

Doing the Difficult Stuff: Influence of Self-Determined Motivation Toward the Environment on Transportation Proenvironmental Behavior

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Abstract

Past research has shown that as proenvironmental behaviors (PEBs) become more difficult, the level of self-determined motivation becomes a more powerful predictor of behavior participation. The purpose of this study was to (1) examine the perceived difficulty of transportation PEB in two contexts using self-determination theory and (2) examine the mediation effect of autonomous and controlled motivation toward the environment. Results indicate that when the transportation behavior was perceived as difficult to perform, autonomous motivation was associated with more frequent participation. When the transportation behavior was perceived to be easy, motivation type had no influence on behavior frequency. Mediation analysis indicated a significant total indirect effect of perceived environmental competence on frequency of easy PEB via both types of motivation, but for difficult behaviors only autonomous motivation was a significant mediator. This study suggests that increasing individuals' autonomous motivation toward the environment and sense of environmental competence supports participation in difficult PEBs, potentially leading to a larger environmental benefit. Key Words: Self-determination theory—Autonomous and controlled motivation—Proenvironmental behaviors—Public transportation—Perceived difficulty.

Greenhouse gas emissions and air quality are identified as ongoing concerns for Canadians (Government of Canada, 2007). However, these concerns are not being translated into appropriate levels of proenvironmental behavior (PEB) to help protect the environment. With 20% of the national carbon emissions coming from individuals, individual behavior change can directly impact improved environmental conditions (Government of Canada, 2007). One area that has the largest impact on emissions is the selection and use of household technologies and transportation (Gardner & Stern, 2008). It is therefore important to increase the rate of individuals' PEBs overall but particularly target transportation behaviors as a means to reduce the nation's impact on the environment.

Increasing proenvironmental behaviors

Many prior studies on increasing PEB focused on environmental concern, the use of external rewards as incentives, and removing barriers to elicit and maintain desired behavior. For literature reviews in the area, see articles by Dwyer and associates (1993), Gifford (2007, 2011), Steg and Vlek (2009), Stern (2000), and also a number of meta-analyses (e.g., Bamberg & Möser, 2007; Hines et al., 1987; Osbaldiston & Schott, 2012).

Having concern for the environment is a logical first step in motivating participation in PEB, but self-reported concern for the environment often does not translate to objective increases in PEB (Kormos & Gifford, 2014). Some externally motivated incentive strategies can lead to increased PEB (Bamberg & Möser, 2007), but

long-term maintenance of these behaviors remains problematic. People initially react positively to an incentive strategy, but behavior tends to decline over time, even returning to baseline if the source of external motivation is withdrawn (Lehman & Geller, 2004). Also, incentives do not promote the internalization of behaviors but instead favor a source of regulation for the PEB that is external to the person, one that is dependent on the presence of the incentives for the maintenance of the behavior (Deci et al., 1999).

Strategies to make a PEB easier (i.e., curbside composting) also have limitations (Oskamp, 1995). Removing barriers to a behavior creates a targeted response for a specific behavior in a specific context, that is, a context where the behavior is easy to perform. When individuals are confronted with the same behavior but in a context where the behavior is not easy to perform, the frequency of the behavior declines. Finally, it is not economical or always possible to make all PEB easy to perform. It is important to discover ways of promoting PEB that are difficult. Based on these limitations in previous research, the current study proposes the use of a different theory of motivation to explore the use of internal as well as external motivation on PEB.

Self-determination theory

Self-determination theory (SDT; Deci & Ryan, 2000) is a theory of motivation that is concerned with supporting individuals' inherent tendencies to behave in effective and healthy ways. This striving to become more self-determined is contingent on the satisfaction of three basic psychological needs: autonomy (feeling free to act), competence (feeling capable), and relatedness (feeling connected). Supporting the satisfaction of these basic needs leads to increased self-determination by promoting an individual's natural growth (Deci & Ryan, 2000).

Self-determination theory defines six different ways in which motivated behavior is regulated by a person; from least to most self-determined these types are amotivation, external, introjection, identification, integration, and intrinsic regulation. According to SDT, motivation for behavior varies along a continuum characterized by the level of self-determination present and can be divided into three broad categories: amotivated (i.e., the absence of motivation), controlled motivation, and autonomous motivation (Deci & Ryan, 1985, 2000; Ratelle et al., 2007; Ryan & Deci, 2000; Vansteenkiste et al., 2009). Research using SDT has shown that people's behavioral experience and maintenance are related to the extent the behavior is intrinsically motivated and autonomous, as opposed to extrinsically motivated and controlled. Overall, higher autonomous motivation leads to increased occurrences of desirable behavior (Deci & Ryan, 1985; Osbaldiston & Sheldon, 2003; Pelletier et al., 1998).

Self-determination theory was chosen as a framework to examine the relations between motivation and PEB for two main reasons: It has been shown to be significantly and reliably associated with PEB, and it provides specific predictions about how motivation will influence behaviors (Deci & Ryan, 2008; Pelletier et al., 1998; Villacorta et al., 2003). Compared to controlled motivation, autonomous motivation has been reliably associated with increased behavior persistence, well-being, psychological health, and more frequent PEB (Deci & Ryan, 2008). For example, Villacorta, Koestner, and Lekes (2003) found that autonomously motivated individuals report stable proenvironmental attitudes over time, a greater number of environmental behaviors, and higher levels of well-being.

Self-determination has been found to play a role in the relationship between PEB and behavior difficulty in a previous study (Green-Demers et al., 1997). Participants completed the Motivation Toward the Environment Scale, self-report measures of three types of PEBs, and the perceived difficulty of those PEBs. The behaviors measured were recycling (easy), purchasing environmentally friendly products (medium), and proenvironmental education (difficult). As expected, easier PEBs were performed more often than difficult PEBs. However, a significant interaction showed that people with higher autonomous types of motivation performed more difficult PEBs compared to when autonomous motivation was low. Structural equation modeling analysis revealed the magnitude of the relation between higher autonomous types of motivation, and PEB frequency increased with the reported difficulty of the PEB, indicating that autonomous types of motivation were better predictors of difficult PEBs.

Although the results from this previous study are promising, there are still a number of limitations. One major limitation is that the context in which the behaviors were performed was not taken into account. Oskamp (1995), who studied differences in frequency of PEB across different contexts (i.e., recycling at home vs. outside of the home), found that context had a large impact on whether or not people performed a behavior. Green-Demers et al. (1997) looked at varying difficulty of different behaviors (recycling vs. purchasing vs. education), not the same behavior that is perceived as easy or difficult to perform depending on the context. Despite the success SDT has had in predicting differences between types of motivation and frequency of easy and difficult behaviors, it is still unknown if this relation still exists across different contexts. The first part of the current research aims to explore this possibility.

Antecedents of motivation. Based on SDT, people's participation in PEBs should increase as their autonomous motivation toward the environment increases (Green-Demers et al., 1997; Pelletier, 2002).

The question arises, how do you then increase people's motivation so they will participate in more PEB? The second part of our current study aims to explore a proposed antecedent of motivation.

There are a number of different antecedents proposed to increase motivation (e.g., challenges, rewards, feedback). According to SDT, autonomous motivation is related to the satisfaction of three psychological needs (autonomy, relatedness, and competence) (Deci & Ryan, 2000). The current study focused on the concept of competence because it is very applicable to the environmental domain since many PEBs may be outside the usual behaviors of people (e.g., I do not know how to take the bus, I always drive to the mall). When people feel competent in their skills, they will feel much more capable in performing the target behavior (Deci & Ryan, 2000). A feeling of competency facilitates internalization of behaviors (Vallerand & Ratelle, 2002) and is associated with higher rates of behavior maintenance (Arkes, 1978; Ng et al., 2012). People need to feel they have the ability to change their behavior and their environment so they can make a positive difference for the planet.

Hypotheses

The goal of the current research was to replicate (Kline, 2013) and further the results obtained by Green-Demers et al. (1997) by examining the perceived difficulty of PEB, but this time compare the same behavior across different contexts with different perceived difficulties—that is, in one context where a behavior is perceived as being easier to perform and in a second context where the same behavior is perceived as being more difficult to perform by the same people.

The study addresses two specific objectives: (1) The type of motivation toward the environment will account for differences in PEB frequency, and the pattern will be different for perceived easy- and difficult-to-perform PEB. Specifically, more frequent participation in perceived difficult PEBs is more likely for participants with higher autonomous environmental motivation. (2) Motivation toward the environment is a mediator between a sense of personal environmental competency and PEB frequency. To address these two objectives, two different analyses will be conducted that will complement each other.

Method

Participants and procedure

A sample of 282 full-time undergraduate students (228 female and 54 male) living in campus residence participated in the two parts of the study. The mean age was 18 years (range 17–23 years). Students were invited to participate in the online study in exchange for course

credit in an introductory psychology course at a Canadian University. All data were collected through an online survey system (i.e., LimeSurvey) that could be accessed by participants from any computer with Internet access and completed at the convenience of the participants. The questionnaire assessed participants' motivation toward the environment, self-reported frequency and difficulty of various environmental behaviors (e.g., recycling), and perceived level of environmental competence, along with basic demographic information. Scale items were presented in random order, and all questionnaires were completed in English. The average time participants took to complete all the measures was 26.49 minutes.

Measures

Motivation Toward the Environment Scale (Pelletier et al., 1998; Villacorta et al., 2003). This scale includes 24 items that answer the question "Why are you doing things for the environment?" and reflects the types of motivation specified by SDT. Example items include "for the pleasure I get from contributing to the environment" and "for the recognition I get from others." Participants were asked to indicate the extent to which each item corresponded to their reasons for engaging in PEB on a 7-point scale ranging from 1 (*Does not correspond at all*) to 7 (*Corresponds exactly*). Higher scores indicate a higher level of self-determined motivation. The reliability and validity of this scale have been demonstrated by exploratory and confirmatory factor analyses (Pelletier et al., 1998) and further validated by Villacorta et al. (2003). Two subscales were created to reflect participants' level of controlled motivation toward the environment ($\alpha = .82$; introjected and external regulation) and their autonomous motivation toward the environment ($\alpha = .91$; intrinsic, integrated, and identification regulation) as per previous SDT research (Ratelle, et al., 2007).

Environmental competence (Pelletier et al., 1998). The seven items ($\alpha = .79$) in this scale measure how competent a person perceives himself or herself to be cognitively and affectively in relation to the environment. Example items include "I think I can effectively do things to help the environment" and "I feel I am able to make a difference in the environmental situation." Participants were asked to indicate the extent to which each item corresponded to their self-perception on a 7-point scale ranging from 1 (*Does not correspond at all*) to 7 (*Corresponds exactly*).

Public transportation. Each participant was asked to report the frequency and difficulty of using public transportation for two different

contexts; at her or his on-campus residence and at her or his permanent home. The frequency was rated on a 7-point scale ranging from 1 (*Not very often*) to 7 (*Very often*), and difficulty was rated on a 7-point scale from 1 (*Not very difficult*) to 7 (*Very difficult*). Higher ratings are associated with a higher frequency and more perceived difficulty of using public transportation.

When the student sample took public transportation while living in school residence, they reported the behavior easy to perform in this context. The bus line runs directly next to the location of the campus residences, allowing for increased accessibility and ease of public transportation use in this context. When the student sample took public transportation while living at home, they reported the behavior difficult to perform in this context, possibly due to lack of accessibility or frequency of public transportation options. By changing the context around where the participants took the bus (residence vs. home), the perception of difficulty of performing the behavior changed, $t(280) = 11.06, p = .000$.

Due to the non-normal distribution of the public transportation frequency, an optimized dichotomous variable was created in each context (residence vs. home) based on the average frequency rating. Participants reporting lower than 3 on the 7-point frequency scale were coded as low frequency of public transportation (see Table 1 for counts and means). Those who reported a frequency rating of 5 and above were coded as having high frequency of public transportation.

Frequency and difficulty of proenvironmental behaviors (Pelletier et al., 1998). This scale measures the frequency and difficulty of various PEBs. The scale covers five broad categories including recycling, conservation, biopurchasing, education, and activism. The frequency items were rated on a 7-point scale ranging from 1 (*Not very often*) to 7 (*Very often*), and the difficulty items for the same behaviors were rated on a 7-point scale from 1 (*Not very difficult*) to 7 (*Very difficult*). Higher ratings are associated with a higher frequency and more perceived difficulty of performing the PEB.

To permit the independent evaluation of easy and difficult behaviors in the mediation analysis, two subscales were created based on the self-reported perceived difficulty scores of the PEB items. Behavior items that had an average difficulty rating of below 2 were identified as an easy PEB (alpha for the six items = .75). Behavior items that had an average difficulty rating above the midpoint of the scale (3.5) were identified as a difficult PEB (alpha for the three items = .80). The subscales were significantly different in difficulty rating, $t(274) = -21.82, p = .000$. See the Appendix for a description of the PEB items classified as easy and difficult.

Results

Part 1: The influence of motivation type across context

The current study looked at how differences in the situational context of when people use public transportation change perceived difficulty of this PEB and how motivation toward the environment is related to the frequency of using public transportation. By studying these differences in perceived difficulty due to the context of the PEB it allows us to explore differences in motivation on the same behavior reported by the same people, when they perceived the behavior to be easy and when they thought it was difficult to perform.

Two logistical regression analyses were performed to test if type of motivation toward the environment accounted for differences in PEB frequency across context: first with an outcome of high and low frequency of public transportation use while living in university residence, then while living at home. Levels of autonomous and controlled motivation toward the environment were used as predictors in both models. Three cases were removed as outliers, resulting in a usable sample size of 282. All analyses were performed using pairwise deletion. Assumptions were met for logistic regression. Descriptive statistics can be seen in Table 2.

Transportation behavior in the residence context. When participants were taking public transportation from their university residence

Table 1. Counts and Means of Low and High Transportation Proenvironmental Behavior (PEB) Frequency

	LOW FREQUENCY	HIGH FREQUENCY	TOTAL	MISSING	MEAN	SD
Easy PEB Residence transportation use	21	244	265	17	.92	.27
Difficult PEB Home transportation use	101	117	218	64	.54	.50

Note. Low coded 0. High coded 1.

Table 2. Correlation and Descriptive Statistics

VARIABLES	1	2	3	4	5	6	7
1. Autonomous motivation	–	.39**	.04	.25**	.29**	.33**	.47**
2. Controlled motivation		–	–.11	.17*	–.04	.23**	.14*
3. Easy transportation use			–	.12	.27**	.04	.07
4. Difficult transportation use				–	.10	.28**	.20**
5. Easy PEB					–	.21**	.21**
6. Difficult PEB						–	.28**
7. Environmental competency							–
Alpha	.91	.82	–	–	.75	.84	.79
Range	1–7	1–7	0–1	0–1	14–42	7–49	1–7
Mean	4.91	3.45	0.92	0.54	34.91	21.33	4.42
SD	.98	1.01	0.27	0.50	6.32	8.15	.99

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

environment, the behavior was perceived as an easy behavior. In this context the overall logistic regression model with the two motivation predictors was not significantly better at predicting low and high bus frequency than the null model $\chi^2(2, N=263)=4.97, p=.083$. This indicates that autonomous and controlled motivation toward the environment, as a set, are not distinguishing between low and high frequency of taking the bus when participants thought this was an easy behavior in the university residence context.

Transportation behavior in the home context. When participants were taking public transportation from their home environment, the behavior was perceived as a difficult behavior. In this context the overall logistic regression model with the two motivation predictors was significantly better at predicting low and high bus frequency than the null model, and the likelihood ratio test demonstrated good fit $\chi^2(2, N=216)=15.32, p<.001$. The Cox and Snell pseudo R^2 indicates a small percent of variance being accounted for by the motivation variables (pseudo $R^2=.07$), and 63% of the data was correctly classified.

Table 3 shows the regression coefficients, Wald statistics, odds ratios, and 95% confidence limits for the transportation outcomes in both contexts (residence/easy and home/difficult). According to the Wald criteria, it was autonomous motivation toward the environment that reliably predicted difficult transportation behavior frequency

(Wald = 8.45, $p = .004$). The odds ratio of 1.61 (95%, CI [1.17, 2.22]) indicates that the odds of higher public transportation use increase by 61% for each unit increase in autonomous motivation toward the environment, controlling for controlled motivation. Results suggest the higher the autonomous motivation toward the environment of participants, the more likely they are to take public transportation even when the context results in people identifying it as a difficult behavior to perform.

Part 2: Indirect effects between competence and proenvironmental behaviors

Building on the significant effect of autonomous motivation toward the environment on frequency of a perceived difficult-to-perform PEB, next we wanted to look at what could influence people's level of autonomous motivation toward the environment. The second objective of this study was to determine if type of motivation toward the environment would mediate the relation from perceived environmental competency to influence PEB frequency as predicted by SDT. See Figs. 1 and 2 for visual representations of the models tested and the unstandardized regression coefficients. Generally, it was hypothesized that as perceived environmental competence increased, so too would motivation toward the environment, which would be related to increasing frequency of behaviors.

Table 3. Summary of Logistic Regression Analysis for Motivation Predicting High Frequency of Public Transportation Use

VARIABLES	B	SEB	WALD	OR	95% CONFIDENCE INTERVAL FOR OR	
					LOWER	UPPER
Residence (Easy)						
$\chi^2 (2, N=263) = 4.97$						
Autonomous motivation	.38	.26	2.14	1.46	.88	2.41
Controlled motivation	-.52	.24	4.45*	.60	.37	.96
Constant	2.53	1.23	4.20*	12.53		
Home (Difficult)						
$\chi^2 (2, N=216) = 15.32***$						
Autonomous motivation	.48	.16	8.45**	1.61	1.17	2.22
Controlled motivation	.18	.15	1.35	1.20	.88	1.62
Constant	-2.82	.82	11.94**	.06		

Note. OR=odds ratio. Low frequency coded 0. High frequency coded 1.

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

Two models of indirect effects were tested using Hayes (2013) bootstrapped multiple parallel mediation analysis macro for SPSS. Estimates of all paths were calculated using OLS regression path analysis, and bootstrapped confidence intervals are based on 10,000 random resamples (Hayes, 2013; Preacher & Hayes, 2008). Assumptions were met

for mediation analysis. Descriptive statistics can be seen in Table 2. The first parallel mediation model tested the indirect effect of perceived environmental competency through both autonomous and controlled motivation toward the environment on a composite of easy PEB. The second parallel mediation model tested the indirect effect of perceived

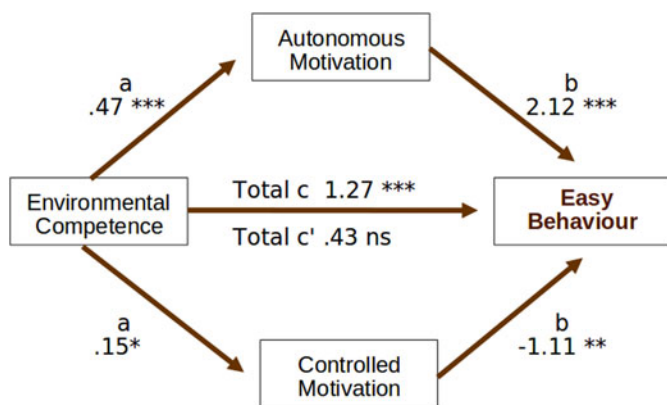


Fig. 1. Visual representation of the indirect effects with easy behaviors model tested and the unstandardized regression coefficients. Both motivation types were significant mediators. * $p < .05$. ** $p < .01$. *** $p < .001$.

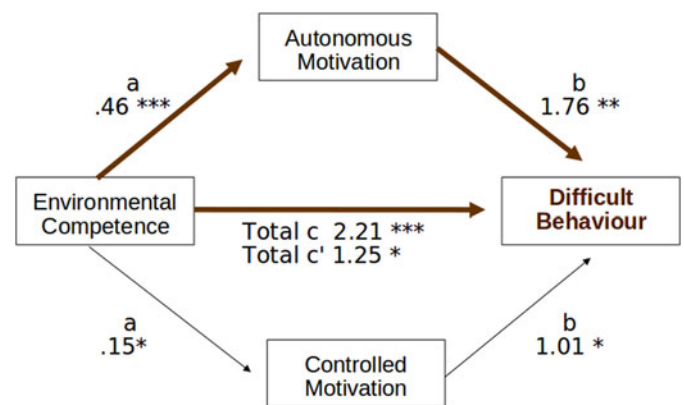


Fig. 2. Visual representation of the indirect effects with difficult behaviors model tested and the unstandardized regression coefficients. Only autonomous motivation was a significant mediator. * $p < .05$. ** $p < .01$. *** $p < .001$.

environmental competency through both autonomous and controlled motivation toward the environment on a composite of difficult PEB.

Indirect effects with easy behaviors. Taken as a set, autonomous and controlled motivations toward the environment have an indirect effect between environmental competence and easy PEB. The overall model containing one predictor (perceived environmental competence) and two mediators (autonomous and controlled motivations toward the environment) was significant, $F(3, 274) = 12.00, p = .000$, and the adjusted R^2 explained approximately 12% of the variance in the composite score of frequency of easy PEB.

Results from the parallel mediation analysis showed that both autonomous and controlled motivations toward the environment were significant mediators. As can be seen from Fig. 1 and Table 4, participants with higher perceived environmental competence were associated with higher autonomous motivation toward the environment ($a = .47$) and to a lesser extent with higher controlled motivation toward the environment ($a = .15$). Participants with higher autonomous motivation toward the environment were associated with higher frequency of easy PEB ($b = 2.12$), and participants with higher controlled motivation toward the environment were associated with lower frequency of easy PEB ($b = -1.11$). There was no evidence that perceived environmental competence directly influenced frequency of easy PEB ($c' = .43$).

A biased-corrected bootstrap confidence interval for the indirect effect of autonomous motivation toward the environment ($ab = .90$) based on 10,000 bootstrap samples was entirely above zero (.47 to 1.42). A biased-corrected bootstrap confidence interval for the indirect effect of controlled motivation toward the environment ($ab = -.14$) was entirely below zero (-.38 to -.01).

Indirect effect with difficult behaviors. Taken as a set, autonomous and controlled motivations toward the environment have an indirect effect between environmental competence and difficult PEB. The overall model containing one predictor (perceived environmental competence) and two mediators (autonomous and controlled motivations toward the environment) was significant, $F(3, 271) = 14.92, p = .000$, and the adjusted R^2 explained approximately 14% of the variance in the composite score of frequency of difficult PEB.

Results from the parallel mediation analysis showed a significant indirect effect through autonomous but not controlled motivation toward the environment. As can be seen from Fig. 2 and Table 4, participants with higher perceived environmental competence were associated with higher autonomous motivation toward the environment ($a = .46$) and higher controlled motivation toward the environment ($a = .15$). Participants with higher autonomous motivation toward the environment were associated with higher frequency of difficult PEB ($b = 1.76$), and participants with higher controlled

Table 4. Summary of Multiple Mediation Analysis for the Indirect Effects on Frequency of PEB

VARIABLES	POINT EST. OF AB PATH	BOOTSTRAPPED 95% CONFIDENCE INTERVAL	
		LOWER	UPPER
Easy PEB ($N = 266$)			
Total indirect effect	.76	.35	1.24
Autonomous motivation indirect effect	.90	.47	1.42
Controlled motivation indirect effect	-.14	-.38	-.01
Autonomous vs. controlled indirect effect	1.04	.53	1.67
Difficult PEB ($N = 263$)			
Total indirect effect	.94	.26	1.66
Autonomous motivation indirect effect	.79	.16	1.50
Controlled motivation indirect effect	.14	-.003	.44
Autonomous vs. controlled indirect effect	.65	-.03	1.39

Note. Bootstrapped 10,000.

motivation toward the environment were associated with higher frequency of difficult PEB ($b = -1.01$). There was evidence that perceived environmental competence directly influenced frequency of difficult PEB ($c' = 1.25$).

A biased-corrected bootstrap confidence interval for the indirect effect of autonomous motivation toward the environment ($ab = .79$) based on 10,000 bootstrap samples was entirely above zero (.16 to 1.50), indicating it was a significant mediator. A biased-corrected bootstrap confidence interval for the indirect effect of controlled motivation toward the environment ($ab = .14$) contained zero (-.003 to .44), indicating it was not a significant mediator.

Across both parallel mediation models the magnitude of the mediation was consistently larger for autonomous motivation toward the environment (point estimate easy PEB = 1.00, point estimate difficult PEB = .81) compared to the mediation through controlled motivation (point estimate easy PEB = -.16, point estimate difficult PEB = .15). This indicates that autonomous motivation toward the environment was having a larger impact on frequency of PEBs.

Discussion

This research aimed to expand upon the findings from Green-Demers et al. (1997) by testing the influence of autonomous motivation for PEBs, firstly by using the same behavior (i.e., people's use of public transportation) that was perceived to be more or less difficult depending on the context in which the behavior was performed. Secondly, we also tested a mediation model to explore a person's sense of perceived competence as an antecedent of motivation for easy and difficult PEB.

A few points become clear as a result of this research. First, autonomous motivation toward the environment is more important when a behavior is perceived as difficult to perform. In agreement with Green-Demers et al. (1997), our results from both the logistic regressions and mediation analysis indicate that when PEBs were perceived to be more difficult, autonomous motivation toward the environment was a better predictor of PEB frequency. When the PEB of public transportation use was perceived as difficult, autonomous motivation was associated with more frequency; but when public transportation was perceived to be easy, both types of motivation had no influence on the behavior frequency. It seems as if people do not need to be motivated as much to do this PEB when it is thought to be easy but require a certain level of autonomous motivation toward the environment to create the energy necessary to engage in it when it is difficult.

A possible reason for the lack of significant controlled motivation might be that using public transportation was identified as a difficult behavior for personal reasons (e.g., I like to drive, places I want to go

are far). Previous research has found that autonomous regulation is displayed when the behavior is under personal control and more controlled regulation is displayed when the behavior is out of a person's direct control (Kay et al., 2008). Future research and interventions should take into account the level of personal control over participation in the PEBs that are being targeted.

Mediation analysis indicated a significant total indirect effect of perceived environmental competence on frequency of easy and difficult behaviors via both types of motivation toward the environment (controlled and autonomous). Overall, the association between feeling more competent and doing more environmentally responsible behaviors is partially explained by the type of motivation. The mediation of controlled motivation on easy PEBs was unique in that it had a negative indirect effect. This indicates that higher environmental competence was associated with a lower frequency of easy PEBs when participants had controlled-type motivation for the environment. Controlled motivation toward the environment was not a significant mediator for the frequency of difficult PEBs. Only autonomous motivation toward the environment was a significant mediator for both the easy and difficult PEBs.

When people feel competent in their skills, they feel much more capable in performing behaviors (Arkes, 1978), and feelings of competence facilitate the internalization of behaviors (Vallerand & Ratelle, 2002). However, the type of motivation people have influences the frequency of the behavior. Most of the time autonomous motivation toward the environment seems to help increase PEBs, whereas controlled motivation seems to actually be reducing people's participation in easy PEBs.

When the indirect effects between autonomous and controlled motivation were compared, they confirmed that the impact of autonomous motivation toward the environment as a mediator on frequency of PEB was significantly bigger, compared to when controlled motivation was the mediator. The larger magnitude of the effect of autonomous motivation toward the environment, especially for the difficult behaviors, is also consistent with Green-Demers et al. (1997). Motivating people to do more difficult behaviors is important because often times it is these behaviors that have a larger benefit to the environment.

This study suggests that increasing individuals' autonomous motivation toward the environment and sense of environmental competence supports more participation in difficult PEBs, potentially leading to a larger positive environmental impact. Based on this research, PEB interventions should target ways to increase people's experience of competence for helping the environment as a means of promoting autonomous motivation toward the environment for

example, by having hands-on workshops, providing information with specific tips for using public transportation or multimedia videos to model behavior. People can learn to seek out supportive (and avoid controlling) environments, find the information needed to enhance their own environmental competence, and take self-determined action for the environment.

Future research directions should explore how best to increase individuals' autonomous motivation toward the environment to be able to increase the frequency of difficult PEBs. According to SDT, autonomous motivation levels are related to the satisfaction of three psychological needs (autonomy, relatedness, and competence; Deci & Ryan, 2008). By increasing the satisfaction of these needs for people, theoretically, the quality of people's motivation would be increased, resulting in more frequent performance of difficult environmental actions. This study focused on the need for competence, but the satisfaction of autonomy or relatedness might be contributing more to the improvement of autonomous motivation toward the environment. Laboratory studies are also needed to better control the difficulty level of PEBs and to examine more systematically whether differences between easy and difficult PEBs are actually leading to differences in the performance of the behaviors. Finally, longitudinal studies are necessary to identify what influences maintenance of difficult PEBs because protecting the planet is a long-term goal.

There are a few limitations to this study. First, there was only a small amount of variance in PEB frequency being accounted for by motivation. Likely there are other, perhaps more influential, contextual and dispositional factors affecting environmental motivation (e.g., de Groot & Steg, 2010). Second, due to the cross-sectional nature of the research, the direction of the effects cannot be assured. It is possible that participation in PEBs leads people to experience higher motivation levels. However, this is unlikely, considering the amount of previous research in the environmental domain and across other domains (e.g., work motivation, dieting) that supports SDT. Confirming causal links is another reason to advocate for more longitudinal research in this area. Due to the subject matter of the study, it is likely that some participants were influenced by a social desirability effect (Sintov & Prescott, 2011). Finally, the data obtained for this study are all based on student self-report, and single items were used to assess the frequency of the PEBs, including the public transportation use variable. Future studies should target more objective measures of a variety of PEBs, use several items to assess different aspects of PEBs that could provide a more solid measure of frequency and difficulty of behaviors, and expand the research to nonstudent populations.

In conclusion, research utilizing SDT has the potential to explain and promote more effective PEBs. Specifically, this study suggests

that increasing individuals' autonomous motivation toward the environment supports participation in difficult PEBs, potentially leading to a larger environmental impact and a happier, healthier planet.

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Table A1. Description of PEB Items in Easy and Difficult Composite Variables

PEB ITEM	COMPOSITE VARIABLE
Recycle glass	Easy PEB
Turn off lights when not at home	Easy PEB
Reuse grocery bags	Easy PEB
Recycle cans	Easy PEB
Recycle newspaper	Easy PEB
Reuse plastic containers	Easy PEB
Avoid packaging	Difficult PEB
Buy products that will not harm the environment	Difficult PEB
Select products with recycled packaging	Difficult PEB