universität wien

MASTERARBEIT / MASTER'S THESIS

Titel der Masterarbeit / Title of the Master's Thesis

Green universities: predictors of pro-environmental behaviour in university staff

verfasst von / submitted by

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angestrebter akademischer Grad / in partial fulfilment of the requirements for the degree of

Master of Science (MSc)

Wien, 2023 / Vienna, 2023

Studienkennzahl lt. Studienblatt / Degree programme code as it appears on the student record sheet:	UA 066 840
Studienrichtung lt. Studienblatt / degree programme as it appears on the student record sheet:	Masterstudium Psychologie UG2002
Betreut von / Supervisor:	Univ.-Prof. Dipl.-Psych. Sabine Pahl, MSc PhD
Mitbetreut von / Co-Supervisor:	

Abstract

The current study aims to explore the predictors of pro-environmental behaviour (PEB) in the workplace using an adjusted version of the theory of planned behaviour (TPB). Growing concerns of global warming and pollution continue to rise. Accordingly, understanding PEB is crucial for promoting sustainable practices. The TPB posits that PEB is dependent on one`s intention to act pro-environmentally, which is determined by subjective norms, pro-environmental attitudes and perceived behavioural control. This study modified the TPB by replacing subjective norms with green shared vision and adding perceived behavioural control as a moderator. Organizational commitment, gender, age, and level of education were also included as predictors. Data was collected via a voluntary questionnaire sent to all employees of the University of Vienna via the official digital newsletter. Results revealed a significant correlation between attitudes, perceived behavioural control and intention, and a negative moderating effect of perceived behavioural control. Intention, female gender, and age were significant predictors of PEB. While the TPB was applicable to PEB in the university workplace, the evidence for the adjusted model was mixed. With less than half of the variance in PEB explained by the adjusted TPB model, the need for research into new predictive factors and further improvements to the model was highlighted.

Keywords: pro-environmental behaviour, theory of planned behaviour

Abstrakt

Das Ziel der folgenden Studie ist, die Prädiktoren für umweltfreundliches Verhalten (PEB) am Arbeitsplatz anhand einer angepassten Version der Theorie des geplanten Verhaltens (TPB) zu untersuchen. Die Besorgnis über globale Erwärmung und Umweltverschmutzung nimmt weiter zu. Daher ist ein besseres Verständnis von PEB für die Förderung umweltfreundlichen Verhaltens von entscheidender Bedeutung. Die TPB geht davon aus, dass PEB von der Absicht einer Person abhängt, sich umweltfreundlich zu verhalten, welches durch subjektive Normen, umweltfreundliche Einstellungen und wahrgenommene Verhaltenskontrolle bestimmt wird. In dieser Studie wurde die TPB modifiziert, indem die subjektiven Normen durch die Variabel gemeinsame grüne Vision ersetzt und die wahrgenommene Verhaltenskontrolle als Moderator hinzugefügt wurde. Engagement zum Unternehmen, Geschlecht, Alter und Bildungsstand wurden ebenfalls als Prädiktoren einbezogen. Die Daten wurden mittels eines freiwilligen Fragebogens erhoben, der allen Mitarbeitern der Universität Wien über den offiziellen digitalen Newsletter zugesandt wurde. Die Ergebnisse zeigten eine signifikante Korrelation zwischen Einstellungen, wahrgenommener Verhaltenskontrolle und Intention, sowie einen negativen moderierenden Effekt der wahrgenommenen Verhaltenskontrolle. Die Intention, das weibliche Geschlecht und das Alter waren signifikante Prädiktoren für die PEB. Während die TPB auf PEB am Arbeitsplatz in der Universität anwendbar war, war die Evidenz für das angepasste Modell gemischt. Da weniger als die Hälfte der Varianz in PEB durch das angepasste TPB-Modell erklärt wird, wurde die Notwendigkeit der Erforschung neuer Vorhersagefaktoren und weiterer Verbesserungen des Modells hervorgehoben.

Schlagwörter: Umweltfreundliches Verhalten, Theorie des geplanten Verhaltens

Green universities: predictors of pro-environmental behaviour in university staff

Whether it is wood for shelter or metals for tools, humans have always relied on the environment and its resources to survive and even thrive. However, during the last decade unsustainable emissions of greenhouse gasses and the misuse of the environment has led to severe environmental problems affecting millions around the world in form of global warming, water shortages, urban air pollution, and loss of biodiversity (Steg & Vlek, 2009). The Carbon Majors Report (Griffin & Heede, 2017) found that 71% of global greenhouse gas emissions since 1988 were produced by just 100 companies, highlighting the importance of research into ways of reducing the ecological impact of organizations. One essential factor to investigate is organizational *pro-environmental behaviour*.

Pro-environmental behaviour is defined as "behaviour that consciously seeks to minimize the negative impact of one's actions on the natural and built world" (Kollmuss & Agyeman, 2002). Examples include, but are not limited to, direct behaviours such as saving energy by turning off unused electronics or recycling and indirect behaviours such as educating others or participating in pro-environmental events. While pro-environmental behaviour has been widely studied in private households, barely any studies on such behaviours have been conducted in the workplace, including in universities (Blok et. Al, 2015). Further research is thus needed to fill this gap in the literature.

Apart from the economic sector, the education sector remains important to further investigate. With close to two and a half million people, working, teaching, studying, and researching at just 334 German institutions for higher education, universities are comparable to large commercial organizations regarding energy consumption and material use (Viebahn, 2002). Moreover, pro-environmental behaviour is especially important to investigate in universities considering universities have far-reaching influence on environmental beliefs in society which may further the goal of reducing emissions over time. Yet, universities tend to lag behind both governments and businesses concerning environmental initiatives (Ralph & Stubbs, 2014). Over the last

decade, universities have increasingly shown incentives to improve sustainability and commit to pro-environmental initiatives acknowledging its influential impact on society. One example is the University of Vienna, which is currently launching a new sustainability initiative with the goal of reaching climate neutrality by 2030. With this in mind, the current study aims to investigate pro-environmental behaviour and related factors in a sample of employees of the University of Vienna.

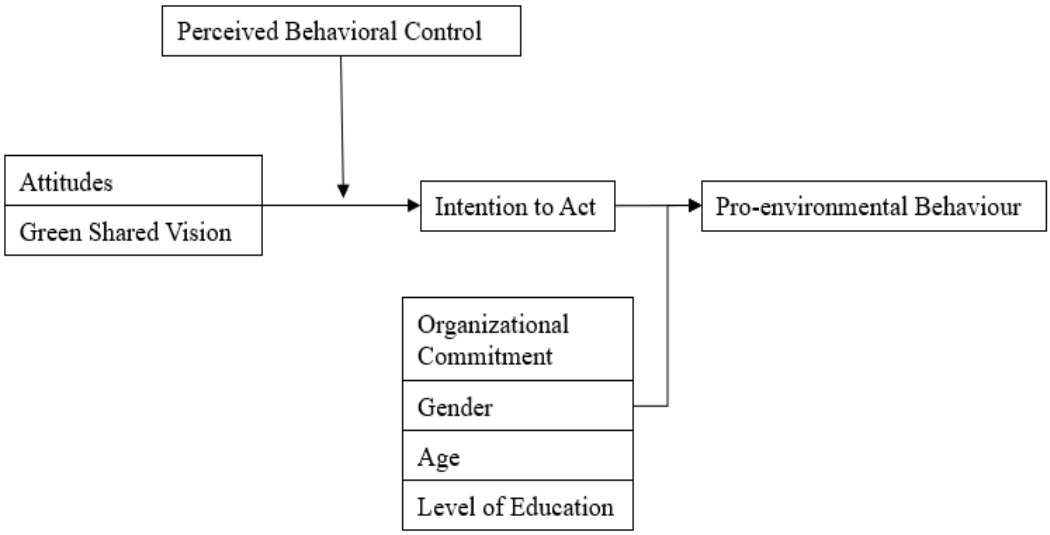
The Theory of planned behaviour is one of the major models used to describe individual differences in behaviour and is also commonly applied in environmental psychological research with pro-environmental behaviour as the behavioural outcome. (TPB; Ajzen, 1985). In general, the TPB suggests that the strongest predictor for human behaviour is the *intention to act*. Intention to act is, in turn, typically guided by three factors: A person's *attitude* towards the behaviour, their beliefs about the normative expectations and actions of others (i.e., *Subjective Norm*), and their beliefs about their capability of achieving or adopting the behaviour (i.e., *Perceived Behavioural Control*). Attitudes result from a person's behavioural beliefs about possible outcomes of the behaviour and their evaluation thereof. Pro-environmental attitudes may include statements such as "PEBs at the workplace are important to me" and "I think it's a good idea that the University of Vienna, as an employer, supports PEB in the workplace". Subjective norms stem from a person's beliefs about the normative expectations of others and their willingness to comply with these norms (Ajzen, 2002). Typical statements on subjective norms may include "Most people who are important to me approve of my behaviour" and "Most people like me behave this way". Perceived behavioural control describes a person's perception of their ability to perform a task (Blok et al., 2015). The literature shows that perceived behavioural control is an import predictor of pro-environmental behaviours such as recycling (Kaiser & Gutscher, 2003; Mannetti et al., 2004; Klöckner & Oppendal, 2011). According to Ajzen (1985) more favourable attitudes are correlated with a higher probability of resulting in the specific behaviour, as are normative beliefs that result in the perception of social pressure or a subjective norm to carry out

the behaviour. Moreover, higher perception of behavioural control is linked to the facilitation of behaviour.

Although the TPB model remains widely used in research, several recent papers have argued the need for adjustments to the model when measuring PEB. La Barbera and Ajzen (2020) demonstrated in three studies that even though attitude, subjective norm, and perceived behavioural control are typically treated as independent predictors of PEB in TPB, treating perceived behavioural control as a moderator for the effects of attitude and subjective norm on intention resulted in a more robust model. Their results showed that higher perceived behavioural control strengthened the effect of attitudes on intention while weakening the relative importance of subjective norms. These relationships were observed for voting behaviour, reducing household waste and energy consumption in three separate studies (La Barbera & Ajzen, 2020). These three studies showed that adding the interaction terms increased the explained variance of their models by 2.1%, 3.4%, and 3.7%. Arguably, these studies justify the use of an adjusted TPB model to measure pro-environmental behaviour more accurately in future research. Apart from the studies mentioned above, very few studies have so far investigated the adjusted TPB model with perceived behavioural control as a moderator and pro-environmental behaviour as the outcome variable. Even fewer have applied this research in a university setting. Therefore, the current study aims to add to the existing literature by investigating this relationship on pro-environmental behaviour in a university setting.

Figure 1.

Adjusted model of the Theory of Planned Behaviour



Another recent study investigating pro-environmental behaviour in a workspace setting investigated the indirect effect of responsible leadership on pro-environmental behaviour mediated by *green shared vision* and *organizational commitment* (Afsar et al., 2019). Although the current study does not aim to investigate responsible leadership, the paper underlines green shared vision and organizational commitment as two potentially important predictors of pro environmental behaviour in the workplace. According to Afsar and colleagues, green shared vision refers to a common goal aimed toward sustainability, commonly evoked by leadership or organizational green culture. Statements regarding green shared vision may include "the vast majority of members of my organization strive to implement environmental strategies" and "members are excited about our organizations' collective environmental mission". In relation to the TPB model, green shared vision and subjective norms share many similarities, as both reflect a person's beliefs about the social norms around them. The aforementioned study found that green shared vision was a significant predictor of pro-environmental behaviour. Thus, in the context of the current study, green shared vision might act as a better measure than subjective norms, as it is specific to social norms regarding sustainability goals and strategies in an organization and fits the theme of research for the sustainability strategy of the university.

In keeping with this, Afsar and colleagues included organizational commitment as a predictor for PEB. *Organizational commitment* is defined as "the relative strength of an individual's identification with and involvement in a particular organization" (Mowday et al., 1979, p. 4). Typical examples of organizational commitment include showing pride in working for an organization and taking initiative to go above and beyond for the organization. Previous research has found that high organizational commitment is an important determinant of organizational citizenship behaviour, altruism, and pro-social behaviour at work (Devece, Palacios-Marqués, & Alguacil, 2016; Ng & Feldmann, 2011). With pro-environmental behaviours such as saving energy and reducing material waste at work being a type of organizational citizenship behaviour, Afsar and colleagues hypothesized a positive relationship between organizational commitment and pro-environmental behaviour. However, the aforementioned study failed to find a significant correlation. Still, as organizational commitment was shown to improve organizational citizenship behaviour and a possible relationship to pro-environmental behaviour has not yet been studied in a university setting. In order to better understand the predictors of PEB, organizational commitment will be included in the current study.

Further determinants of pro-environmental behaviour rarely investigated in the workplace include personal factors such as gender, age, and level of education (Thondhlana & Hlatshwayo, 2018). Noteworthy, studies have found that women generally perform more PEBs than men (Kollmuss & Agyeman, 2002). Additionally, age and level of education were found to be positively related to PEBs such as sustainable consumption and recycling (Lynn, 2014; Brown, 2014). Gender, age, and level of education will be included on the current study to determine if these demographic differences predict pro-environmental behaviour in a sample of university employees.

The current study is part of a larger study and aims to guide the University of Vienna in further decision-making regarding coming green initiatives, investigate the robustness of the adjusted TPB model, and explore different predictors not typically included in the TPB. Based on previ-

ous research, the following hypotheses were formed. Hypothesis (I): Pro-environmental attitudes, green shared vision, and perceived behavioural control positively predict pro-environmental intention, which in turn predicts pro-environmental behaviour. Hypothesis (II): Perceived behavioural control positively moderates the relationship between pro-environmental attitudes, green shared vision and pro-environmental intention. Hypothesis (III): Organizational commitment positively predicts of pro-environmental behaviour and adds to the robustness of the TPB. Hypothesis (IV): Female gender, higher age, and higher level of education predict higher pro-environmental behaviour.

Methods

Participants

To define the optimal number of participants needed to fulfil sufficient power a G*power analysis was conducted. The Cohen's effects size was estimated based on previous research within the same topic (La Barbera & Ajzen, 2020). With their reported effect size of f^2= 0.2, the power analysis suggested a sample size of at least 59 participants for the present study to find such effect (power = 0.80). However, scientific research and their effect sizes may be inflated due to the influencing factors such as underpowered studies or publication bias to mention a few. Therefore, we followed a general rule of thumb and widely acknowledged suggestion to recruit 2.5 times as many participants. As such, the ideal sample size for the current study would be comprised of a minimum of 148 respondents.

Recruitment to the present study was carried out through an invitation in the official digital newsletter of the University of Vienna. In total the current study recorded data of 269 respondents between 12.10.2022 and 02.12.2022. After cleaning the data and accounting for missing data 197 participants were included in the study. In the sample, 34 participants (18.3%) were under 20 years old, 59 (31.7%) were between 20 and 29, 48 (25.8%) were between 30 and 39, 37 (19.9%) were between 40 and 49, and 8 (4.3%) were between 50 and 59 years old (n = 8). 11 participants did not indicate their age. 124 participants were female (72.1%) and 48 were male

(27.9). 22 participants did not indicate their gender and 3 identified as “other”. The highest completed education was a university/college of higher education degree for 158 participants (85.4%), an international baccalaureate/A-levels for 22 (11.9%) participants, vocational school/technical school for one participant (0.5%), a completed apprenticeship for three participants (1.6), and mandatory school for one participant (0.5%). 158 participants (80.2%) were aware of the University of Vienna’s goal of becoming climate neutral by 2030 and 148 (75.1%) were aware of the energy saving campaign “Switch It Off” by the university.

Materials

Pro-environmental behaviour

Pro-environmental behaviour was assessed using a shortened 14-item questionnaire with a 5-point Likert scale ranging from 1= *never* to 5= *always* (Blok et. Al, 2015). Items cover a range of pro-environmental behaviours such as “If I can avoid it, I don’t print documents” and “I turn off my PC/laptop when I go home”. The Cronbach’s alpha was .69.

Pro-environmental intention

Pro-environmental intention was assessed using a 5-item questionnaire with a 7-point Likert scale ranging from 1=“*strongly disagree*” to 7=“*strongly agree*” (Blok et. Al, 2015). Items included “I intend to turn off my computer/notebook when I go home.” And “I intend to turn off the lights when I leave the office”. The Cronbach’s alpha was .73.

Organizational commitment

Organizational commitment was assessed using a shortened 5-item questionnaire with a 7-point Likert scale ranging from 1= “*strongly disagree*” to 7= “*strongly agree*” (Mowday et al., 1979). Items included “I am proud to tell others that I am a part of this firm.” and “I really care about the fate of this organization.”. The Cronbach's alpha was .77.

Green shared vision

Green shared vision was assessed using a shortened 3-item questionnaire with a 5-point Likert scale ranging from 1=“*strongly disagree*” to 5=“*strongly agree*” (Chen et al., 2015). Items in-

cluded questions like “A commonality of environmental goals exists in the company.”. The Cronbach's alpha was .83.

Perceived behavioural control

Perceived behavioural control was assessed using a shortened 3-item questionnaire with a 5-point Likert scale ranging from 1=“*strongly disagree*” to 5=“*strongly agree*” (De Leeuw, Valois, Ajzen, & Schmidt, 2015). Items included questions like “For me, performing pro-environmental behaviours on a regular basis in the next year would be easy.” The Cronbach's alpha was .84.

Pro-environmental attitudes

Pro-environmental attitudes were assessed using a shortened 3-item questionnaire measured on a 5-point Likert scale ranging from 1=“*Strongly disagree*” to 5=“*Strongly agree*” (Blok et al., 2015). Items included questions like “I'm in favour of behaving pro-environmentally in the workplace.” The Cronbach’s alpha was .91.

Demographics

Demographic information on gender, age, level of education, and prior knowledge of sustainability initiatives by the University of Vienna was assessed via a short self-designed questionnaire.

Procedure

Participants had to be above 18-years old, fluent in German or English, and employed at the University of Vienna to be eligible to take part in the present study. Participants gave informed consent, enrolled in the study voluntarily and had the right to withdraw at any time. Responses were recorded anonymized. The study was conducted in an online environment where participants were asked to respond to a set of self-report questionnaires exploring the variables mentioned. The entire survey took approximately 10 minutes to complete and concluded with debriefing about the goals of the study and a link for further information about the sustainability strategy of the University of Vienna.

Statistical analysis

All analyses were conducted using the computer software JASP (JASP Team, 2023) with a significance level of $\alpha = 0.05$ (two-tailed). The reliability of each scale was tested using Cronbach's alpha, with a Cronbach's alpha above 0.7 indicating good internal reliability. Prior to statistical analyses relevant assumptions were tested. Descriptive statistics of all variables were carried out for the sample. Visual inspection of distribution plots of all variables revealed a strong skew to the left and a clear ceiling effect for pro-environmental attitudes, intention to act and level of education. Pro-environmental behaviour was slightly skewed to the left.

Hypothesis (I): Pro-environmental attitudes, green shared vision, and perceived behavioural control positively predict pro-environmental intention, which in turn predicts pro-environmental behaviour

Two separate multiple liner regressions were used to test Hypothesis (I). The first regression (regression 1) tested whether the continuous independent variables pro-environmental attitudes, green shared vision, and perceived behavioural control significantly predict the continuous dependant variable pro-environmental intention. The second regression ("regression model 2") tested whether the continuous independent variables pro-environmental intention, pro-environmental attitudes, green shared vision, and perceived behavioural control significantly predict the continuous dependant variable pro-environmental behaviour.

The assumptions of linearity, no or little multicollinearity, independence and normality of residuals, and homoscedasticity were tested prior to these analyses. Visual inspection of scatter plots of the independent and dependent variables showed no violation of linearity. Collinearity diagnostics of both regressions indicated that multicollinearity was not a concern, as VIF scores were under 10 and Tolerances over 0.1 for all variables. Both regressions met the assumption of independence of residuals as indicated by a Durbin-Watson value of between 1 and 3. The assumption of normality of residuals was met, as indicated by the histograms of standardised residuals containing approximately normally distributed errors and Q-Q Plots with points on or close to the line. A visual inspection of the scatter plots of the residuals indicated that "regression

model 2" with pro-environmental behaviour as outcome variable was approximately homoscedastic. However, "regression model 1" with pro-environmental intention as outcome variable violated the assumption of homoscedasticity. Heteroscedasticity increases the variance of the regression coefficient estimates and makes the results of the regression less reliable.

Hypothesis (II): Perceived behavioural control positively moderates the relationship between pro-environmental attitudes, green shared vision and pro-environmental intention

To assess the moderating effects of perceived behavioural control on the significant association between pro-environmental attitudes and pro-environmental intention, an interaction term between perceived behavioural control and pro-environmental attitudes (attitudes*PBC) was added to "regression model 1". Due to the lack of a significant effect of green shared vision, the interaction term between perceived behavioural control and attitudes was omitted.

Hypothesis (III): Organizational commitment positively predicts of pro-environmental behaviour and adds to the robustness of the TPB

A simple linear regression was carried out with organizational commitment as the continuous independent variable and pro-environmental behaviour as the continuous dependent variable to assess whether organizational commitment was a significant predictor of pro-environmental behaviour. Prior to conducting the simple linear regression, assumptions of linearity, independence and normality of residuals, and homoscedasticity were met. Visual inspection of a scatterplot between the organizational commitment and pro-environmental behaviour showed linearity of the association. Visual inspection of the histogram and Q-Q Plot of standardized residuals indicate independence and normality of residuals. The scatterplot of residuals vs. predicted confirmed homoscedasticity of the data.

As a next step, organizational commitment was added to "regression model 2" as an independent variable. Assumptions were tested as described above and were met; however, the data was slightly heteroscedastic.

Hypothesis (IV): Female gender, higher age, and higher level of education predict higher pro-environmental behaviour

Respondents identifying as "other" were excluded from the analysis of gender differences, due to the low number of responses. Given the unequal distribution of male participants, gender differences in pro-environmental behaviour were assessed with a Welch's t-test. This test assumes a normal distribution of sample means in both groups, which was confirmed by an insignificant Shapiro-Wilk test.

Two separate linear regressions were used to test how age and level of education predict pro-environmental behaviour. Age and level of education were independent ordinal variables but were treated as continuous variables in the analysis. Pro-environmental behaviour was the continuous dependent variable for both regressions. The assumptions of linearity, independence and normality of residuals, and homoscedasticity were confirmed in the regression between age and pro-environmental behaviour, however the regression between level of education and pro-environmental behaviour violated the assumption of homoscedasticity.

Missing Data

Participants missing >20% of total responses were excluded from analyses. Responses of participants missing >20% of items in individual questionnaires were excluded from analyses using these questionnaires. Missing data of participants missing <20% of items per questionnaire were imputed by averaging observed item scores for each respondent (Graham, 2009; Eekhout et. al., 2013).

Results

Hypothesis (I): Pro-environmental attitudes, green shared vision, and perceived behavioural control positively predict pro-environmental intention, which in turn predicts pro-environmental behaviour

The results of the first multiple linear regression showed that pro-environmental attitudes (M=4.63, SD=.67) was the strongest positive predictor for intention to act (b=0.65, β=0.54,

t(139)=7.72, *p*<.001). Moreover, higher perceived behavioural control (*M*=3.14, *SD*=.97) was associated with a significantly higher intention to act (*b*=0.13, *β*=0.16, *t*(139)=2.15, *p*=.033). In contrast, no significant associated between green shared vision (*M*=3.14, *SD*=.76) and intention to act were found (*b*=0.05, *β*=0.05, *t*(139)=0.70, *p*=.486). Overall, the regression was statistically significant and explained 36% of variance in intention (R^2=.36, *F*(3,136)=25.89, *p*<.001, *N*=140).

The second multiple linear regression indicated that intention to act was indeed the strongest predictor of pro-environmental behaviour (*M*=4.20, *SD*=.45) and that the two variables had a significant positive relationship (*b*=0.36, *β*=0.62, *t*(126)=7.30, *p*<.001). On the contrary, pro-environmental attitudes (*b*=0.03, *β*=0.05, *t*(126)=0.59, *p*=.556), green shared vision (*b*=-0.01, *β*=-0.02 *t*(126)=-0.21, *p*=.836), and perceived behavioural control (*b*=-0.00, *β* =-0.00, *t*(126)=-0.02, *p*=.986) had no significant direct effects on pro-environmental behaviour. The overall model was statistically significant and explained 41% of variance in pro-environmental behaviour (R^2=.41, *F*(4,122)=21.45, *p*<.001, *N*=127).

Hypothesis (II): Perceived behavioural control positively moderates the relationship between pro-environmental attitudes, green shared vision and pro-environmental intention

The addition of the interaction term (*attitudes*PBC*) in "regression model 1" showed that perceived behavioural control negatively moderated the relationship between pro-environmental attitudes and intention to act (*b*=-0.24, *β*=-1.58, *t*(139)=-2.55, *p*=.012). Thus, when perceived behavioural control was high, positive relationship between attitudes and intention became weaker. The inclusion of the interaction effect significantly increased the explained variance of the model from 36% to 39% (R^2=.39, *F*(4,135)=21.83, *p*<.001, *N*=140).

Hypothesis (III): Organizational commitment positively predicts of pro-environmental behaviour and adds to the robustness of the TPB

A simple linear regression indicated that organizational commitment (*M*=4.39, *SD*=1.10) significantly positively predicted pro-behavioural behaviour (*b*=0.07, *β*=0.03, *t*(163)=2.17, *p*=.031) and

explained 2.8% of the variance in pro-environmental behaviour (R^2=.03, F(1,162)=4.72, N=164). However, adding organizational commitment to "regression model 2" revealed that its inclusion does not significantly improve robustness of the model and only increased the explained variance of pro-environmental behaviour by 0.1% ($R^2Change$=.00, $FChange$(1,118)=0.15, b=0.01, β=0.03, t(123)=0.39, p=.698).

Hypothesis (IV): Female gender, higher age, and higher level of education predict higher pro-environmental behaviour

Welch's t-test showed that female participants (M=4.29, SD=0.40) scored significantly higher on pro-environmental behaviour than male participants on average (M=4.10, SD=0.50) (p=.023).

Simple linear regressions revealed that age (M=2.53, SD=1.08) significantly explained 3% of the variance in pro-environmental behaviour (R^2=.03, F(1,161)=4.92, p=.028). Higher age predicted more pro-environmental behaviours (b=0.07, β=0.17, t(162)=2.22). However, level of education (M=4.90, SD=0.29) showed no significant association with pro-environmental behaviour (R^2=.00, F(1,161)=0.11, p=.739).

Discussion

The aim of the current study was to explore whether an adjusted TPB model with perceived behavioural control as a moderator was a more robust model than the original TPB model when it comes to explaining pro-environmental behaviour in a university workplace setting. Furthermore, the study aimed to explore the role of additional factors such as organizational commitment and the demographic variables age, gender, and level of education in explaining differences in pro-environmental behaviour.

Overall, the results support the use of the original TPB when explaining differences in pro-environmental behaviour in the university workplace. In line with previous research and our hypotheses, we found that positive pro-environmental attitudes and higher perceived behavioural control can predict the intention to act pro-environmentally. Moreover, the intention to act was the strongest predictor for pro-environmental behaviour. Due to the correlational nature of the

current study no causal inferences can be made, however, future causational research could investigate how increasing the perceived behavioural control, positive pro-environmental attitudes and intentions to act may help facilitate pro-environmental workplace behaviours.

Furthermore, in an attempt to improve the robustness of the original model when applied to PEB in the university, several adjustments to the TPB model were. Notably, the current study replaced subjective norms with green shared vision as a measure of pro-environmental workplace norms. Based on previous research, we replaced subjective norms with green shared vision as a measure of social norms regarding pro-environmental behaviour in the workplace, due to it being specific about the environmentalism and the workplace (Afsar et al., 2020). In line with La Barbera and Ajzen's (2020) adjustments to the TPB model, the current study also added perceived behavioural control as a moderator of the relationship between attitudes and green shared vision with intention.

Contrary to expectation, the findings of the current study do not support the use of green shared vision as a factor in the TPB model. A strong sense of a green shared vision in the workplace did not statistically affect intention or pro-environmental significantly. A possible explanation for the lack of a significant effect might be that prior research found that the formation of a green shared vision is reliant on managers or leaders who communicate and share the achievement of the organization's goals with employees (Aragón-Correa, Hurtado-Torres, Sharma, & García-Morales, 2008). Afsar and colleagues (2020) showed that green shared vision mediates the effects of responsible leadership on PEB. In a university setting, where there are no managers and the concept of leadership might be different compared to in other organizations, a green shared vision as described in the above-mentioned studies might not be applicable in influencing behaviours in university employees. Another possible explanation might be the lack of a green shared vision in the current sample. While most participants indicated prior knowledge of sustainability initiatives by the university, this study marks the early stages of the sustainability strategy of the University of Vienna. Thus, a collective green shared vision might not have

formed yet. Future research should thus reinvestigate the effects of green shared vision at a later stage of the sustainability strategy.

Perceived behavioural control was found to only moderate the relationship between attitudes and intention. However, opposite to our expectation, perceived behavioural control moderated the relationship between attitude and intention negatively. This finding suggests that individuals with higher levels of perceived behavioural control may be less influenced by their attitudes when forming intentions to act. However, this finding is not in line with previous research by La Barbera and Ajzen (2020) and Blok and colleagues. Blok and colleagues (2015) noted that while perceived behavioural control would logically interact with attitudes and subjective norms in determining intentions and behaviour, these interaction effects would only be empirically measurable if values of the predictor variables cover the full range of possible scores. Our data showed a clear ceiling effect for attitudes and intention; this data is therefore limited in its ability to measure these interaction effects. As such, our results do not give conclusive evidence for the benefit of adding perceived behavioural control as a moderator. Further research is necessary to determine the moderating effect of perceived behavioural control in a university setting.

To add to the existing literature, we explored the effects of organizational commitment and the demographic variables gender, age, and level of education on pro-environmental behaviour. Our results show a positive relation between organizational commitment and pro-environmental behaviour in the university workplace when analysed isolated from other variables. However, this significant effect was not present after adding organizational commitment to the TPB model. This points towards the possibility, that the effects of organizational commitment were mediated by another variable in the TPB model. Still, previous research reports mixed results on the effects of organizational commitment on pro-environmental behaviour. Our results are supported by studies (Devece, Palacios-Marqués, Alguacil, 2016, Ng & Feldman, 2011) showing that higher organizational commitment leads to more organizational citizenship behaviours. However, Afsar and colleagues (2020) found no correlation between organizational com-

mitment and PEB when conducting their study in a business setting. The reason for the mixed results can perhaps be due to PEBs being an organizational citizenship behaviour towards the environment, whereas employees high in organizational commitment are more likely to engage in other OCBs such as task performance, job engagement, and proactive behaviour (Pradhan & Pradhan, 2015). Our study underlines that organizational commitment does predict PEB in universities to some degree.

Our hypothesis on the relationship between gender and PEB was supported by our findings. Our results show that women perform significantly more PEBs than men. However, our results suggest that people act pro-environmentally independent of their age and level of education.

The current study has some limitations. Firstly, due to being part of a larger study and limitations to the total length of the survey, questionnaires were significantly shortened. While Cronbach's alpha (i.e., reliability) remained high, it is unknown how the validity of the questionnaires changed due to the changes made. Secondly, the participation was voluntary and only a fraction of total employees responded. This may indicate a non-response bias where employees interested in the sustainability strategy participated disproportionately more than uninterested employees. Thirdly, we observed a ceiling effect for pro-environmental attitudes, intention to act and level of education. This led to problems interpreting interaction effects of perceived behavioural control in the adjusted TPB model. The ceiling effect may be a real representation of the population or due to self-selection as mentioned before. Further research is needed. Lastly, our data were collected through self-report questionnaires, and can therefore reflect self-report biases. Further research is needed to explore the internal validity of the current study and the generalizability of subsequent findings.

Despite some limitations, the current study has several strengths. Firstly, the final sample size of $N = 197$ exceeded our aim to recruit 148 participants. This ensures sufficient power. Further, the questionnaire was sent out via the official digital newsletter of the University of Vienna,

reaching all staff of the university and while non-response bias might have been a limitation, sampling bias was not. In addition, response biases such as the desirability bias and social pressure phenomena would be limited due to the online setting and participants and responses being fully anonymized. Furthermore, a lack of information and awareness does not confound our study as most participants indicated previous knowledge of the university's green strategies and initiatives. Moreover, Cronbach's alpha of all questionnaires was high indicating good reliability. Lastly, the current study added to the literature by investigating the TPB in a university setting and tested the viability of an adjusted model. We further investigated demographic differences regarding PEB in a university, which has rarely been studied prior.

In sum, while not all hypotheses were supported, our results illustrate the robustness of the TPB model when applied to pro-environmental behaviour in a university workplace setting. Studying pro-environmental is acutely relevant due to global efforts to reduce emissions and combat climate change. Research on pro-environmental behaviour is especially important in the university workplace context, as these institutions have carbon footprints comparable to large companies. Additionally, they educate and set examples to the public. A better understanding of the predictors of pro-environmental behaviour allows universities to adopt better sustainability strategies and reveal specific targets work on. Our model explained less than half of the variance in pro-environmental, and thus fails to fully predict pro-environmental behaviour in the university workplace. Further research is needed to investigate other factors that relate to pro-environmental behaviour in the workplace. Our efforts to improve on the TPB model with adjustments were not conclusive due to some shortcomings in our data. Further research is needed to prove whether the adjusted TPB model is more robust model. Yet, our findings have shown that in universities, intention is the strongest predictor for pro-environmental behaviour and must therefore be the focus of interventions to increase pro-environmental behaviour. Finally, given our finding that females and older employees exhibit higher levels of pro-environmental behav-

iours in the workplace, future research may explore strategies to enhance the engagement of male employees and younger employees.

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