■論文

Pilot study on the intertwined effects of attitude, relatedness and social norms on environmental behaviour

Yuki Yoshida and Michelle McCauley

Abstract

This study examined the role of the fulfilment of a social need for relatedness in the Self-Determination Theory as a moderator for the discrepant relationship between attitudes and actual behaviours toward the natural environment. Three hundred sixty-four participants answered an online survey evaluating attitudes, behaviours, and perceived social norms regarding the environment, as well as fulfilment of need for relatedness. Pearson correlational analysis, a univariate analysis of variance, and a series of t-tests on their responses suggest that pro-environmental individuals were more likely to act consistently with their attitudes in a social environment with contrasting views if their need for relatedness is fulfilled. Findings suggest that consideration be given to interpersonal relationships and relatedness need fulfilment in the environmental movement.

Keywords: Environmental attitude; Environmental behaviour; Attitude-behaviour incongruence; Relatedness; Self-determination theory; Social norm

1. Introduction

What does it take for the environmentally conscious to act accordingly in their everyday lives? The gravity and urgency of remediating climate change are established and communicated by mainstream media worldwide (Barkemeyer et al., 2017; UNEP, 2019). Longitudinal surveys indicate increasing acceptance of and concerns about anthropogenic climate change (Jones & Saad, 2019; Leiserowitz et al., 2018; Milfont, Wilson, & Sibley, 2017; Ray & Pugliese, 2011). More than ever, the general public considers these impacts to become serious within their life time (Brenan & Saad, 2018). Even in the US, a country with a high proportion of climate change deniers, the majority of people indicate they are particularly concerned about the environment and motivated to help the environment in their daily lives (Funk & Kennedy, 2016).

Nonetheless, behavioral shifts have been small and slow. Less than a third of poll respondents that expressed environmental concern reported environmentally responsible behaviors in their daily lives (Funk & Kennedy, 2016). Furthermore, those that do engage in environmentally responsible behaviors tend to stick to the less impactful, easier actions. For example, although a strong majority of polled Americans expressed willingness to recycle or use efficient light bulbs, few were willing to make more impactful sacrifices such as giving up meat (De Pinto, Backus, & Salvanto, 2019). Similarly, although respondents' belief in climate change predicted their pro-environmental behavioral *intentions* and support of environmental policies in general, it was not as predictive of their behaviors or support for specific policies with readily conceivable personal costs to the respondent (Hornsey, Harris, Bain, & Fielding, 2016). In fact, Hall, Lewis, and Ellsworth (2018) found that those indicating the strongest belief and concerns regarding climate change reported the least every day pro-environmental behaviors (PEB).

We believe that tackling the inconsistency between awareness and action could play a considerable role in rectifying human actions at the root of environmental issues. Here, we suggest that congruency between environmental attitudes and environmental behaviors can be better explained by combining knowledge on the effect of social normative information with Self-Determination Theory (SDT) (Ryan & Deci, 2002). Specifically, we examine the effects of two aspects of relationship involvement on personal environmental action: 1) perceived social norm as represented by the extent to which one perceives their peer group to hold pro-environmental attitudes, and 2) the extent to which one's basic psychological need for relatedness, as defined in SDT, is fulfilled.

1.1 Social Norms and Environmental Behavior

Social norm information is extremely influential on our behavior yet almost invisible. In the absence of *injunctive norms* that describe others' approval or disapproval of a behavior, people tend to follow the *descriptive norm*, which simply describes a behavior's prevalence (Cialdini, 2003; Kallgren, Reno, & Cialdini, 1993). Research on the connection between pro-environmental behavior and social norms demonstrates that providing people with descriptive normative information about their behavior relative to others leads them adjust by aligning their behavior with the norm (Farrow, Grolleau, & Ibanez, 2017). Although this finding is robust, people are not typically aware of such normative influence. In one classic intervention study, California residents indicated they believed normative information to be the least persuasive of motivations for energy conservation (Nolan, Schultz, Cialdini, Goldstein, & Griskevicius, 2008). Nevertheless, belief of others' behaviors was the only significant correlate of their behaviors; in fact, the only situation in which participants reduced their energy were those in which they were told that their neighbors conserved. Meanwhile, participants' self-reported motives such as environmental protection, saving money, and desire to benefit society had no statistical significance in predicting behavior.

Importantly, the power of social norms varies by comparison group. Normative information is particularly influential when it represents a group perceived as being similar to the target individual on some relevant dimension. Gender, race, religion, and geographic region are important dimensions, but tenuous connections may also suffice to activate the social pressure. For example, Goldstein, Cialdini, and Griskevicius (2008) demonstrated that hotel guests were significantly more likely to reuse their towels when presented with descriptive normative information of reusing towels about guests who had previously stayed in the same room, compared with identical information describing hotel guests in general.

The research on the influence of social norms on behavior is extensive. Yet despite their powerful effect, social norms alone do not sufficiently explain why a gap often exits between people's attitudes and behaviors. Nor do norms explain why the disconnect between intentions and behaviors are more pronounced when discussing private sphere, individual, everyday pro-environmental actions than in the public sphere such as supporting petitions and environmental organizations (Hornsey et al., 2016). Here, we look to SDT for one explanation of attitude-behavior congruency within a social context.

1.2 Self-Determination Theory and attitude-behavior congruency

We propose it is necessary to consider not only perceived social norms, but also the extent to which people's psychological needs for self-determination (Deci & Ryan, 2000, 2008; Ryan & Deci, 2002) are met to understand people's behavior. In particular, we suggest that there is a greater likelihood that one's environmental atti-

tudes will manifest as overt pro-environmental behavior when one's basic need for relatedness is met, as opposed to thwarted. Below we provide a cursory overview of SDT and explain why we propose that understanding need fulfillment, particularly relatedness, is important for predicting pro-environmental behaviors.

The premise of SDT is that humans are innately oriented toward psychological vitality, integration, and health (Deci & Ryan, 2000, 2008; Ryan & Deci, 2002). According to SDT, we have three basic psychological needs that must be met for optimal wellbeing: (1) *autonomy*, the need for agency; (2) *competence*; and (3) *relatedness*, which involves feeling connected to others, mutual caring with those others, and a general notion of belonging (see Section 1.4; Ryan & Deci, 2002). The extent to which these needs are met determines one's self-determination and wellbeing.

Psychological needs differ from physiological drives insofar as their fulfillment not only leads to vitality and wellbeing, but also increased motivation towards psychological growth. While hunger ceases to serve as a motivator once satisfied, the fulfillment of psychological needs furthers motivation and action toward greater personal development (Ryan & Deci, 2002). Moreover, it is not uncommon for a person whose basic psychological needs are thwarted to behave counterintuitively, in ways that further undermine their own self-determination and wellbeing (Deci & Ryan, 2000). For example, someone whose need for relatedness has been impeded may withdraw from social opportunities, thereby reducing the chance of making new friends and aggravating their relatedness deficit.

According to Deci and Ryan, deprivation of the basic needs will result in less optimal psychological outcomes. For instance, individuals deprived of their basic psychological needs often spend considerable cognitive and emotional resources to gain social acceptance. Threats to social bonds can lead people to seek external validation and to demonstrate their own value and sense of self-worth through extrinsic mechanisms such as the acquisition of material possessions to enhance their social status (Baumeister & Leary, 1995; Deci & Ryan, 2000). Similarly, adolescents with non-nurturing mothers are more likely to have an extrinsic value system and be materially or financially oriented than peers whose mothers were warmer, less controlling, and more democratic (Kasser, Ryan, Zax, & Sameroff, 1995). While those who are not self-determined generally act upon external motivation and rely on others' opinion for behavioral guidance, a predominantly self-determined person will find internal validation and act upon intrinsic sources of motivation. It follows logically that the attitudes and actions of those who are not self-determined would be less congruent compared to individuals who are (Darner, 2009; Deci & Ryan, 2000).

A growing body of empirical evidence suggests that self-determination may be requisite for one's behaviors to match their attitudes. Specifically, those who report being more self-determined demonstrate greater congruence across personality, awareness and behavior when compared to less self-determined peers (Lavergne & Pelletier, 2015; Ryan & Deci, 2002). In addition, self-determined individuals are both more aware of their own feelings and thoughts and act more consistently with these thoughts and feelings than control-determined individuals (Knee, C Raymond; Neighbors, 2002; Koestner, Bernieri, & Zuckerman, 1992).

1.3 Self-determined motivation regarding the environment

Within the environmental domain, we know that people who report engaging in PEBs for internal (i.e., self-determined) reasons are more likely to continue the behavior (Osbaldiston & Sheldon, 2003), to attach more importance to environmental problems, and to feel more compe-

tent in dealing with environmental issues (Pelletier, Tuson, Green-Demers, Noels, & Beaton, 1998) than those who engage in PEBs for extrinsic or instrumental reasons. For example, Shean and Shei (1995) found that pro-environmentally active individuals were less likely to hold extrinsic aspirations of personal affluence and political accomplishments than a general sample. Lavergne and Pelletier (2015, 2016) reported that people with more self-determined, or autonomous forms of motivation for the environment are more likely to adjust their behavior to reduce attitude-behavior inconsistency, while people with more extrinsic, or controlled forms of motivation tend to adjust their thinking to reduce their psychological discomfort.

Studies that do not explicitly address SDT concepts also report findings in line with SDT. For example, learned helplessness, indicative of lack of autonomy or competence i.e. lack of self-determination, was found to inhibit PEBs of environmentally concerned undergraduates (Landry, Gifford, Milfont, Weeks, & Arnocky, 2018). Similarly, Tam and Chan (2018) found that generalized trust moderates the consistency of environmental concern and PEB. In their study, generalized trust was interpreted as lowered levels of fear that unconcerned others would free ride on one's pro-environmental actions. Applying instead the SDT framework, we suggest that generalized trust may be interpreted as the respondents' level of satisfaction with their own interpersonal relationships. In other words, consistency between environmental concern and PEB can be said to be moderated by the satisfaction of respondents' need for relatedness. As such, various evidence within and without the SDT literature suggest that self-determination bolsters—or in its absence, obstructs—PEBs of pro-environmental individuals.

Deci and Ryan explicate that all three needs must be met for one to be truly self-determined. Sheldon and Niemiec (2006) have further suggested that it is not solely need fulfillment, but the balance among the different needs that predicts self-determination. That said, while extensive research has assessed the importance of autonomy and competence on well-being and engagement in PEBs, less research has focused on the role of relatedness (Darner, 2009; Gagné, 2003). According to Gagné's (2003) study, relatedness need fulfillment mediates the linkage between causality orientation, another component of self-determination, and engagement in a range of pro-social behaviors including recycling. In the current research, we sought to extend this work by focusing directly on the connection among fulfillment of the need for relatedness, perception of social norms for environmental action, and engagement in PEB.

1.4 Need for Relatedness

The need for relatedness is the "feeling of connectedness to others, to caring for and being cared for by those others, to having a sense of belongingness both with other individuals and with one's community" (Ryan & Deci, 2002, p.7). Relatedness also has been discussed as the need to feel that one belongs to a social group (Darner, 2009) as well as being valued in relationships with partners who actively demonstrate their care and interest (La Guardia & Patrick, 2008). Key components are responsiveness and sensitivity, wherein partners provide "non-contingent positive regard for the person and a warm, loving, and nurturing environment" (La Guardia & Patrick, 2008, p.203). Variants of the construct such as *belonging* (Baumeister & Leary, 1995), *attachment* (Hazan & Shaver, 1987), and *need for affiliation* (Murray, 1938) have been studied extensively. In particular, Baumeister and Leary's belongingness hypothesis (1995) overlaps significantly with the need for relatedness. Their hypothesis is that people have "a pervasive drive to form and maintain at least a minimum quantity of lasting, positive, and significant interpersonal relationships" (p. 497). The need for belonging has been characterized as being com-

prised of two parts: (1) "frequent, affectively pleasant interactions with a few other people" (2) that "take place in the context of a temporally stable and enduring framework of affective concern for each other's welfare" (p. 497).

Although the belongingness hypothesis posits that each person has a minimum number of significant bonds necessary to fulfill their need, the actual number of bonds required differs person to person, depending on personality factors and past experiences (Mellor, Stokes, Firth, Hayashi, & Cummins, 2008). Thus, a history of thwarted relatedness need will result in a person experiencing an unusually high need for relatedness (Deci & Ryan, 2000). This is not a linear relationship but rather, a threshold model: the question is not how many relationships one has, but whether one's need is satiated. Lack of satisfaction in personal relationships relative to one's personal need to belong (or for relatedness) results in loneliness (Mellor et al., 2008) as well as a host of maladaptive outcomes such as stress and mental and physical illnesses (Baumeister & Leary, 1995). Similarly, there is a well-established, positive correlation between strong personal relationships and happiness (Darner, 2009; Deci & Ryan, 2000).

1.5 Aims of the current research

We have thus reviewed, on the one hand, the power of social norms to shift behavior, and on the other, the potential of self-determination and autonomous orientation to increase the congruence between attitudes and behaviors and long-term commitment to the endeavors. In this study, we assess how these two effects interact. We suggest that the extent to which one's need for relatedness is met relates to the congruence between one's personal environmental attitudes and behaviors. Specifically, we hypothesized that participants whose need for relatedness was fulfilled, as opposed to thwarted, would demonstrate greater attitude-behavior consistency (i.e., those with stronger pro-environmental attitudes would behave in alignment with these attitudes). Furthermore, we hypothesized that the extent to which social norms, rather than attitudes, predict PEBs would depend significantly on whether one's personal need for relatedness had been met. Since need fulfillment and self-determination associate negatively with conformity with social norms, we expected that PEB of individuals whose relatedness needs are met would be less influenced by their perceptions of peers' norms than for participants whose relatedness needs were not met. Those who hold pro-environmental attitudes, have high need fulfillment, and whose peers agree with their pro-environmental attitudes should report the greatest levels of PEB. Those who hold anti-environmental attitudes, high need fulfillment, and peers who are not environmental should report the least PEB. Regardless of personal environmental attitudes, those who report a lack of relatedness and peers who are not environmental should report little PEB. Finally, we anticipated an interaction among these constructs such that those participants who hold strong pro-environmental attitudes, but are lacking in their need for relatedness, would follow the what they perceive their friends to do (social norm) to a greater extent than their personal values (i.e., incongruence). To assess this, we asked participants to answer a questionnaire with established scales as well items designed for this study measuring their level of need fulfillment, environmental attitudes, perceived social norms (PSN), and PEBs.

2. Method

2.1 Ethics approval

The research protocol was reviewed and approved by the authors' institutional review board committee prior to commencement.

2.2 Participants and design

Three hundred sixty-four participants responded to a 73-item online survey distributed

through convenience and snowball sampling via institution-wide email and social media. Raw data are available on an open-access repository (*citation withheld for blind review*). One response was omitted for failing to meet an 80%-per scale threshold, leaving 363 responses. Participants ranged in age from 18 to 87 years old, with the average age being 22 years. Sixty-three percent of participants were female and 72% indicated that they were undergraduate or graduate students. The survey took approximately ten minutes and those who completed it were entered in a lottery for the chance to a $100 gift certificate.

2.3 Materials

2.3.1 Environmental Attitudes

Twelve items from the original New Environmental Paradigm (NEP) assessed ecological worldview by asking individuals to indicate the extent to which they view the natural environment as limited and fragile versus unlimited and for human beings to dominate (e.g., "We are approaching the limit of the number of people the earth can support") on a 5-point Likert scale (Dunlap & Van Liere, 1978). The NEP is one of the most widely used indicator of environmental attitudes (Milfont & Duckitt, 2010).

2.3.2 Relatedness

Perceived fulfillment of participants' need for relatedness was measured using the eight item, relatedness subscale of the SDT Basic Need Satisfaction in General scale (Deci & Ryan, 2000; Gagné, 2003). Participants indicated their level of agreement to items such as "People in my life care about me" on a 7-point Likert scale.

2.3.3 Pro-Environmental Behavior (PEB)

We measured participants' self-reports of their PEBs by combining three subscales of Smith-Sebasto and D'Costa's (1995) Environmentally Responsible Behavior Index (ERBI), which was designed to measure undergraduate students' pro-environmental behavior. Participants indicated their environmental consumption (e.g., "Stopped buying from a company that showed a disregard for the environment"), activism (e.g., "Voted for a politician due to his or her record on protecting the environment"), and education (e.g., "Talked to others about environmental issues") on a 5-point Likert scale for 21 items. Measures of PEBs continue to evolve, and the ERBI has often been used in part or adapted as constructs (Lee, Jan & Yang, 2013).

2.3.4 Perceived Social Norm (PSN)

Two items inspired by Thøgersen (2006) assessed the extent to which participants believed their peers engaged in pro-environmental behaviors. Our two items for social norms were, "Most of my friends are in favor of recycling," and "Generally speaking, my friends are concerned about the environment." Participants indicated their level of agreement with these items on a 5-point Likert scale.

3. Analysis and Results

3.1 Preliminary Analysis

Mean scores for each scale were used in the analysis. Responses were slightly negatively skewed for NEP (M = 3.92, SD = 0.50, *Median* = 3.92), relatedness (M = 5.45, SD = 0.83, *Median* = 5.50), and PSN (M = 3.90, SD = 0.91, *Median* = 4.00), though less so for PEB (M = 2.61, SD = 0.67, *Median* = 2.58). Cronbach's alphas of all scales were adequate to high (Taber, 2018), ranging between 0.74 and 0.91 (Table 1).

Table 1 Number of respondents, means, standard deviations, medians, confidence intervals, and reliabilities of scales for Environmental Attitude (NEP; New Environmental Paradigm), fulfillment of relatedness need, Perceived Social Norm (PSN), and Pro-Environmental Behavior (PEB).

		n	*M*	*SD*	*Median*	*95% CI*		*α*
New Environmental Paradigm (NEP)	12 items	363	3.92	0.50	3.92	3.86	3.97	0.74
Relatedness	8 items	363	5.46	0.83	5.50	5.38	5.55	0.79
Perceived Social Norm (PSN)	2 items	363	3.90	0.91	4.00	0.38	4.01	0.86
Pro-Environmental Behavior (PEB)	21 items	348	2.61	0.67	2.58	2.54	2.69	0.91

A Mann-Whitney test indicated that women (M = 3.97, SD = 0.48, *Median* = 4) scored higher on the NEP than men (M = 3.82, SD = 0.52, *Median* = 3.83) (U = 12433.5, p = .007, n = 359). A significant sex difference was also found for relatedness (U = 11143, p < .001, n = 359; women: M = 5.89, SD = 0.83, *Median* = 5.63; men: M = 5.23, SD = 0.78, *Median* = 5.38) but not for PSN (p = 0.125) or PEB (p = 0.133). Age correlated significantly with PSN (τ_b = 0.16, p < .001, n = 359) and PEB (τ_b = 0.09, p = .015, n = 344), had a weak relationship with NEP (τ_b = 0.07, p = .061, n = 359), and no significant correlation with relatedness (p =.174). As expected, NEP, relatedness, PSN and PEB correlated positively with each other (Table 2).

3.2 Environmental Attitude (NEP), Relatedness, Perceived Social Norm (PSN) and Pro-Environmental Behavior (PEB)

Our main hypothesis was that the relationship between pro-environmental attitudes and behavior would depend both on the extent to which one's need for relatedness was met and on perceived social norms to engage in pro-environmental behaviors. We predicted that perceived environmental social norms would be more important for participants who reported lower satisfaction with their relatedness need fulfillment than for those whose relatedness needs were met. To test this, we divided participants into high and low categories using a median split for (a) NEP, (b) PSN, and (c) fulfillment of need for relatedness. This allowed us to test interactions among these variables using a 2 x 2 x 2 ANOVA with PEB as the outcome variable. Cell sizes, means, standard deviations, means and confidence intervals for the factorial design are presented in Table 3.

We found expected main effects for pro-environmental attitudes (NEP; F(1, 340) = 11.01, p < .001, η^2_p = .08) and PSN (F(1, 340) = 12.07, p < .001, η^2_p = .09) on PEB. Participants who had higher NEP scores reported greater engagement in PEB (M = 2.83 out of a possible 5, SD = 0.66, *Median* = 2.87) compared to those with lower NEP scores (M = 2.41, SD = 0.63, *Median* = 2.34). Likewise, those participants who reported their peers as holding more pro-environmental attitudes acted more pro-environmentally (M = 2.78, SD = 0.65, *Median* = 2.79) than those who reported their peers to be less environmentally oriented (M = 2.33, SD = 0.61, *Median* = 2.28). No main effect was found for fulfillment of need for relatedness and PEB, p = .122.

These main effects were qualified by two significant interactions. The first was a two-way interaction between NEP and relatedness, F(1, 340) = 2.78, p = .006, η^2_p = .02 (Figure 1). Post-hoc tests indicated that when participants' need for relatedness was not fulfilled, the PEB of participants who scored high on the NEP (M = 2.65, SD = 0.62, *Median* = 2.62) was slightly greater than of those scoring lower on the NEP

Table 2 Correlations for Environmental Attitude (NEP; New Environmental Paradigm), Relatedness, Perceived Social Norm (PSN), and Pro-Environmental Behavior (PEB)

		1	2	3	4
1. New Environmental Paradigm (NEP)	*Kendall's Tau*	-			
	p				
	n				
2. Relatedness	*Kendall's Tau*	0.08	-		
	p	.034			
	n	363			
3. Perceived Social Norm (PSN)	*Kendall's Tau*	0.17	0.26	-	
	p	.000	.000		
	n	363	363		
4. Pro-Environmental Behavior (PEB)	*Kendall's Tau*	0.28	0.13	0.28	-
	p	.000	.001	.000	
	n	348	348	348	

Table 3 Cell sizes, means, standard deviations, medians and confidence intervals of Pro-Environmental Behavior (PEB; 1 to 5 scale) by median-split NEP (New Environmental Paradigm), Relatedness, and Perceived Social Norm (PSN).

NEP	Relatedness	PSN	*n*	PEB			*95% CI*	
				Mean	*SD*	*Median*		
Low	Low	Low	46	2.27	0.55	2.27	2.10	2.43
		High	42	2.54	0.76	2.47	2.31	2.78
		Total	88	2.40	0.67	2.34	2.26	2.54
	High	Low	29	2.02	0.42	1.96	1.86	2.18
		High	62	2.62	0.57	2.54	2.47	2.76
		Total	91	2.43	0.59	2.39	2.31	2.55
	Total	Low	75	2.17	0.52	2.13	2.05	2.29
		High	104	2.59	0.65	2.52	2.46	2.71
		Total	179	2.41	0.63	2.34	2.32	2.51
High	Low	Low	27	2.35	0.54	2.46	2.14	2.57
		High	43	2.84	0.60	2.87	2.65	3.02
		Total	70	2.65	0.62	2.62	2.50	2.80
	High	Low	25	2.78	0.74	2.80	2.47	3.08
		High	74	3.01	0.62	3.03	2.87	3.16
		Total	99	2.95	0.65	3.02	2.82	3.08
	Total	Low	52	2.56	0.67	2.50	2.37	2.74
		High	117	2.95	0.61	2.99	2.84	3.06
		Total	169	2.83	0.66	2.87	2.73	2.93
Total	Low	Low	73	2.30	0.55	2.32	2.17	2.43
		High	85	2.69	0.70	2.69	2.54	2.84
		Total	158	2.51	0.66	2.49	2.41	2.61
	High	Low	54	2.37	0.70	2.19	2.18	2.56
		High	136	2.83	0.62	2.88	2.73	2.94
		Total	190	2.70	0.68	2.72	2.61	2.80
	Total	Low	127	2.33	0.61	2.28	2.22	2.44
		High	221	2.78	0.65	2.79	2.69	2.87
		Total	348	2.61	0.67	2.58	2.54	2.69

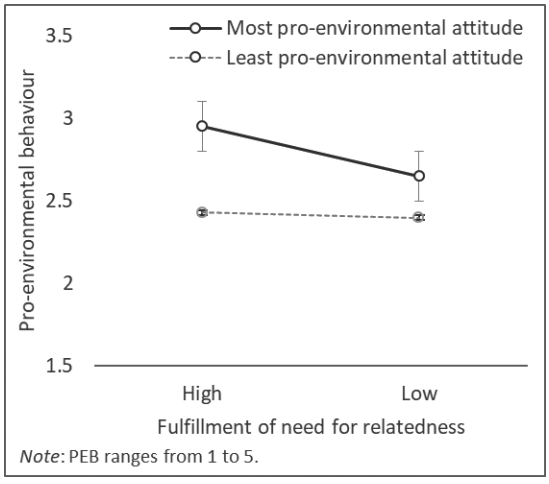

Figure 1. Pro-environmental behavior (PEB) by satisfaction of need for relatedness and environmental attitude (NEP).

(M = 2.40, SD = 0.67, *Median* = 2.34), $t(156) = 2.43$, $p = 0.016$, 95% CI: -0.458, -0.047. Consistent with our expectations, when need for relatedness was met, PEB was significantly greater for participants who had high NEP scores (M = 2.95, SD = 0.65, *Median* = 3.02) than low NEP scores (M = 2.43, SD = 0.59, *Median* = 2.39), $t(188) = 5.77$, $p < .001$, 95% CI: -0.70, -0.34. Interestingly, there was no influence of relatedness need fulfillment on PEB for participants with weaker environmental attitudes (i.e. low NEP), $p = 0.744$, but high NEP participants whose relatedness needs were met reported more PEBs than high NEP participants whose relatedness needs were not met, $t(167) = 3.01$, $p = .003$, CI: -0.50, -0.10. No significant interaction was found between NEP and PSN ($p = .600$) or PSN and relatedness ($p = .800$).

The second interaction was a three-way interaction between levels of NEP, relatedness, and PSN, $F(1, 340) = 1.54$, $p = .042$, $\eta^2_p = .01$. This interaction demonstrates that both one's own and perceived peers' environmental attitudes interacted significantly with relatedness need fulfillment. Figure 2 shows PEB levels of participants whose need for relatedness were relatively unmet. Within these participants, the

low NEP group scored greater on PEB when they perceived their friends as being concerned about the environment (M = 2.54, SD = 0.76, *Median* = 2.47) than when they did not perceive their friends as being particularly pro-environmental (M = 2.26, SD = .55, *Median* = 2.27), $t(86) = 1.95$, $p = .054$, CI: -0.55, 0.01. Differences in PEB were greater for the high NEP group, $t(68) = 3.41$, $p = .001$, CI: -0.77, -0.20. Participants indicating a strong belief that their friends hold pro-environmental attitudes (high PSN; M = 2.84, SD = 0.60, *Median* = 2.87) acted more pro-environmentally than those indicating that their friends did not have pro-environmental attitudes (low PSN; M = 2.35, SD = 0.54, *Median* = 2.46). Additional post-hoc tests by PSN further elucidated the interaction within the low relatedness fulfillment group. When participants' perceived their peers as having pro-environmental leanings, the high NEP group scored higher on PEB than the low NEP group, $t(83) = 2.00$, $p = .049$, CI: -0.59, -0.00. The difference between the two NEP groups was not statistically significant for low PSN, $p = .526$.

Figure 3 shows PEB by own and perceived peer environmental attitudes for participants who scored higher on relatedness. As hypothesized for this group, NEP levels predicted PEB in both high and low PSN. The high NEP group had greater PEB scores than the low NEP group for both high PSN, $t(134) = 3.86$, $p < .001$, CI: -0.60, -0.19 (high NEP: M = 3.01, SD = 0.62, *Median* = 3.03; low NEP: M = 2.62, SD = 0.57, *Median* = 2.54), and low PSN, $t(52) = 4.65$, $p < .001$, CI: -1.08, -0.43 (high NEP: M = 2.78, SD = 0.74, *Median* = 2.80; low NEP: M = 2.02, SD = 0.42, *Median* = 1.96). At the same time, further post-hoc tests within this group of participants with high fulfilment of relatedness need revealed unanticipated differences between reported actions of high and low NEP participants under different PSN. The high NEP group reported consistent levels PEB for high and low PSNs, $p = .120$; however, the low NEP group acted more environmentally consciously when they perceived their friends to be more environmental, that is when the PSN was high, and less so when they perceived their friends to be less pro-environmental i.e. low PSN, $t(89) = 5.04$, $p < .001$, CI: -0.83, -0.36.

This unexpected difference between the high and low NEP groups led us to more closely examine their PEB levels according to need fulfillment and PSN. For both groups, there was no significant difference by relatedness need fulfillment under high PSN (high NEP: $p = 0.139$,

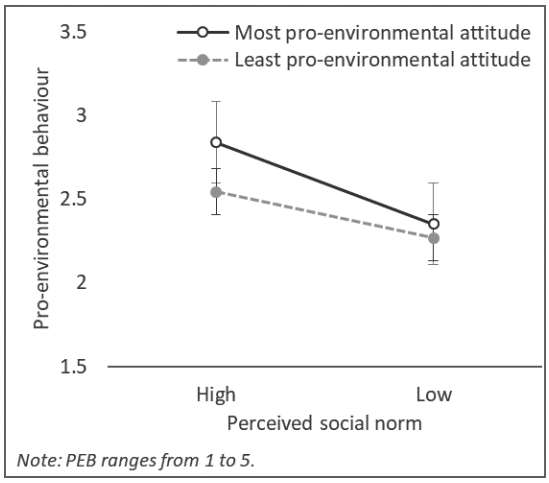

Figure 2 Pro-environmental behavior (PEB) by environmental attitude (NEP) and perceived peers' environmental attitudes (PSN) for respondents with low fulfillment of need for relatedness.

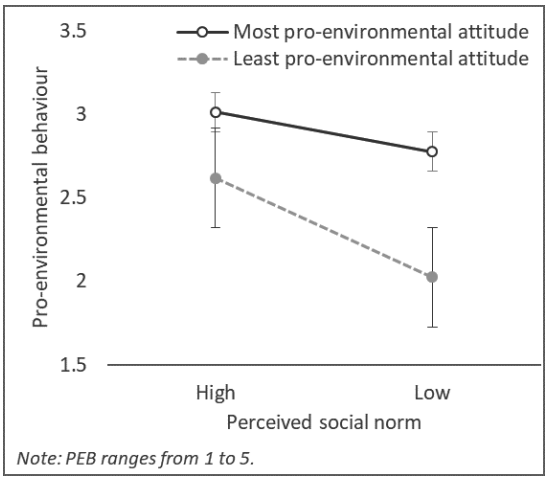

Figure 3 Pro-environmental behavior (PEB) by environmental attitude (NEP) and perceived peers' environmental attitudes (PSN) for respondents with high fulfillment of need for relatedness.

low NEP: p = 0.556), but some difference under low PSN (high NEP: $t(50)$ = 2.36, p = .022, CI: -0.08, -0.06, low NEP: $t(73)$ = 2.02, p = .047, CI: 0.003, 0.48). In other words, the hypothesis about those with the highest level of PEBs (i.e., high NEP, high relatedness need fulfillment, and high PSN) was met, but the reverse, that those with low NEP, high need fulfillment, and low PSN would report the least PEB, was not supported. As such, the data supported our main hypotheses but revealed unexpected patterns warranting further investigation in the future.

4. Discussion

4.1 Interpretation

Consistent with previous research on how self-determination and attitude-behavior consistency associate (Deci & Ryan, 2000), participants who held strong pro-environmental attitudes, and whose need for relatedness was met, were most likely to act in concordance with these attitudes. For participants with strong pro-environmental attitudes but who did not feel as fulfilled in their need for relatedness, perceived social norms better predicted behavior. Given only pro-environmentalists whose relatedness need was relatively fulfilled acted more environmentally responsibly than non-environmentalists, the findings of this study present a strong case for the relevance of people's interpersonal relationships to environmental action.

Interestingly, individuals who did not care strongly about the environment (as evidenced by a low NEP score) acted according to their perceptions of friends' opinions, regardless of their relationship need fulfillment. Specifically, non-environmental respondents with high fulfillment of need for relatedness with non-environment peers reported little pro-environmental behavior, while those with pro-environmental peers reported significantly more pro-environmental behavior. In fact, for low NEP respondents, behaviors associated most closely with the perceived norm when their need for relatedness was fulfilled. While surprising at first glance, this finding is consistent with previous reports of low concern groups following social norms (Bamberg, 2003; Shean & Shei, 1995). Further, "low" NEP here does not indicate an anti-environmental worldview. The low end of the NEP scale in this sample scored in the mid-range (M = 3.54, SD = 0.33, $Median$ = 3.63) of a scale from "1: disagree strongly" to "5: agree strongly," indicating an ambiguous rather than antagonistic attitude towards the environment. Even though these individuals, by implication of their high need fulfillment, would have been conscious of their own inner thoughts and feelings, their thoughts and feelings did not provide a behavioral guideline. Going along with the social norm therefore did not contradict their personal attitudes. While not predicted, this outcome is consistent with our understanding of SDT.

As expected, perceived social norm played a significant role in determining the actions of participants with lower relatedness. Both high and low NEP groups with low relatedness scored significantly higher in PEB when they perceived their peers as pro-environmental than when they perceived their peers as non-environmental. Again, under non-environmental social norms, pro-environmental behaviors of pro-environmental and non-environmental participants did not differ significantly from each other when their relatedness need fulfillment was low. This is consistent with the notion that less self-determined individuals are more prone to looking to external, rather than internal guidance, for behavior.

4.2 Alternative Explanations

While the results are consistent with the theoretical implications of SDT, they dispute the claims of a social norm theory. The social identity theory (D. E. Abrams & Hogg, 1990), more recently extended as the self-categorization theory (Terry & Hogg, 1996; Turner, Hogg, Oakes,

Reicher, & Wetherell, 1987), claims that people are influenced by behaviorally relevant groups that they identify with. In this study, all participants were asked to answer the survey with how they perceived the views of peers who were relevant and important in their social life. The fact that the pro-environmental, high relatedness group of participants did not conform to the perceived norms of friends they identified with indicates that group identification does not fully explain their behaviors.

4.3 Sample characteristics

Each of the measures used in the study had a slight negative skew. A 1995 survey using the NEP compared a general population sample (M = 3.68, SD = 1.14) with a sample of individuals active in environmental organizations (M = 4.09, SD = 1.03) (Grendstad, 1999). The sample of the present study (M = 3.92, SD = 0.50) lies between the two groupings. One reason for the high NEP scores may be that the topic of the questionnaire was described as "environmental psychology" to potential participants. Individuals with pro-environmental leanings may have been more likely to participate, resulting in a self-selection bias. Additionally, while the snowball sampling method made it possible for individuals that were multiple degrees of separation from the researcher to participate, there may again have been a pro-environmental tendency in some of the social groups that were accessed.

Causes of the negative skew in NEP may also explain the negative skew in social norms. Research on social norms attests to our imminent tendency to choose peers that are similar to oneself as well as to become similar to our friends through repeated interactions (de Klepper, Sleebos, van de Bunt, & Agneessens, 2010). Since friends are likely to hold similar attitudes and values, and the questionnaire instructed participants to indicate the perceived attitudes of peers they considered friends, it is logical that a negative skew in NEP would correspond with a negative skew in perceived social norms.

Despite the skews in environmental orientations, our sample was demographically diverse. We did not specify a target population for the study, and convenience and snowball sampling led to a sample comprised primarily of students but with a wide range of ages and geographical spread. Our data of 363 responses is suitable for a target population of about 7,000, and small for assessing such a diverse sample. This makes us relatively prone to Type II error and gives us confidence in reporting the statistically significant findings of our study.

4.4 Limitations and Future Research

Findings of this study are subject to the limitations of extrapolating from within-subject, self-report surveys. For example, self-reported pro-environmental behaviors do not correspond with behavioral intention as well as other-reported pro-environmental behaviors (Chao & Lam, 2009). This on itself is unlikely to have compromised the comparative analyses of this study. However, given its socially inflicted nature, participants with low fulfillment of their relatedness need may have been more prone to such desirability bias. Future studies should consider using observed, instead of self-reported, behaviors as a dependent variable.

Additionally, as mentioned above, this study could have benefited from the sample's skew towards higher environmental attitudes. Given this skew, it is possible that our low environmental attitude group held slightly positive environmental attitudes. Further tests of our hypotheses could examine the extent to which attitude congruence is both stronger and resistant to social pressure when the attitudes in question are firmly negative. A future study could examine the influences of relatedness fulfillment and perceived social norms with a sample of people with strong anti-environmental policy attitudes.

It would also be valuable to expand the

questionnaire items. Environmental activism, consumerism, and education were assessed as categories of environmental behavior. While these subscales held together as a reliable construct, other realms of household and personal behaviors such as energy or water conservation and recycling could be considered equally or more relevant. Similarly, the need for relatedness is one of various aspects of self-determination. Relying on empirical findings that the three psychological needs – autonomy, competence, and relatedness – were distinct constructs, this study focused solely on relatedness. Although this was an intentional choice given our hypotheses around the importance of this construct specifically, responses on the two other scales would certainly be informative to have. Furthermore we did not consider causality orientation, which has also been discussed as influencing the attitude-behavior consistency (Gagné, 2003; Ryan & Deci, 2002). While these items were not central to the questions we pursued in this study, future studies could look more closely into how the various aspects of self-determination interplay to see if the effects of fulfillment of need for relatedness would be replicated.

4.5 Implications

Recently, the need for relatedness has been gaining attention in the form of loneliness and the perceived absence of meaningful relationships with others (DiJulio, Hamel, Muñana, & Brodie, 2018). Part of this may reflect our technology. In 2015, compared to 2000, families spent more of their time while in each other's presence focused on separate screens (Mullan & Chatzitheochari, 2019). Surveys in countries such as the US, UK, Australia and Japan suggest that between one in five to nearly half of the residents report feeling lonely (DiJulio et al., 2018; Lim, 2018; Polack, 2018). Coined the Loneliness Epidemic, the issue has led to the formation of support systems including the appointment of a Minister for Loneliness in the UK (Health Resources & Services Administration, 2019; Murphy, 2017; "Press release: PM launches Government's first loneliness strategy," 2018).

In this context, the findings from this study should be taken seriously as a partial explanation for the lack of tangible action by many individuals who are genuinely concerned about the natural environment. On the flipside, environmental interest groups can employ the findings of this study directly and indirectly. For example, event and movement organization would likely benefit from community outreach. Events that bring people together and networks that emphasize shared beliefs among its members may not only help promote their explicit aims, but also provide a place for relationships that fulfill people's psychological needs. Indeed, the surge of youth movements for the climate (Laville, Taylor, & Hurst, 2019) could be viewed through the lens of relatedness need fulfillment. Were the demonstrators quietly concerned about the environment until a few vocal individuals and groups altered the dominant social norm? A recent study in Denmark found, in fact, that adolescents had lower levels of internalized motivation to act pro-environmentally than their parents - whose behavior they emulated (Grønhøj & Thøgersen, 2017). Might some of the demonstrators have joined the environmental cause with an interest to "belong" to the social group? How have the inner beliefs and relatedness need fulfillment of these individuals altered or endured over the course of the demonstrations? Evidence that need fulfillment enhances the transmission of intrinsic values such as community contribution from mother to adolescent (Lekes et al., 2011) suggests that environmental movements that forge meaningful social connections could further the adoption of pro-environmental attitudes. The dynamic interrelationships between social relationships, environmental attitudes, and action harbors insights and guidance for policies and civic action that

could tackle today's environmental and social problems, together.

Globalization, modernization, and the increased tempo of life may have brought a tendency for us to neglect or take for granted the micro-society of family and friends. As we, as members of the global community, tackle the environmental issues that threaten our planet, we must not forget to heed the wellbeing of our hearts and communities; these are the necessary foundation for enduring, self-determined action.

5. Conclusions

The objective of this study was to determine whether fulfillment of the need for relatedness moderated the relationship between attitudes and behaviors toward the environment. SDT (Ryan & Deci, 2002) presents a potential framework for understanding the weak consistency between environmental attitude and behavior (Hines, Hungerford, & Tomera, 1987): fulfillment of the need to feel connected to others in meaningful ways is one component of self-determination that enables individuals to act consistently with their inner beliefs (Ryan & Deci, 2002). Findings support the hypothesis that satisfaction of the need for relatedness predicts a higher consistency between environmental attitude and behavior across social norms.

6. References

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