Mitigating Climate Change Across Different Roles: The Role of Attitude, Subjective Norm, and Perceived Behavioral Control in Forming Pro-Environmental Behavior

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Abstract

Individual climate action is crucial for mitigating climate change. In various contexts, including personal and professional roles, individuals can engage in pro-environmental behaviors (PEB). The performance of PEB depends on multiple factors, emphasizing the need to understand the underlying mechanisms of behavior formation. Utilizing the Theory of Planned Behavior, a within-subject design involving 125 participants was employed to compare individuals' PEB across personal and professional contexts. Findings suggest that individuals perform more PEB in their personal lives than in their professional lives. Attitude and subjective norm predict behavior across both roles, while perceived behavioral control was found to be insignificant. Furthermore, the study highlights that these factors more strongly predict PEB in the personal role than in the professional role. This suggests that the variables influencing the formation of PEB vary across contexts, emphasizing distinct drivers in workplace environments compared to the personal role. Intervention programs aiming to counteract the lack of climate action should therefore be tailored to the specific context in which behavior is executed.

Keywords: Climate Change, Theory of Planned Behavior, Pro-environmental behavior

Mitigating Climate Change Across Different Roles: The Role of Attitude, Subjective Norm, and Perceived Behavioral Control in Forming Pro-Environmental Behavior

Climate change has emerged as one of the most urgent issues for humanity, emphasizing the increasing need to mitigate its effects (IPCC, 2023). The consequences of global warming largely impact individuals' lives all across the globe through rising sea levels, an increase in global temperatures and the destruction of ecosystems. Political debates often revolve around possible methods to mitigate these effects, involving multiple actors responsible for its far reaching consequences such as large-scale industries, governments and businesses (IPCC, 2023; Jordan et al., 2010).

However, individuals also significantly contribute to global warming (IPCC, 2023). Household consumption alone is responsible for approximately two-thirds of total greenhouse gas emissions (Ivanova et al., 2020). Despite growing concern about the consequences of climate change, individuals do not take sufficient action which impedes the desired mitigation effects (IPCC, 2023; Searle & Gow, 2010). Individuals can engage in mitigating the effects of climate change by engaging in *pro-environmental behavior* (PEB) which is defined as actions taken to protect the environment (Stern, 2000). These actions can range from conserving energy, recycling or changing one's mode of transportation (Krajhanzl, 2010; Van Valkengoed & Steg, 2019). Behavior choices can directly affect greenhouse gas emissions, through one's diet, or indirectly through voting or civic engagement (Hampton & Whitmarsh, 2023). Given the significant impact of individual behavior on the environment, it is critical to disentangle the complex formation of PEB across different contexts to understand the factors that motivate or inhibit PEB (IPCC, 2023).

Pro-environmental Behavior Across Different Roles

Past research has demonstrated that individuals take climate action across a variety of different contexts (Hampton & Whitmarsh, 2023). Behavior choices are made not only in the home environment but also at work and politically in the form of voting and activism. In various contexts, often referred to as roles, behavior is influenced by a wide range of factors that might impede or promote behavior. These factors can for instance be psychological, cultural or spatial, therefore affecting behavior in numerous ways. Across different roles, individuals belong to numerous social groups, such as their family or colleagues, each of which may exhibit distinct cultures and social norms (Whitmarsh et al., 2017). Being part of a group that endorses pro environmental norms can positively influence the individuals pro-environmental choices whereas groups that endorse unfavorable views related to environmentalism might hinder a person from acting pro-environmentally. Furthermore, people's attitudes towards pro-environmental behavior are subject to situational and social influence and can therefore change depending on the person's environment (Albarracín et al., 2018). Geographical location also influences behavior choices, impacting access to sustainable infrastructure (Gill & Moeller, 2018). Additionally, practical barriers, such as varying access to sustainable food choices can impact sustainable food consumption (Larson & Story, 2009). Therefore, depending on the context and the role of the individual, they encounter a variety of different situational, social and personal factors that can significantly shape their pro-environmental choices (Hampton & Whitmarsh, 2023).

Theory of Planned Behavior

As it becomes crucial to understand in which roles individuals are likely to take pro-environmental actions, previous research has attempted to investigate factors that influence the development of behavior (Yuriev et al., 2020). Few factors have been shown to reliably exert high influence on the formation of pro-environmental intention and subsequent behavior; namely

attitude, subjective norm and perceived behavioral control. These antecedents constitute the Theory of Planned Behavior, illustrated in Figure 1 (Ajzen,1991). Theory of Planned Behavior serves as a suitable framework to explain pro-environmental behavior across different contexts (Yuriev et al., 2020). The theory states that attitudes, subjective norms and perceived behavioral control form the antecedents of intention and indirectly predict behavior (Ajzen, 1991). Attitudes encompass an individual's beliefs and feelings associated with a given subject (Albarracín et al., 2018). Subjective norms refer to the person's perception of how they are expected to behave in a particular group, while perceived behavioral control pertains to an individual's perception of their capacity to manage their own behavior (Ajzen, 1991).

Figure 1

Conceptual Model of the Theory of Planned Behavior
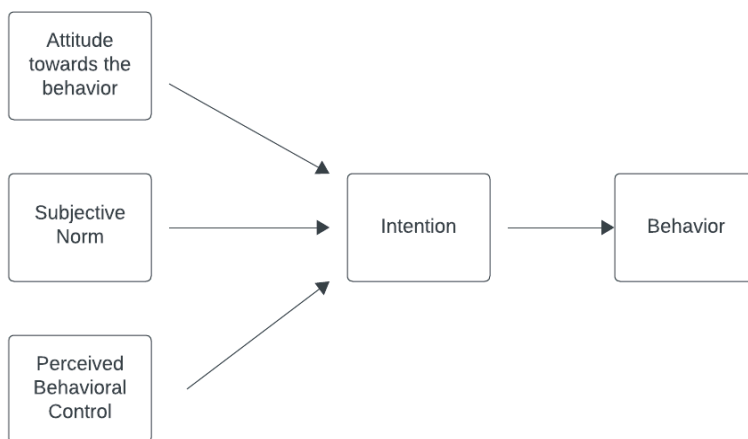
Personal Pro-Environmental Behavior

The framework has primarily been applied to study personal behaviors in the home environment, such as energy saving (Nie et al., 2019), and the use of public transportation (Heath & Gifford, 2002). Across various behaviors, the constructs consistently predict environmentally friendly intentions and subsequent actions (Yuriev et al., 2020). However, the

predictive strength of each predictor can vary depending on the context and the behavior being studied. For instance, attitude emerges as the most significant predictor of intention to buy environmentally friendly products (Paul et al., 2016), while perceived behavioral control is more predictive of energy-saving intentions (Du & Pan, 2021). Moreover, previous research highlights the significance of norms on behavior, particularly for behavior that is visible to others (Heath & Gifford, 2002). These findings highlight the theory's utility in predicting PEB, while emphasizing the necessity of studying PEB within specific roles to make inferences about the influence of each construct on behavior.

The Theory of Planned Behavior has been well studied in the home environment; yet largely unexplored in other contexts (Yuriev et al., 2020). In a scoping review by Yuriev and Colleagues (2020), studies were examined that used the theory as a framework to study environmentally friendly behavior. Interestingly, 81% of studies included in the review investigated individual PEB performed in their personal lives. Since individuals do not limit their sustainable actions to the home environment, it is crucial to conduct further research to examine sustainable behavior in other contexts such as the workplace (Blok et al., 2015).

Pro- Environmental Behavior In The Organizational Context

Few researchers have attempted to apply the framework to study PEB in the workplace (Blok et al.,2015; Gao et al., 2017) In contrast to the aforementioned research, these studies have yielded mixed evidence regarding the influence of the three factors on PEB. In a study by Gao and Colleagues (2017), the theory was applied to investigate employees' energy-saving behaviors. Findings suggest that both attitudes towards energy-saving and employees perceived behavioral control significantly predict intention and subsequent behavior. Subjective norms appeared insignificant in predicting behavior. Furthermore, Blok and Colleagues (2015) applied

an extension of the theoretical framework to investigate a broad range of PEB among employees of a Dutch university. Findings suggest that the three antecedents namely attitude, subjective norm and perceived behavioral control significantly predict intentions to act pro-environmentally. As research in this field is limited and researchers have found contradicting results, it is important to further investigate the predictive power of the theory in workplace settings.

Different Levels of Pro-Environmental Behavior

Previous research suggests that individuals will likely show varying degrees of pro-environmental behavior between their personal and professional roles (Lee et al., 1995; Lo et al., 2012). In a qualitative study conducted by Lo and Colleagues (2012), employees were interviewed about their energy-saving behaviors at the workplace. Findings reveal that employees regard their mandatory work tasks as their main focus which often leads them to show low motivation to engage in voluntary energy-saving behaviors. Relating it to the Theory of Planned Behavior, one might postulate that engaging in sustainable action is likely not employees' main concern, potentially leading to unfavorable attitudes. Moreover, participants in the study indicated that they regard major decisions about energy-saving as beyond their scope of influence. This finding can potentially be related to the construct of perceived behavioral control as it seems that employees do not perceive agency to take action. An earlier study shows a similar trend, indicating that individuals recycle less frequently at their workplace than at home (Lee et al., 1995). Furthermore, the construct subjective norm of the Theory of Planned Behavior concerns itself with the perceived expectations of other people (Ajzen, 1991). As many people who are in a work environment are surrounded by other individuals all day, one might postulate that norms could become more salient, potentially impacting the formation of behavior.

Given that the Theory of Planned Behavior has been shown to be a framework able to predict pro-environmental intention and subsequent behavior, we aim to apply the theory to the personal and professional setting to understand how the constructs influence behavior (Yuriev et al., 2020). As previous research indicates a lower level of energy saving and recycling among employees, it seems plausible that being in a restricted work environment might lead the individual to engage in less pro-environmental action through the effects it potentially has on one's attitude, subjective norms and perceived behavioral control (Lee et al., 1995; Lo et al., 2012). By conducting this study, we wish to fill the literature gap by identifying main predictors and barriers to pro-environmental behavior. Considering these findings, we derive our hypotheses.

Hypothesis 1: Individuals perform more pro-environmental behavior in their personal role compared to their professional role.

Hypothesis 2a: Attitude, subjective norm and perceived behavioral control predict PEB in an individual's personal role.

Hypothesis 2b: Attitude, subjective norm and perceived behavioral control predict PEB in an individual's professional role.

Hypothesis 3: Lower levels of PEB in the workplace result from lower levels of perceived behavioral control, more unfavorable attitudes and non-environmental subjective norms compared to individuals' personal lives.

Overall, the aim of this study is to examine factors that predict PEB in the professional and personal role. Most research up to this point has studied personal PEB in specific contexts instead of comparing behavior across roles (Yuriev et al., 2020). By applying a within-subject

design, we wish to compare an individual's PEB between the work and home setting and make inferences about the predictive power of the antecedents across both roles.

Methods

Participants and Procedure

Participants were students and other European citizens over the age of 18. A power analysis for a one-sample paired t-test was performed to assess the minimum sample size needed for this study. The analysis indicated that, to detect a small effect size (0.3) with 80% power and 0.05 significance, a sample size of 90 is necessary. A total of 125 individuals took part in the questionnaire, comprising 65 % women ($n = 82$), 32% men ($n = 40$), and 1.6 % identifying as non-binary ($n = 2$) or preferring not to report gender (0.8 %, $n = 1$). Participants who failed the attention check ($n = 5$) or expressed disbelief in climate change were automatically directed to the end of the study and excluded from further analysis. Age distribution ranged from 18 to 71 with a mean age of 27. Participants predominantly (49.6%) affiliated themselves with the education sector, while the remaining respondents represented diverse occupational backgrounds. Data was collected through an online survey in the period between the 29th of April and the 26th of May 2024. Participants were recruited in two ways. First, the researchers used snowballing by sending the link to the survey to university group chats, friends, family, and posting it on social media (e.g., Instagram). The remaining participants were first-year students at the University of Groningen, who took part in the study for course credit. The University of Groningen ethics committee approved the study before the distribution of the survey.

Survey and Design

The present study utilized a within-subject design. The design featured an experimental manipulation - all participants encountered all questions, but the order of the two main blocks

was randomized to control for anchoring effects. Hence, half of the participants saw the

questions about their organizational role first and the questions about their personal role second,

while the other half saw the questions about their personal role first and organizational role

second. The order of the variable categories was kept the same in both conditions. The survey

was conducted through Qualtrics to ensure full anonymity of the participants. After entering the

survey and reading some information about it, participants were asked for their informed

consent. Following this was the control question assessing participants' belief in climate change,

and then a short paragraph explaining what the personal and organizational roles entail.

Participants were prompted to answer in one of the two roles with the terms "In your

organization…" or "In your organizational role…" for the organizational condition and "In your

personal role…" for the personal role condition. Items tailored to a specific role were exclusively

shown in their condition, for example, how often participants urged friends and family to take

action to limit climate change. An attention check was included in the middle of the survey.

Participants were asked to select "Once" on a five-point likert scale ranging from "Never" to

"Many". Additionally, they indicated demographics including their age, gender, and the sector in

which they work (e.g. education).

Measures

Pro-environmental Behavior

Behavior was measured as the dependent variable, indicating the participants' level of

PEB in their personal or professional role over the past 12 months. The construct was assessed

by combining the scores of the "Personal behavior" and ''Advocacy behavior'' scales. The

scales were based on Stern (2000) and examined on a 5-point likert scale ranging from 1 (*never*)

to 5 (*always*) for the personal behavior items and from 1 (*never*) to 5 (*many*) for the advocacy

behavior items. A high score on the construct indicates a high level of PEB. Personal behavior was assessed using four items that all started with the same question ("*Over the past 12 months, how often have you taken the following actions in your* personal life/ in your organization"?) followed by asking the participant about their engagement in four different PEBs such as saving energy or traveling sustainably. A full list of questionnaire items can be found in Appendix B. Advocacy behavior was measured using seven items in the personal role and four items in the organizational role. Participants were asked the same question for each item ("*How often have you taken the following action in your* personal life/ at your organization?") followed by asking them about their engagement with different advocacy behaviors such as urging friends and family to take climate action or advocating for climate action in their organization. The combined items display a high reliability (α = .85 in the personal role; α = .78 in the professional role).

Attitude

The attitude scale was constructed based on Ajzen (2002) and was assessed on a 7-point likert scale (1 = *strongly disagree*, 5 = *strongly agree*) with a higher score indicating a more favorable attitude towards PEB. The construct was measured with three items ("*For me, behaving pro-environmentally in my* personal life / at my organization *is enjoyable / important / inconvenient*"). The items display a low reliability (α = .68 in the personal role; α = .59 in the professional role).

Subjective Norm

Subjective norm was measured by assessing the participants' injunctive- and descriptive social norms. The scores on the two constructs were combined to assess subjective norms. The scale was based on Mouro and Duarte (2021) and was measured on a 7-point likert scale (1 =

strongly disagree, 5 = *strongly agree*) with a higher score indicating stronger pro-environmental norms. Injunctive social norms were measured with three items ("*The people in my* social circle / organization *expect me to engage in pro-environmental behavior* " / "*I disappoint people* in my social circle/ in my organization *when I do not engage in pro-environment behavior*" / "*It is important for my* social circle/ my organization *that I engage in pro-environmental behavior*"). Descriptive social norms were assessed using four items ("*The people in my* social circle/ organization *engage in saving energy / sustainable food consumption / sustainable consumption / traveling in a sustainable way*"). Combining the items showed good reliability (α = .87 in the personal role; α = .76 in the professional role).

Perceived Behavioral Control

The perceived behavioral control scale was based on Blok and colleagues (2015) and was measured on a 7-point likert scale (1 = *strongly disagree*, 5 = *strongly agree*) where a higher score suggests a higher level of perceived behavioral control. The construct was assessed with two items ("*Whether I perform pro-environmentally in my* personal life/ at my organization *is entirely up to me*" / "*If I wanted to, I could easily behave pro-environmentally in* my personal life/ at my organization"). When combined, the items display a low reliability (α = .66 in the personal role; α = .46 in the professional role).

Results

Assumption Checks

To conduct paired samples t-tests and multiple linear regressions, the assumptions of linearity, independence of observations, homoscedasticity and normality need to be met. Tests reveal that the assumptions are met, therefore analyses can be performed. The data of 125 participants were utilized, with a significance level set at α = 0.005.

Hypotheses Testing

Hypothesis 1: Difference in PEB Across Roles

Our first hypothesis was confirmed: Individuals take more pro-environmental action in their personal lives compared to their professional lives. A one-sided paired sample t-test suggests a significant difference in behavior across the two roles (t (121)= 6.209, p < .001). Mean scores were calculated, indicating a higher mean in the personal condition (M = 3.01, SD = 0.76) than in the professional condition (M = 2.65, SD = 0.79). Figure 2 displays the difference in means across the two roles.

Figure 2

Bar Graph Comparing the Group Means of the Personal and Professional Role
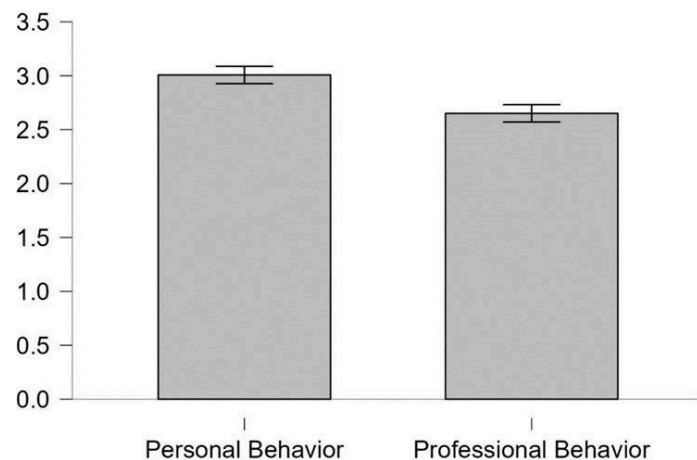
Hypothesis 2a: Predictors of PEB in the Personal Role

The second hypothesis states that attitude, subjective norm and perceived behavioral control predict PEB in individuals personal lives. A multiple linear regression was run with attitude, subjective norm and perceived behavioral control as predictors and PEB as the outcome variable. Results reveal that the model is significant (F(3,121) = 30.95, p = < .001). For detailed statistics, refer to Table 1. The model accounts for 41.2 % of variability in personal PEB. A

person's attitude significantly predicts PEB in individuals' personal lives ($\beta = 0$ .48). The same

accounts for subjective norms ($\beta = 0.32$). One's perceived behavioral control is insignificant in

predicting PEB ($\beta = -0.12$). Therefore, the hypothesis is partly supported as a person's attitude

and their subjective norm significantly predict PEB in their personal role, whereas perceived

behavioral control is nonsignificant in predicting behavior.

Table 1

Coefficients Table Personal Role

Variables	Estimate	SE	t	95%CI		p
				LL	UL	
(Intercept)	0.47	0.34	1.38	-0.21	1.15	.17
Attitude	0.38	0.06	6.14	0.25	0.45	<.001
Subjective norm	0.24	0.06	4.29	0.13	0.35	<.001
PBC	-0.08	0.05	-1.6	-0.17	0.02	.108

Note: N = 125. PBC = perceived behavioral control; CI = confidence interval; LL = lower limit; UL = upper limit.

Hypothesis 2b: Predictors of PEB in the Professional Role

We hypothesized that attitude, subjective norm and perceived behavioral control predict

PEB in individuals' professional lives. A multiple linear regression was conducted with attitude,

subjective norm, and perceived behavioral control as predictors and PEB as the outcome

variable. Analysis suggests that the model is significant (F (3, 121) = 14.76, $p = < .001$). Detailed

statistics can be found in Table 2. The model explains 25% of variability in professional PEB.

Specifically, attitude significantly predicts PEB in the organizational context ($\beta = 0.29$), while

subjective norms also demonstrate a significant effect on PEB in the organizational role ($\beta = 0.27$). Perceived behavioral control however, is not statistically significant in predicting PEB in

the organizational role ($\beta = 0.12$).

Table 2

Coefficients Table Professional Role

Variables	Estimate	SE	t	95%CI		p
				LL	UL	
(Intercept)	0.22	0.38	0.59	-0.53	0.98	.56
Attitude	0.21	0.06	3.37	0.09	0.34	.001
Subjective norm	0.24	0.07	3.22	0.09	0.39	.002
PBC	0.08	0.05	1.52	-0.02	0.18	.13

Note: N = 125. PBC = perceived behavioral control; CI = confidence interval; LL = lower limit; UL = upper limit.

Given the low reliability of the perceived behavioral control scale in the professional condition, two more multiple linear regressions were run, using the two perceived behavioral control items as separate predictors (see Table 3 in Appendix A). Findings reveal that adding the first perceived behavioral control item to the model significantly predicts PEB (β = 0.16), accounting for 26% of variability in PEB. In contrast, adding the second item is not significant in predicting behavior (β = 0.04), explaining 23.7% of variability in PEB. However, using either the scale or its items separately results in only a marginal change in explained variance, thus partly supporting our hypothesis that attitude and subjective norm predict PEB in the professional role, while perceived behavioral control does not predict behavior.

Hypothesis 3: Examining Differences in PEB

The third hypothesis states that the difference in PEB between professional and personal life can be attributed to lower levels of perceived behavioral control, more unfavorable attitudes and non-environmental subjective norms in individuals' professional lives compared to their personal lives. First, mean scores were computed for each predictor, and results indicate slightly lower scores on attitude, subjective norm and perceived behavioral control in the professional

condition compared to the personal condition (see Table 4). However, one-sided paired samples t-tests results suggest that these differences are not significant.

Table 4

T-test Comparing Group Means of the Personal and Professional Role

	Personal role		Professional role		*t(*124*)*	*p*	Cohens's d
	M	*SD*	*M*	*SD*			
Attitude	4.95	0.98	4.86	1.09	1.04	.150	0.09
Subjective norm	4.43	1.02	4.26	0.90	1.59	.057	0.14
PBC	4.99	1.17	4.82	1.24	1.61	.055	0.14

Note: n = 125. PBC = perceived behavioral control; M = mean; SD = standard deviation.

Additionally, correlations between PEB and the three predictors were computed for both conditions (see Table 5 & 6). Findings suggest that attitude and subjective norms are more strongly related to PEB in the personal role (r = .57, p = < .001; r = .51, p = <.001) than in the professional role (see Table 6). Perceived behavioral control however, is more related to PEB in the professional role (r = .24, p = < .05) than in the personal role (see Table 5).

Table 5

Pearson's Correlations Between the Predictors and PEB in the Personal Condition

Measure	1	2	3	4
1. Attitude	–			
2. Subjective norm	.40**	–		
3. Perceived behavioral control	.30**	.04	–	
4. PEB	.57**	.51**	.04	–

Note: * indicates *p* < .05. ** indicates p < .001. PBC = perceived behavioral control

Table 6

Pearson's Correlations between the predictors and PEB in the professional condition

Measure	1	2	3	4
1. Attitude	–			
2. Subjective norm	.40**	–		
3. Perceived behavioral control	.27*	.15	–	
4. PEB	.43**	.41**	.24*	–

*Note: * indicates p < .05. ** indicates p < .001.* PBC = perceived behavioral control

Moreover, results indicate that the three predictors explain more variance in PEB in the personal role (R^2_{adj} = .41) than in the professional role (R^2_{adj} = .25). Therefore, our third hypothesis is partially supported. Analysis reveals that although the constructs predict PEB, the differences in behavior between the roles cannot be entirely attributed to these predictors, given their correlations and the variance they explain.

Discussion

The present study investigated PEB across different roles; namely the personal and professional context. The framework of the Theory of Planned Behavior was applied to examine the predictive power of the constructs in both contexts.

Difference in PEB Across Roles

Findings support the first hypothesis that individuals report higher levels of PEB in their personal lives than in their professional lives. Previous research confirms our findings, observing lower levels of energy-saving and recycling behaviors among employees (Lee et al., 1995; Lo et al., 2012). Yuriev and colleagues (2018) examined barriers to PEB at the workplace, concluding that employees face different challenges compared to their personal lives.These include not only

personal factors but also organizational ones, such as the companies lack of resources to support PEB. Given the unique challenges employees face at the workplace, it seems plausible they engage in less PEB in their professional role.

Attitudes, Norms, and Perceived Control in Predicting PEB

Our second hypothesis is partly supported: while one's attitudes and subjective norms predict behavior in the personal and professional context, one's perceived control does not appear to be predictive of behavior. Previous research has found the predictive power of the three constructs to depend on the behavior that is being studied and the context in which it is performed (Yuriev et al., 2020). The predictive power of perceived behavioral control, in particular, varies depending on how the construct is operationalized and therefore measured (Notani, 1998). Notani (1998) concludes that applying a global measure to examine perceived behavioral control can enhance the construct's predictive power. Employing a higher number of questionnaire items to comprehensively assess the construct can increase its significance. Nonetheless, several studies have revealed that attitude, subjective norm and perceived behavioral control serve as predictors of pro-environmental intentions and subsequent behavior, both in the personal (Heath and Gifford, 2002; Nie et al., 2019) and professional role (Blok et al., 2015; Khalid et al., 2022). However, it is worth noting that several researchers applying the theoretical framework utilize an extended version of the theory to gain a more comprehensive understanding on how behavior is formed (Blok et al., 2015; Heath and Gifford, 2002).

Examining Differences in PEB between the Personal and Professional Role

Based on the present findings, we partially reject our third hypothesis. Despite observing slightly less favorable attitudes, encountering more non-environmental norms, and perceiving lower behavioral control regarding PEB in the professional role, these factors predict PEB less

effectively compared to the personal role. This suggests that the three predictors are not the main drivers of PEB in professional roles, and thus do not fully explain the observed differences in PEB. Previous research has recognized that the three predictors explain some variance in PEB in professional roles (Blok et al., 2015). However, Blok and colleagues (2015) point out that incorporating additional predictors to the model is essential to capture the complexity of PEB at the workplace, as behavior is influenced by different factors compared to individuals' personal lives. Given that the Theory of Planned Behavior addresses internal factors, whereas PEB in the workplace might often depend on external factors like leadership support, it seems plausible that the three predictors fail to fully capture behavior formation (Blok et al., 2015).

Theoretical Limitations

The present study assessed a broad spectrum of PEB rather than examining a specific behavior. In a scoping review, Yuriev and colleagues (2020) examined studies on different PEB's that utilized the theoretical framework of the theory of planned behavior. They conclude that the theoretical framework is only appropriate for examining one specific PEB at a time. Combining a wide range of different behaviors into one construct fails to account for the complexity of different PEB's. The present study likely oversimplified PEB, since different behaviors are influenced by qualitatively different factors. Future research should therefore focus on studying one specific behavior at a time such as comparing an individual's energy saving behaviors between their personal and professional lives.

Moreover, PEB in the organizational context was assessed without differentiating between voluntary engagement and PEB performed as obligatory work tasks (Rasmus & Killmer, 2007). Voluntary PEB, also known as extra-role behavior, includes actions that are not mandatory parts of the job and that are executed without receiving a reward for it (Van Dyne et

al., 1995). On the other hand, obligatory PEB often referred to as in-role behavior, includes actions that need to be performed to not get punished (Ones & Dilchert 2012). The present study did not utilize a distinction between the two actions, potentially impacting our understanding of the motivation behind PEB at the workplace. Future research should employ a distinction between the two types of behaviors to understand under what circumstances individuals perform pro-environmentally if they are not required to do so.

Methodological Limitations

Participants were mainly friends and family members that were contacted by the researchers, along with first year psychology students that participated in the study for course credit. The average age of participants is 27, with most affiliating themselves with the educational sector. Given the average age of the participants, we assume that most of the participants have not held full-time jobs. Since the aim of the study is to investigate PEB at the workplace, the sample is likely not representative of the working population. Furthermore, since we were not able to use simple random sampling, the external validity is likely compromised (Thompson, 2012).

Moreover, data was collected through a self-report questionnaire. Participants were asked to report their PEB over the last year along with answering sensible topics such as their attitude towards climate change. Using a self-report questionnaire is susceptible to bias since it lacks objectivity (Podsakoff et al., 2003). Hence, the validity of the present study might be affected by employing a self-report measure.

Furthermore, the reliability of some constructs is rather low, particularly for perceived behavioral control in the professional condition. A possible reason for the low reliability is that only two items were used to assess the construct (Cortina, 1993). With an increase in

questionnaire items, reliability generally tends to increase as the construct is measured more comprehensively. Additionally, perceived behavioral control is often measured by assessing the person's perceived control and perceived difficulty in executing a behavior (Sparks et al., 1997). In the present study, participants were asked if taking pro-environmental action is entirely up to them, which assesses control, and if they could easily behave pro-environmentally, which assesses difficulty. As the two items assess slightly different dimensions of the construct, the reliability is compromised. Future research should therefore focus on further operationalizing perceived behavior control and develop questionnaire items that reliably measure the construct (Notani, 1998).

Direction for Future Studies

Given that the formation of PEB is influenced by various factors across contexts, the theoretical model should be extended to incorporate more variables that can predict PEB (Yuriev et al., 2020). Yuriev and colleagues (2020) suggest combining the framework of the Theory of Planned Behavior with other theoretical approaches such as the Value Belief Norm model (Stern et al., 1999) or the Norm Activation model (Schwartz, 1977) that are often used to predict behavior in various contexts. Using an extended version of the framework can enhance its predictive power.

Additionally, the framework of the Theory of Planned Behavior has been questioned for emphasizing rational thinking, despite evidence that some behavior choices are made irrationally (Sheeran et al., 2013). Future research could include habit as a construct, specifically habit strength, since different factors predict routine- versus non-routine behaviors (Kloeckner & Matthies, 2004; Verplanken & Aarts, 1999). Relating it to the present study, one might postulate that many PEB's carried out in the home- or work environment might be performed routinely,

thus involving qualitatively different predictors that cannot be accounted for by the theoretical framework of the Theory of Planned Behavior which emphasizes deliberate actions.

To enhance the understanding of PEB at the workplace, future research should focus on distinguishing between various barriers to PEB (Yuriev et al., 2018). In a study by Yuriev and colleagues (2018), a distinction is made between "within barriers", referring to individual characteristics and "between barriers", relating to the characteristics of the workplace. A "between barrier" might relate to the internal resources of the organization such as the amount of financial resources available for the implementation of sustainable practices. "Within barriers" revolve around personal characteristics such as the person's attitude. It can be helpful to distinguish between the barriers to understand if the characteristics of the workplace hinder an individual's pro-environmental performance or if it stems from their own characteristics.

Practical Implications

Given the lack of action in professional roles, one may question what actions are necessary to encourage employees to adopt more environmentally friendly behaviors. Since subjective norms appear to be a predictor of PEB at the workplace, companies should establish social norms that encourage sustainable actions (Yamin et al., 2019). Managers can act as pro-environmental role models within the company, utilizing their high socioeconomic status along with their social and financial resources to influence employee behavior and drive organizational change (Nielsen et al., 2021). Previous research has explored the effect of leadership support in the formation of PEB at the workplace, suggesting that when managers support sustainable actions, employees are more likely to engage in PEB (Blok et al., 2015). Acknowledging that a person's attitude predicts PEB, companies could implement informational strategies to change employees attitudes towards PEB by informing them about its significance

in mitigating global warming (Abrahamse & Matthies, 2018). These strategies extend to individuals' personal lives, emphasizing the importance of setting pro-environmental norms in social environments and changing attitudes towards PEB (Abrahamse & Matthies, 2018; Yamin et al., 2019).

Despite the aforementioned implications, it is important to acknowledge that the formation of PEB depends on individual, social and even political factors (Hampton & Whitmarsh, 2023). Focusing on changing individual's attitudes and norms can be a way to mitigate the lack of climate action; however, as they are less predictive in the professional context it is necessary to investigate other context-specific predictors that impact the formation of PEB.

Conclusion

The current lack of climate action highlights the necessity of understanding barriers to PEB (IPCC, 2023). This study contributes to the body of research by demonstrating that individuals perform more PEB in their personal role compared to their professional role. Attitudes and subjective norms influence whether PEB is performed, but perceived behavioral control does not predict PEB. Importantly, these factors exert stronger influence in personal contexts compared to professional ones. These findings underscore the importance of investigating PEB within specific contexts to uncover distinct behavior predictors. Future interventions should be designed to fit the context in which behavior is performed. Furthermore, additional research is needed to acknowledge the complexity of PEB across different roles and develop theoretical frameworks that encompass a diverse array of predictors.

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Appendix A

Table 3

Coefficients Table Professional Role Using the First and Second Perceived Behavioral Control

Item Respectively

Models	Variables	Beta	SE	t	95%CI		p
					LL	UL	
1	(Intercept)	0.05	0.40	0.12	-0.75	0.84	.91
	Attitude	0.22	0.06	3.56	0.1	0.34	<.001
	Subjective norm	0.27	0.07	3.58	0.12	0.41	<.001
	Item 1-PBC	0.08	0.04	2.01	0.00	0.17	.046
2	(Intercept)	0.45	0.35	1.28	-0.25	1.14	.20
	Attitude	0.23	0.06	3.56	0.10	0.35	<.001
	Subjective norm	0.24	0.08	3.08	0.08	0.39	.003
	Item 2- PBC	0.02	0.04	0.46	-0.07	0.11	.65

Note: N = 125. Item 1- PBC = first item of the perceived behavioral control scale; Item 2- PBC = second item of the perceived behavioral control scale.

Appendix B

Questionnaire

Climate Change Belief

Do you think climate change is caused by natural processes, human activity or both?

1. Completely by natural processes

2. Mainly due to natural processes

3. About as much due to natural processes and human activity

4. Mainly due to human activity

5. Entirely due to human activity

6. I don't think there is climate change

Different Roles

This study will focus on the different attitudes, beliefs, and behaviors you might have towards climate change. We would like you to answer some questions in either your personal role or as a member of an organization.

In your **personal role**, please focus on actions you take at home, with friends or family, etc.

In your **organizational role**, please focus on actions you take in your work or university setting.

Individual Role

In the following questions, we would like you to answer in your personal role.

Please focus on actions you take at home, with friends or family, etc.

Personal Behavior

In this part of the survey, we will ask about the actions you can take personally that help limit climate change and would like you to answer in your personal role.

Over the past 12 months, how often have you taken the following actions in your personal life?

(1 = never, 2 = sometimes, 3 = about half of the time, 4 = most of the time, 5 = always)

1) Saving energy at home (e.g. lowering/turning off the thermostat, turning off lights, using energy efficient appliances)

2) Sustainable food consumption (e.g., eating no or little meat and dairy, reducing food waste, not using disposable cutlery)

3) Sustainable consumption (e.g., only purchasing items if necessary, repairing items instead of buying new ones, purchasing sustainably produced products)

4) Traveling in a sustainable way (e.g., walking, cycling or public transport instead of using a car or flying, traveling less)

Advocacy Behavior

In this part of the survey, you will be asked about the actions you can take to encourage others to help limit climate change.

How often have you taken the following action in your personal role?

(1 = never, 2 = once, 3 = a few times, 4 = several times, 5 = many)

1) Voted for candidates that support actions on climate change

2) Joined public demonstrations or protests to urge governments and industries to take action to limit climate change

3) Signed a petition in support of limiting climate change

4) Donated money to an organization working on climate change

5) Boycotted companies that have a great impact on climate change

6) For attention check, please select "Once" for this question

7) Urged friends and family to take action to limit climate change

8) Advocated for climate actions in your social circle (e.g., calling out unsustainable practices)

Attitude

In the following questions, we would like you to answer in your personal role.

For me, behaving pro-environmentally in my personal life is…

(1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree)

1) Enjoyable

2) Important

3) Inconvenient

Descriptive Norms

In the following questions, we would like you to answer in your personal role.

How much do you agree with the following statement: the people in my social circle engage in…

(1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree)

1) Saving energy (e.g. lowering/turning off the thermostat, turning off lights, using energy efficient appliances)

2) Sustainable food consumption (e.g., eating no or little meat and dairy, reducing food waste, not using disposable cutlery)

3) Sustainable consumption (e.g., only purchasing items if necessary, repairing items instead of buying new ones, purchasing sustainably produced products)

4) Traveling in a sustainable way (e.g., walking, cycling or public transport instead of using a car or flying, traveling less)

Injunctive Norms

In your personal role, how much do you agree with the following statement:

(1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree)

1) The people in my social circle expect me to engage in pro-environmental behavior

2) I disappoint the people in my social circle when I do not engage in pro-environmental behavior

3) It is important for my social circle that I engage in pro-environmental behavior

Perceived Behavioral Control

In the following questions, we would like you to answer in your personal role.

(1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree)

1) Whether I perform pro-environmentally in my personal life is entirely up to me.

2) If I wanted to, I could easily behave pro-environmentally in my personal life.

Organizational Role

In the following questions, we would like you to answer in your organizational role.

Please focus on actions you take in your work or university setting.

Occupation

Which sector does your organization belong to?

1) Agriculture

2) Energy

3) Production Industry

4) Transportation

5) Public administration and services

6) Financing Institutions

7) NGO

8) Media, Communication

9) Education (University, School, Apprenticeship, etc.)

10) Health and welfare

11) Food and accommodation services

12) Culture, Sports and recreation

13) Other

Personal Behavior

In this part of the survey, we will ask about the actions you can take that help limit climate change and would like you to answer in your organizational role.

Over the past 12 months, how often have you taken the following actions in your organization?

(1 = never, 2 = sometimes, 3 = about half of the time, 4 = most of the time, 5 = always)

1) Saving energy at home (e.g. lowering/turning off the thermostat, turning off lights, using energy efficient appliances)

2) Sustainable food consumption (e.g., eating no or little meat and dairy, reducing food waste, not using disposable cutlery)

3) Sustainable consumption (e.g., only purchasing items if necessary, repairing items instead of buying new ones, purchasing sustainably produced products)

4) Traveling in a sustainable way (e.g., walking, cycling or public transport instead of using a car or flying, traveling less)

Advocacy Behavior

In this part of the survey, you will be asked about the actions you can take to encourage others to help limit climate change and would like you to answer in your organizational role.

How often have you taken the following action in your organization?

(1 = never, 2 = once, 3 = a few times, 4 = several times, 5 = many)

1) Signed a petition in support of limiting climate change

2) Boycotted companies that have a great impact on climate change

3) Urged colleagues to take action to limit climate change

4) Advocated for climate actions in your organisation (e.g., calling out unsustainable practices)

Attitude

In the following questions, we would like you to answer in your organizational role.

For me, behaving pro-environmentally in my professional life is…

(1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree)

1) Enjoyable

2) Important

3) Inconvenient

Descriptive Norms

In the following questions, we would like you to answer in your organisational role.

How much do you agree with the following statement:

The people in my organisation engage in…

(1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree)

1) Saving energy (e.g. lowering/turning off the thermostat, turning off lights, using energy efficient appliances)

2) Sustainable food consumption (e.g., eating no or little meat and dairy, reducing food waste, not using disposable cutlery)

3) Sustainable consumption (e.g., only purchasing items if necessary, repairing items instead of buying new ones, purchasing sustainably produced products)

4) Traveling in a sustainable way (e.g., walking, cycling or public transport instead of using a car or flying, traveling less)

Injunctive Norms

In the following questions, we would like you to answer in your organisational role.

(1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree)

How much do you agree with the following statement:

1) The people in my organisation expect me to engage in pro-environmental behavior

2) I disappoint the people in my organisation when I do not engage in pro-environmental behavior

3) It is important for my organisation that I engage in pro-environmental behavior

Perceived Behavioral Control

In the following questions, we would like you to answer in your organizational role.

(1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree)

1) Whether I perform pro-environmentally at my organization is entirely up to me.

2) If I wanted to, I could easily behave pro-environmentally at my organization.

Demographics

1) What is your age? (in years)

2) What is your gender?

    a) Male

    b) Female

    c) Non-binary

    d) Prefer not to say

3) Feedback: Please leave any feedback or comments you might have in the box below.