned behavior." *Action Control, from Cognition to Behavior: From Cognition to Behavior*, pp. 11.
- Ajzen, I. (1991). "The theory of planned behavior: Some unresolved issues." *Organizational Behavior and Human Decision Processes*, Vol. 50, no. 2, pp. 179–211.
- Ajzen, I., and M. Fishbein. (1980), *Understanding attitudes and predicting social behavior*. Prentice-Hall, 1980.
- Ajzen, Icek, and Martin Fishbein. (1974). "Factors influencing intentions and the intention-behavior relation." *Human Relations*, Vol. 27, no. 1, pp. 1.
- Alan, R. Andreasen. (2002). "Marketing social marketing in the social change marketplace." *Journal of Public Policy & Marketing*, Vol. 21, no. 1, pp. 3.
- Albarracin, Dolores, Martin Fishbein, Blair T. Johnson, and Paige A. Muellerleile. (2001). "Theories of reasoned action and planned behavior as models of condom use: A meta-analysis." *Psychological Bulletin*, Vol. 127, no. 1, pp. 142.
- Andreasen, A.R., and CB Tyson. (1994). "Applying social marketing to ecological problems through consumer research." *Asia Pacific advances in consumer research*, Vol. 1, pp. 22-27.
- Armitage, CJ, and M Conner. (2001). "Efficacy of the theory of planned behaviour: A meta-analytic review." *British Journal of Social Psychology*, Vol. 40, no. 4, pp. 471-99.
- Bagozzi, R.P., and P.R. Warshaw. (1990). "Trying to consume." *Journal of Consumer Research*, pp. 127-40.
- Bagozzi, Richard P. (2007). "The legacy of the technology acceptance model and a proposal for a paradigm shift." *Journal of the Association for Information Systems*, Vol. 8, no. 4, pp. 244-54.

- Bamberg, S., and G. Möser. (2007). "Twenty years after hines, hungerford, and tomara: A new meta-analysis of psycho-social determinants of pro-environmental behaviour." *Journal of Environmental Psychology*, Vol. 27, no. 1, pp. 14-25.
- Barr, S., A.W. Gilg, and N. Ford. (2005). "The household energy gap: Examining the divide between habitual-and purchase-related conservation behaviours." *Energy Policy*, Vol. 33, no. 11, pp. 1425-44.
- Conner, M., P. Sheeran, P. Norman, and C.J. Armitage. (2000). "Temporal stability as a moderator of relationships in the theory of planned behaviour." *British Journal of Social Psychology*, Vol. 39, no. 4, pp. 469-93.
- Dahlstrand, Ulf, and Anders Biel. (1997). "Pro-environmental habits: Propensity levels in behavioral change1." *Journal of Applied Social Psychology*, Vol. 27, no. 7, pp. 588-601.
- de Vries, P., H. Aarts, and C.J.H. Midden. (2011). "Changing simple energy-related consumer behaviors: How the enactment of intentions is thwarted by acting and non-acting habits." *Environment and Behavior*.
- Dunlap, R.E., and K.D. Van Liere. (1978). "The new environmental paradigm: A proposed instrument and preliminary results." *Journal of Environmental Education*, Vol. 9, no. 4, pp. 10-19.
- Dunlap, R.E., K.D. Van Liere, A.G. Mertig, and R.E. Jones. (2000). "New trends in measuring environmental attitudes: Measuring endorsement of the new ecological paradigm: A revised nep scale." *Journal of Social Issues*, Vol. 56, no. 3, pp. 425-42.
- Fransson, N., and T. Gärling. (1999). "Environmental concern: Conceptual definitions, measurement methods, and research findings." *Journal of Environmental Psychology*, Vol. 19, no. 4, pp. 369-82.
- Gary, Evans. (2007). "Marketers take note: Women are more green." *Furniture Today*, Vol. 31, no. 50, pp. 43.
- Gatersleben, B., L. Steg, and C. Vlek. (2002). "Measurement and determinants of environmentally significant consumer behavior." *Environment and Behavior*, Vol. 34, no. 3, pp. 335.
- Gordon, RA. (1990). "Informational bases of behavioral intentions and behavioral expectations or self-predictions." *Basic and Applied Social Psychology*, Vol. 11, no. 4, pp. 433-42.
- Gupta, S., and D.T. Ogden. (2009). "To buy or not to buy? A social dilemma perspective on green buying." *Journal of Consumer Marketing*, Vol. 26, no. 6, pp. 376-91.

- Hines, J.M., H.R. Hungerford, and A.N. Tomera. (1987). "Analysis and synthesis of research on responsible environmental behavior: A meta-analysis." *Journal of Environmental Education*, Vol. 18, no. 2, pp. 1-8.
- Hopper, J.R., and J.M.C. Nielsen. (1991). "Recycling as altruistic behavior." *Environment and Behavior*, Vol. 23, no. 2, pp. 195-220.
- Hsu, C. L., Chang, C. Y., & Yansritakul, C. (2017). Exploring purchase intention of green skincare products using the theory of planned behavior: Testing the moderating effects of country of origin and price sensitivity. *Journal of Retailing and Consumer Services*, 34, 145-152.
- Jaiswal, D., & Kant, R. (2018). Green purchasing behaviour: A conceptual framework and empirical investigation of Indian consumers. *Journal of Retailing and Consumer Services*, 41, 60-69.
- Kollmuss, A., and J. Agyeman. (2002). "Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior?". *Environmental education research*, Vol. 8, no. 3, pp. 239-60.
- Konerding, U. (2001). "Theory and methods for analyzing relations between behavioral intentions, behavioral expectations, and behavioral probabilities." *Methods of Psychological Research Online*, Vol. 6, no. 1, pp. 21-66.
- Mahardika, H., Thomas, D., Ewing, M., and Japutra, A. (2018a). Experience and Facilitating Conditions as Impediments to Consumers' New Technology Adoption. *International Review of Retail, Distribution and Consumer Research*.
- Mahardika, H., Thomas, D., Ewing, M., and Japutra, A. (2018b). Predicting Consumers' Trial/Adoption of New Technology: Revisiting the Behavioral Expectations – Behavioral Intentions Debate. *International Review of Retail, Distribution and Consumer Research*.
- Melillo, W., S. Miller, and G. Solman. (2006). "Companies find it's not easy marketing green." *Brandweek*, Vol. 47, no. 28.
- Newhouse, N. (1990). "Implications of attitude and behavior research for environmental conservation." *Journal of Environmental Education*, Vol. 22, no. 1, pp. 26-32.
- Nguyen, T. N., Lobo, A., & Greenland, S. (2016). Pro-environmental purchase behaviour: The role of consumers' biospheric values. *Journal of Retailing and Consumer Services*, 33, 98-108.
- Pechmann, C., E. Moore, A. Andreasen, P. Connell, D. Freeman, M. Gardner, D. Heisley, *et al.* (2011). "Navigating the central tensions in research on at-risk consumers:

- Challenges and opportunities." *Journal of Public Policy & Marketing*, Vol. 30, no. 1, pp. 23.
- Pickett-Baker, J., and R. Ozaki. (2008). "Pro-environmental products: Marketing influence on consumer purchase decision." *Journal of Consumer Marketing*, Vol. 25, no. 5, pp. 281-93.
- Rajecki, D. W. (1982), *Attitudes: Themes and advances*. Sunderland, MA: Sinauer, 1982.
- Sheeran, P., and S Orbell. (1998). "Do intentions predict condom use? Meta-analysis and examination of six moderator variables." *British Journal of Social Psychology*, Vol. 37, pp. 231-52.
- Sheeran, P., and C. Abraham. (2003). "Mediator of moderators: Temporal stability of intention and the intention-behavior relation." *Personality and Social Psychology Bulletin*, Vol. 29, no. 2, pp. 205-15.
- Sheeran, P., S. Orbell, and D. Trafimow. (1999). "Does the temporal stability of behavioral intentions moderate intention-behavior and past behavior-future behavior relations?." *Personality and Social Psychology Bulletin*, Vol. 25, no. 6, pp. 724-34.
- Smith, R.E., and W.R. Swinyard. (1983). "Attitude-behavior consistency: The impact of product trial versus advertising." *Journal of Marketing Research*, pp. 257-67.
- Steg, L., and C. Vlek. (2009). "Encouraging pro-environmental behaviour: An integrative review and research agenda." *Journal of Environmental Psychology*, Vol. 29, no. 3, pp. 309-17.
- Stern, P.C. (1992). "Psychological dimensions of global environmental change." *Annual Review of Psychology*, Vol. 43, no. 1, pp. 269-302.
- Straughan, R.D., and J.A. Roberts. (1999). "Environmental segmentation alternatives: A look at green consumer behavior in the new millennium." *Journal of Consumer Marketing*, Vol. 16, no. 6, pp. 558-75.
- Tsarenko, Y., Ferraro, C., Sands, S., & McLeod, C. (2013). Environmentally conscious consumption: The role of retailers and peers as external influences. *Journal of Retailing and Consumer Services*, 20(3), 302-310.
- Venkatesh, V, SA Brown, LM Maruping, and Hillol Bala. (2008). "Predicting different conceptualizations of system use: The competing roles of behavioral intention, facilitating conditions, and behavioral expectation." *Management Information System Quarterly*, Vol. 32, no. 3, pp. 483-502.

- Venkatesh, V, LM Maruping, and SA Brown. (2006). "Role of time in self-prediction of behavior." *Organizational Behavior and Human Decision Processes*, Vol. 100, no. 2, pp. 160-76.
- Warshaw, PR, and FD Davis. (1985). "The accuracy of behavioral intention versus behavioral expectation for predicting behavioral goals." *Journal of Psychology*, Vol. 119, no. 6, pp. 599-602.
- Warshaw, PR, and FD Davis. (1985). "Disentangling behavioral intention and behavioral expectation." *Journal of Experimental social Psychology*, Vol. 21, no. 3, pp. 213-28.
- Warshaw, PR, and FD Davis. (1984). "Self-understanding and the accuracy of behavioral expectations." *Personality and Social Psychology Bulletin*, Vol. 10, no. 1, pp. 111.

Appendix 1 New Environmental Paradigm Scale

Listed below are statements about the relationship between humans and the environment.

For each one, please indicate whether you are STRONGLY AGREE, MILDLY AGREE, UNSURE, MILDLY DISAGREE, or STRONGLY

		Strongly agree	Mildly agree	Unsure	Mildly disagree	Strongly Disagree
1	We are approaching the limit of the number of people the earth can support					
2	Humans have the right to modify the natural environment to suit their needs					
3	When humans interfere with nature, it often produces disastrous consequences					
4	Human ingenuity will insure that we do NOT make the earth unlivable					
5	Humans are severely abusing the environment					
6	The earth has plenty of natural resources if we just learn how to develop them					
7	Plants and animals have as much right as humans to exist					
8	The balance of nature is strong enough to cope with the impacts of modern industrial nations					
9	Despite our special abilities humans are still subject to the laws of nature					
10	The so-called "ecological crisis" facing humankind has been greatly exaggerated					
11	The earth is like a spaceship with very limited room and resources					
12	Humans were meant to rule over the rest of nature					
13	The balance of nature is very delicate and easily upset					
14	Humans will eventually learn enough about how nature works to be able to control it					
15	If things continue on their present course, we will soon experience a major ecological catastrophe					