EFFECTS OF PSYCHOSOCIAL DETERMINANTS ON PRO-ENVIRONMENTAL BEHAVIOUR: A STUDY CONDUCTED WITH UNIVERSITY STUDENTS IN ETHIOPIA

by

Eshetu Alemu Jilcha

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Supervisor: Prof Kitty B. Dumont

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DECLARATION

I, Eshetu Alemu Jilcha (student number 42620201), declare that *Effects of Psychosocial Determinants on Pro-Environmental Behaviour: A Study conducted with university students in Ethiopia,* is my work and that all the sources that I have used or quoted have been indicated and acknowledged employing complete references. I further declare that I have not previously submitted this work, or part of it, for examination at UNISA or any other higher education institution for another qualification.

Name: Eshetu Alemu Jilcha   Date: 27 February 2022

Signature:

ABSTRACT

The overall aim of the present research was to investigate the psychological and social factors underpinning pro-environmental behaviour assessed as reduction of electricity use and disposal of waste materials in the context of university students. In three cross-sectional studies, a total of 800 students, who were conveniently sampled from the University of Addis Ababa in Ethiopia (i.e., 200 undergraduate and 600 postgraduate), participated in the research. In these studies, we tested the interplay between self-transcendent and self-enhancing values, environmental beliefs, and personal norms in explaining pro-environmental behaviour as predicted by the value-belief-norm theory (Studies 1, 2, and 3) and its conditionality upon social class (Studies 2 and 3), cultural orientations (Study 2), and social norms (Study 3). All three studies provided evidence that the value-belief-norm theory is appropriate to explain a significant proportion of variance in pro-environmental behaviour. Moreover, the results of Study 2 and 3 revealed that the relationships between value orientations and pro-environmental behaviour through environmental beliefs and personal norms are indeed partially conditional upon social class (Study 2 and 3), cultural orientations (Study 2), and social norms (Study 3). The findings of the present research have theoretical, policy, and practical implications, which are relevant for environmental protection interventions in the context of higher education institutions in Ethiopia in general and the University of Addis Ababa, in particular.

SUMMARY

Identifying determinants of pro-environmental behaviour is paramount in promoting environmentally desirable behaviours as well as reducing practices that induce environmental threats. Both environmental and social psychology have been making important theoretical and empirical contributions to the discourse of human-environment interactions by proposing and testing theories and models that define such determinants of behaviours relevant to environmental protection (Stern, 2011; Klöckner, 2013; Sun et al., 2015). Building on these environmental and social psychological research traditions, the present research aimed at extending our understanding of pro-environmental behaviour by studying its dependency on the interplay between psychological and social factors within the context of developing countries, which are rather underrepresented in research related to environmental issues (e.g., Blankenberg & Alhusen, 2018; Cotton, Shiel, & Paco, 2016; Gifford & Nilsson, 2014; Hertwich & Peters, 2009; Thondhlana & Hlatshwayo, 2018; Vicente-Molina, Fernandez-Sainz, & Izagirre-Olaizola, 2013). More specifically, the present research explored pro-environmental behaviour from the perspective of the value-belief-norm theory (Stern et al., 1999; Stern, 2011), which is one of the most important theories in the field of environmental psychology, in the context of higher education institutions in Ethiopia (Studies 1 to 3). Furthermore, the present research explored the role of social factors such as social class, cultural orientation, and social norms in influencing the interplay between value orientations and pro-environmental behaviour through environmental beliefs and personal norms by applying the *measurement of mediation design* (Pirlott & McKinnon, 2016) which allowed us to test moderated-mediation models statistically.

The overall results based on three studies support the findings of previous research in that both self-transcendence and self-enhancement values orientations play an important role in explaining pro-environmental behaviour (Stern et al., 1999). For instance, the present results

support the reasoning of Stern (2000, p. 413) that people's response to environmental challenges depends on whether self-transcendent or self-enhancing values are affected by those challenges. Although both self-transcendence (i.e., biospheric and altruistic) and self-enhancement (i.e, egoistic) value orientations contributed directly and indirectly to explaining pro-environmental behaviour, it appeared that in the context of the study population, pro-environmental behaviour (i.e., conservation of electricity and disposal of waste materials) was mainly affected by biospheric values (Studies 1-3). More specifically, biospheric value orientation was positively and directly related to pro-environmental behaviour in all three studies, implying that individuals valuing nature and other species tend to show pro-environmental actions (e.g., Ibtissem, 2010; Werff & Steg, 2016). Likewise, egoistic value orientation showed a negative correlation with pro-environmental behaviour persistently across the three studies, implying and replicating previous findings that individuals who endorse self-enhancing values are less likely to care for their environment (e.g., Gifford & Nilsson, 2014; Jia et al., 2017; Nordlund & Garvill, 2002; Saladié & Santos-Lacueva, 2016).

The present research also assessed the role of environmental information, age, gender, and geographic origin of the participants in explaining pro-environmental behaviour. It was found that environmental information from family/community is positively related to pro-environmental behaviour (Study 1), that age is negatively related to pro-environmental behaviour (Study 2), and that females show relatively more pro-environmental behaviour (Study 2). In contrast, pro-environmental behaviour was not affected by participants' geographical origin (Study 1).

In addition, Studies 2 and 3 explored whether the direct and indirect relationships between value orientations and pro-environmental behaviour through environmental beliefs and personal norms are conditional upon social class (Studies 2 and 3), cultural orientations (Study 2), and social norms (Study 3). Our results revealed that social class influenced the

direct effect of value orientations on pro-environmental behaviour as well as the indirect effect of value orientations on pro-environmental behaviour through personal norms (Study 2) and environmental beliefs (Study 3). For instance, Study 2 found that the positive indirect effect of altruistic value orientation on pro-environmental behaviour through personal norms is only significant in low social class participants. Equally, we found that the effect of egoistic value orientation on pro-environmental behaviour through personal norms was positive in low social class participants. These results imply that because of their altruistic and egoistic value orientations low social class participants feel morally obliged to act pro-environmentally. The moderation effects of cultural orientations were less straightforward also because the majority of participants in our research shared harmony-cultural orientations.

Like social class, social norms influenced the direct and indirect effects of value orientations on pro-environmental through environmental beliefs (Study 3). The results of the moderation effect of social norms show that biospheric value orientations play an important role in influencing pro-environmental behaviour either directly or indirectly through environmental beliefs when descriptive and injunctive pro-environmental social norms are absent; whereas people act pro-environmentally when the descriptive and injunctive pro-environmental social norms are conforming with their values (e.g., through altruistic values) but not when they are contradicting with their values (e.g., through egoistic values).

In conclusion, the present research contributes to the existing body of research explaining pro-environmental behaviour by providing evidence that the outcomes of the value-belief-norm theory are indeed conditional upon social factors such as social class, cultural orientation, and/or social norm. These findings demonstrate again that the social context matters. Furthermore, the findings of the present research have valuable implications for theoretical, policy, and practical interventions to protect the environment within the context of Ethiopia.

INTRODUCTION

In the past decades, unprecedented environmental challenges such as high temperatures, flooding and landslides, droughts, and loss of biodiversity resulting from factors such as increased carbon emissions, pollution, and land degradation have overwhelmed many communities all over the world. In response to these challenges, mainly resulting from climate change, a global environmental movement has developed since the 1980s (Dibie, 2001). As an immediate outcome of this global movement, an increasing number of governmental and non-governmental agencies, research institutions, civil society organizations, professional associations, and individual researchers have been pooling together their concerted efforts to explore and identify causes of and solutions for these diverse environmental challenges. More specifically, the main directions of these interdisciplinary and international efforts have been towards the understanding of key drivers and processes that cause climate change to predict climate development over time, and mitigate the negative outcomes (Dorsch, 2014; Farinha, Caeiro, & Azeiterio, 2019; Green, 2013; Klöckner, 2013; Stern, 2011).

There is a wide recognition among environmental researchers, now more than ever before, that environmental problems are rooted in human behaviours, which is also called the anthropogenic origin of climate change (e.g., Dorsch, 2014; Duarte, Escario, & Sanagustin, 2017; Farinha et al., 2019; Fritsche et al., 2018; Fu et al., 2018; Quimby & Angelique, 2011; Steg & Vlek, 2009; Stern, 2011). Therefore, an important perspective in addressing environmental problems such as air pollution, disposal of waste, and consumption of environmentally unfriendly products is to investigate the psychological, social, and contextual factors that influence individuals' and groups' behaviour related to the environment (Blankenberg & Alhusen, 2018; Cotton et al., 2016; Gifford, 2007). The fact that psychology is the study of human behaviour makes it intuitive to utilize its theories and methodologies to better understand human behaviour pertinent to the environment and eventually solve issues of

human-driven environmental problems. Accordingly, since the 1980s environmental and social psychology have been making important contributions to discourses of the human-environment interaction by proposing and testing theories and models that aim at explaining and predicting environmentally relevant behaviour and identifying entry points for interventions to change behaviour (Cotton et al., 2016; Sun et al., 2015; Stern, 2011).

In cognizant of the contribution of individual and collective behaviour to environmental threats, psychological research aims at studying the determinants of pro-environmental behaviours such as consumption, mobility, energy use, and recycling (Blankenberg & Alhusen, 2018; Gifford & Nilsson, 2014; Hertwich & Peters, 2009). For instance, Hertwich and Peters (2009) argue that household behaviour is one of the strongest contributors to total energy use and thus carbon dioxide emissions in most developed countries when both direct and indirect energy consumption embedded in consumer goods and services are taken into account. More specifically, based on their analysis of the carbon footprint of 73 nations, they propose that 72% of all carbon dioxide emissions worldwide are connected to household consumption (i.e., food, shelter, and mobility) (Hertwich & Peters, 2009). In a similar vein, an earlier study by Tukker and Jansen (2006) revealed that around 70% of all household-related products and services fall into the categories of food, housing, and transport. Therefore, it is crucial to recognize that human behaviour significantly contributes to global environmental challenges and that behavioural change potentially reduces this negative impact significantly.

To this end, the first step towards encouraging pro-environmental behaviour on either individual or collective levels is identifying factors that drive the propensity to pro-environmental actions. As there is a steady growth of environmental research based on different theoretical perspectives, the contention about comprehensive theoretical models explaining pro-environmental behaviour is getting stronger (e.g., Chan & Bishop, 2013; De Groot & Steg, 2010; Hansala, 2011; Stern, 2000). Although morality-based models such as the value-belief-

norm theory have been considered effective in predicting different types of pro-environmental behaviours (e.g., Amaral, Martins, & Gouveia, 2015; Chan & Bishop, 2013; De Groot & Steg, 2010; Stern, 2000), it is far from being a comprehensive model explaining pro-environmental behaviour. One of the limitations of the value-belief-norm theory is its sole focus on personal norms and their interplay with values and beliefs (Stern, 2000) as predictors of pro-environmental behaviours while neglecting the influence of social and contextual factors such as the material conditions in which people grow up and live as well as the cultural values and social norms people share. Hence, the present research attempts to address this limitation by extending the value-belief-norm theory.

In its original form, the value-belief-norm theory considers a cluster of intrapersonal components such as individual values, beliefs, and personal norms that stand in a causal chain interacting with each other and influencing environmental behaviour (Stern, 2000). Previous studies that attempted to expand the value-belief-norm theory have mainly focused on including personal factors such as knowledge and attitudes in the original model (e.g., Olaizola et al., 2014; Vicente-Molina et al., 2013). We argue that the systematic inclusion of social and cultural factors besides intrapersonal factors into the model will increase the understanding of the interplay of these factors in explaining pro-environmental behaviour. Thus, the overall aim of the present research was to extend the value-belief-norm theory by exploring the role of social class, cultural orientation, and social norms, to provide new insights into understanding pro-environmental behaviour.

Notwithstanding the importance of behavioural change at the household level, the contributions of individual and group actions at the institutional level should not be underestimated to foster pro-environmental behaviour. Particularly, higher education institutions are considered important social settings in the effort to address environmental challenges the world community is facing. At one of the United Nations conferences (UN,

2012), the commitment to the Higher Education Sustainable Initiative was announced, including teaching sustainable development concepts, encouraging research on sustainable development, making campuses more sustainable (i.e., environmentally friendly), involving the community in all these actions, and committing institutions to concrete results and actions. Likewise, it is widely argued in the literature that universities play an important role in promoting pro-environmental behaviour through research, teaching, and training of future leaders (Cortese, 2003; Green, 2013; Vicente-Molina et al., 2013; Wang, Shi, Sun, Huisingh, Hansson & Wang, 2013). By making environmental protection a central part of their functions, universities are playing a key role in promoting environmental protection in society. As Lozano (2006, p. 23) stated "the future leaders, decision-makers and intellectuals of the social, political, economic, and academic sectors are created, formed, and shaped within the world's higher education institutions" as university students influence beyond their campuses in such a way that they do not only gain knowledge but also share this knowledge with people outside the universities (Green, 2013). Likewise, Vicente-Molina et al. (2013) described universities as having a pivotal role to play in impelling pro-environmental behaviour and solutions, since they aim to raise responsible, competent individuals with knowledge, skills, and values that will contribute to an environmentally sustainable world.

The focus on pro-environmental behaviour of university students requires environmental actions relevant to this particular group. While the majority of the previous studies address activities like recycling, mobility, or consumption as pro-environmental behaviours (e.g., Ibtissem, 2010; Nordlund & Garyill, 2003; Vicente-Molina et al., 2013), the present research focused on a set of actions related to the conservation of electricity and waste disposal practices as a composite measure of pro-environmental behaviour. In the context of the present study, conservation of electricity denotes intentional actions performed to minimize the consumption of electricity for personal use. Similarly, waste disposal practices refer to

intential measures taken after a substance, material, or product becomes waste to deposit in a proper place. The selection of these two pro-environmental actions was informed by previous studies stressing that collecting waste is an enormous challenge for countries across the world (e.g., Bortoleto, Kurisu, & Hanaki, 2012; Liotbike & Poškus, 2019; Yesuf, Mekonnen, Kassie, & Pender, 2007), and suggesting that fostering energy conservation through reducing individual energy consumption contributes to narrowing the climate change mitigation gap (e.g. Kiatkawsin & Han, 2017; Wynes & Nicholas, 2017).

Therefore, the present research extends the understanding of pro-environmental behaviour conceptualized as electricity conservation and waste disposal practices by exploring psychological factors relevant to university students sampled from the University of Addis Ababa in Ethiopia. In its broader scope, the current research envisions stimulating environmental research in developing countries, which is rather underrepresented. Pointing to this inequity, Cotton et al. (2016) and Vicente-Molina et al. (2013) argue that most research on pro-environmental behaviour originates from WEIRD nations (i.e., western, educated, industrialized, rich, and democratic), while little is known about pro-environmental behaviour in developing countries. Consolidating this view, research revealed that over 90% of the psychological research is produced by researchers located in WEIRD nations and conducted with WEIRD participants who represent only 12 per cent of the world's population and that the majority of studies are conducted in the United States (Henrich, Heine, & Norenzayan, 2010). Likewise, the findings by Tam, Leung, and Claytons (2021), based on a systematic review of climate change research in social psychological publications, showed that the majority of studies (109 out of 118 studies: 92.37%) involved samples or data collected in WEIRD countries, while half of these studies (60 out of 109studies: 50.85%) involved samples or data collected in the United States. Only two studies (out of the 118 studies: 1.69%) involved samples from Africa. Not surprisingly, Tam et al. (2021, p.137) call for expanding the

geographical coverage of future psychological and behavioural research focusing on climate change and other environmental issues by including non-WEIRD countries given that climate change affects people from every corner of the globe. Therefore, the current research contributes towards narrowing this gap as it was conducted in the context of a non-WEIRD country, i.e., Ethiopia, and thus provides empirical evidence about the validity of the value-belief-norm theory within a geographical context that has not been covered by previous research.

Organization of the Thesis

The present thesis consists of four parts including this introduction. The following second part, which is referred to as the Literature Review, introduces the dominant psychological theories such as the theory of planned behaviour (Ajzen, 1991), the norm activation theory (Schwartz, 1977), and the value-belief-norm theory (Stern, 2000) as well as discusses the differences and commonalities between these theoretical frameworks in light of pro-environmental behaviour. Moreover, the findings of the related research are discussed and the psychological concepts of the value-belief-norm theory are outlined in detail. Finally, the concepts of social class, cultural orientation, social norms, and demographics are discussed concerning their relationship with pro-environmental and their influence on the interplay between values, beliefs, and norms in explaining pro-environmental behaviour. Based on the theories, concepts, and related research, we derived eleven research hypotheses that were tested in three separate studies within the context of a higher education institution (i.e., the University of Addis Ababa) in Ethiopia.

The third part of the thesis reports three studies that explored the direct and indirect effects of self-transcendent value orientations (i.e., biospheric and altruistic value orientations) and self-enhancement value orientations (i.e., egoistic value orientations) on pro-

environmental behaviour through environmental beliefs and personal norms (Studies 1 - 3). Furthermore, the present research explored the role of demographics (Studies 1 and 2), environmental information (Study 1), and social factors such as social class (Studies 2 and 3), cultural orientation (Study 2), and social norms (Study 3) in influencing the interplay between values and pro-environmental behaviours through environmental beliefs and personal norms. Research design, participants, procedure, measurements, results, and discussion are outlined for each study.

The final part of the thesis contains the General Discussion. This section starts with summarizing the overall aims of the present research followed by discussions of the findings in contrast to previous research. Next, the contributions of the research are outlined. Specifically, this section discusses how the results of the present research contribute to the study of pro-environmental behaviour in the context of developing countries like Ethiopia in general, and in higher education institutions in particular. Moreover, this section discusses the roles of social class, cultural orientation, and social norms in moderating the effects of value orientations on pro-environmental behaviour through personal norms and environmental beliefs. Then, the limitations of the study concerning participants, design, and measurements are discussed. Based on the outlined limitations, recommendations for future research are proposed. Finally, some guidance for evidence-based intervention programs in the context of Ethiopian higher education institutions in fostering pro-environmental behaviour is discussed by stressing three possible areas: installing self-transcendent value orientations among students, communicating strategy on environmental social norms, and initiating discourses on environmental protection to endorse environmental beliefs.

LITERATURE REVIEW

Most environmental researchers do not only agree on the anthropogenic origin of climate change and related environmental challenges but also on the importance of fostering pro-environmental behaviour to combat the adverse impacts of climate change on humanity and nature (Blankenberg & Alhusen, 2018; Gifford & Nilsson, 2014; Hertwich & Peters, 2009). Although scholars differ in defining pro-environmental behaviour, most of them agree on its basic features. For instance, Iwata (2001, cited in Ojedokun, 2009, p. 115) describes pro-environmental behaviour as "[...] categories of behaviour such as recycling and energy conservation, which can help to alleviate the alarmingly rapid deterioration of the global environment". Likewise, Kollmuss and Agyeman (2002) define pro-environmental behaviour as "[...] behaviour that consciously seeks to minimize the negative impact of one's actions on the natural and built environment" (cited in Schuett, 2011, p. 240). Steg and Vlek (2009, p. 309) define pro-environmental behaviour as "[...] behaviour that harms the environment as little as possible, or even benefits the environment".

Therefore, the essence of pro-environmental behaviour refers to individual or group actions that aim at doing what is right and undoing what is wrong with the intention of protecting the environment in the course of daily practices. Essentially, pro-environmental actions are manifested in different forms and complexities. For instance, they can take the forms of recycling, saving energy, shopping "green", etc. In terms of complexity, they can range from daily routines of separating plastic, paper, glass, and regulating consumption pattern, etc., which is performed at an individual or household level, to more complex organizational behaviours such as introducing and implementing waste management regulations, policies and programs at the organizational, local and national levels.

Fostering pro-environmental behaviour requires mainly two interrelated endeavours. The first is the recognition and identification of the different forms of pro-environmental

behaviours with their manifestations and desirable effects on the environment. In this regard, researchers proposed different classifications of pro-environmental behaviour. For instance, Karp (1996) proposed three forms of pro-environmental behaviour: *activist behaviour* such as joining an environmental organization or campaigning for the environment, *good behaviour* such as waste separation or recycling, and *healthy consumption behaviour* such as the avoidance to purchase polluting products (e.g., plastic). Stern (2000), on the other hand, distinguishes pro-environmental behaviours along with two dimensions of *private* pro-environmental behaviours (e.g., purchase, use, and disposal of personal products or services) and *public* pro-environmental behaviours (e.g., discourse on environmental issues, pro-environmental policies, and encouraging people to participate in pro-environmental activities).

Secondly, it is necessary to recognize the different theoretical frameworks that explore and explain what people think, do, and feel about the environment. This requires comprehending the existing scientific knowledge describing people's cognitive, emotional, social, and contextual characteristics in their interaction with the environment. Three theoretical approaches dominate the theoretical framework used to explain pro-environmental behaviour. These are the theory of planned behaviour (Ajzen, 1991), the norm activation theory (Schwartz, 1977), and the value-belief-norm theory (Stern, 2000). Their dominance was, for instance, demonstrated by Klöckner (2013) who, based on the review of various studies published before 2013, showed that four out of five research papers were based on one or a combination of these three theoretical perspectives. In the following section, these three theoretical approaches will be discussed.

Psychological approaches explaining pro-environmental behaviour

Theory of planned behaviour

Ajzen (1991) introduced the theory of planned behaviour, which builds on the theory of reasoned action by Fishbein and Ajzen (1974), as a general model of deliberate behaviour. The theory of planned behaviour is one of the social psychological theories that strongly influenced the study of human behaviour (Ajzen, 2011) in general and pro-environmental behaviour in particular. The theory proposes that intention, defined as the manifestation of a person's readiness to perform a particular action (i.e., intention), is the most accurate predictor of behaviour when the respective behaviour is under "volitional" control (Ajzen, 1991). Intention, as a proximal component of behaviour, is an outcome of people's attitudes toward a specific behaviour, people's social surroundings (i.e., subjective norms), and the behavioural control people believe to have (Ajzen, 1991, p. 188). Attitudes towards a behaviour reflect both the degree to which people positively or negatively value the specific behaviour (i.e., the experiential attitudes) and the beliefs people have about the outcome of the specific behaviour (i.e., instrumental attitudes; see Montaño & Kasprzyk, 2008). Subjective norms, on the other hand, indicate the influence of significant others on individuals' behaviour. Lastly, perceived behavioural control refers to the degree to which people perceive that they have the ability and resources to perform a specific behaviour. Figure 1 displays the direct and indirect relationships between the proposed psychological constructs.

Figure 1

The theory of planned behaviour
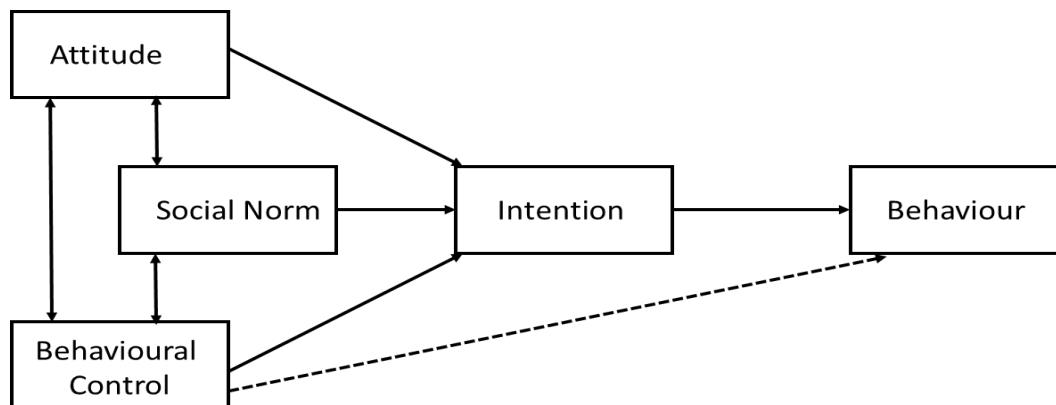
Several studies demonstrated the theory's value in predicting pro-environmental behaviour (e.g., Boldero, 1995; Sparks & Shepherd, 2017; Taylor & Todd, 1997). For example, Boldero (1995) found that intentions to recycle directly predicted actual recycling behaviour and that positive attitudes toward recycling behaviour predicted recycling intentions. In another study, attitudes toward green consumerism, subjective norms, and perceived behavioural control were all significantly related to individuals' intentions to consume organic products (Sparks & Shepherd, 2017). Also, in line with the theory of planned behaviour, Taylor and Todd (1997) found that both attitudes toward recycling and perceived behavioural control were positively related to individuals' recycling and composting intentions. Likewise, Cheung, Chan, and Wong (1999) found that attitudes, subjective norms, and perceived behavioural control influence intention which in turn influences the recycling of wastepaper. Similarly, Armitage's and Conner's (2001) review of 187 studies reported that attitudes, subjective norms, and perceived behavioural control explain on average 39% of the variance of recycling intention and 27% of the variance of recycling behaviour. However, Armitage and Conner (2001) also concluded that subjective norms represent the weakest component in predicting recycling intention and behaviour, which they attributed to measurement issues and theoretical ambiguity

of the normative component. The limited impact of subjective norms on behavioural intention and behaviour has also been demonstrated by Abrahamse and Steg (2013) as well as by Fielding et al. (2011).

Ambiguous results were also found about the perceived behaviour control as it was found to be a significant predictor of recycling intention in some studies (e.g., Strydom, 2018), while in others it did not have a significant effect on recycling intention (e.g., Klöckner, 2013; Hunecke et al. 2001). The meta-analysis by Armitage and Conner (2001, p. 486) showed nevertheless that "the inclusion of perceived behaviour control adds on average 6% to the prediction of intention, over and above attitude and subjective norm".

Besides these ambiguous findings, the theory of planned behaviour did not only receive strong empirical support but is also considered a parsimonious model that allows the inclusion of additional constructs. However, it has been criticized for underrepresenting the impact of morality on environmental behaviour (e.g., Klöckner & Blöbaum, 2010), which has been addressed by the norm activation theory and its successor, the value-belief-norm theory, as described below.

Norm activation theory

The norm activation theory was originally introduced to explain altruism and helping behaviour (Schwartz, 1977). This approach aims at identifying factors that predict conditions under which people are willing to help others. Schwartz (1977) proposed that people help each other if they feel morally obliged to do so, which he named *personal norms*. Personal norms are the reflection of a personal value system in a given situation, which has to be activated before becoming relevant as a determinant of behaviour. To activate personal norms, four conditions need to be fulfilled (see Klöckner, 2013, p. 1035): (1) a person needs to be aware of the need for help, a construct referred to as *awareness of need,* (2) a person needs to be aware

of the consequences a certain behaviour would have for the person in need which is referred to as *awareness of consequences*, (3) a person needs to accept responsibility for his or her actions which is referred to as *ascription of responsibility*, and (4) a person has to perceive him or herself as capable of performing the helping action (i.e., *ability and efficacy*). The latter construct is comparable to perceived behavioural control as proposed by the theory of planned behaviour.

In Schwartz's (1968) original norm activation theory both awareness of consequences and ascription of responsibility are considered individual tendencies that indirectly influence behaviour through personal norms. Some people tend to be more aware of the consequences of their potential acts for other people, while others are less or not at all aware of the implications of their behaviour. The same holds for the ascription of responsibility, in that some people accept responsibility, while others deny it. Likewise, the indirect influence of efficacy and individual ability on behaviour through personal norms has been underlined in the model. Figure 2 summarizes the basic assumptions of the norm activation theory.

Figure 2

The norm activation theory
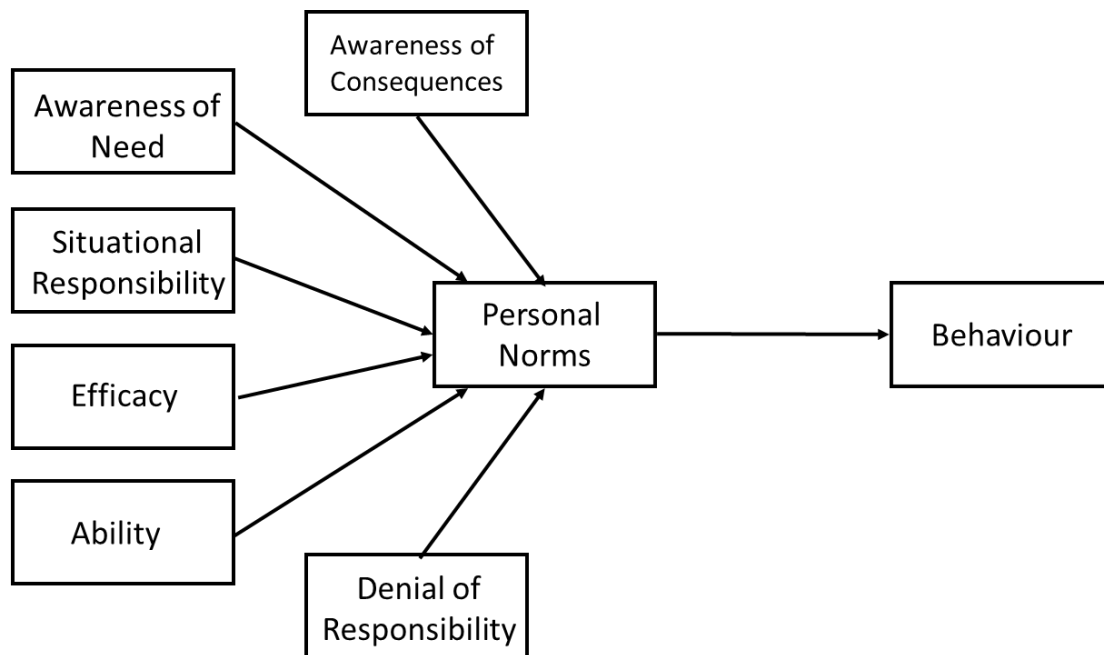
Given that the norm activation theory had been developed to explain altruistic and helping behaviour in an interpersonal context, its application to person-environment interactions or environmentally relevant behaviour does not seem apparent. However, Thøgersen (1996) argued that environmental behaviour belongs to the moral domain, which means that it is not solely determined by cost-benefit calculations as described in the theory of planned behaviour but also by moral beliefs about what is right and wrong in human interactions in general. Subsequently, Stern et al. (1999) stated that pro-environmental actions are fostered in response to personal norms, which are activated within individuals who believe that environmental conditions pose threats to oneself, other people, other species, or the biosphere (see also Stern, 2000). This mindset corresponds with the awareness of consequences that leads to actions aiming at averting those consequences which in turn corresponds with an ascription of responsibility. Thus, the extent to which people are aware of the consequences of behaving pro-environmentally and the extent to which they feel responsible for showing this

behaviour corresponds with their personal norms (Wall, Devine-Wright, & Mill, 2007). In a similar vein, Harland, Staats, and Wilke (2007) stressed the relevance of norm activation theory to the study of pro-environmental behaviour because pro-environmental behaviour often involves the sacrifice of immediate individual benefits for the greater good, being the environment. As all people share the benefits of a better environment, by acting pro-environmentally, people subordinate their individual needs to the needs of the community, thereby showing altruistic behaviour.

Several studies showed that pro-environmental behaviour is influenced by factors proposed by norm activations theory (e.g., Axsen & Kurani, 2012; Bak, 2018; Harland et al., 2007; Stern et al., 1999; Wall et al., 2007). For example, Harland et al. (2007) studied the role of awareness of consequences and personal norms for recycling behaviour and their findings supported the relationships as proposed by Schwartz (1968). They concluded that personal norms influence behavioural intentions and the actual behaviours to use, for instance, unbleached paper, transport forms other than a car, energy-saving lightbulbs, and no running water while brushing teeth (Harland et al., 2007). Likewise, Wall et al. (2007) found support for the main effects of awareness of consequences and personal norms on car-use intention, and Stern et al. (1999) showed that personal norms influence consumers' choice of environmental-friendly packaging at supermarkets. In Harald et al.'s (2007) study, the norm activation model explained 55 per cent of the variance of pro-environmental behaviour (e.g., the use of energy-saving bulbs).

Unlike the theory of planned behaviour, the norm activation theory focuses strongly on the moral drivers of pro-environmental behaviour. Or to put it differently, while the theory of planned behaviour conceptualizes pro-environmental behaviour from the perspective of self-interest based on cost-benefit estimations, the norm activation theory views it as pro-socially motivated (Bamberg & Möser, 2007). The successor of the norm activation theory is called the

value-belief-norm theory, which views pro-environmental behaviour as guided not only by personal norms but also by internalized values and beliefs.

Value-belief-norm theory

Building on the theoretical accounts of Schwartz's norm activation theory (Schwartz, 1977), Stern (2000) proposed the value-belief-norm theory which includes the concern for the self and non-human/living world in addition to the concern for the welfare of others. More specifically, Stern (2000) proposes that environmental concern is a tripartite phenomenon that includes concern about non-human species (i.e., biospheric), concern about the welfare of other human beings (i.e., altruistic), and concern for oneself (i.e., egoism or self-interest orientation).

Stern's (2000) value-belief-norm theory is an attempt to link the assumptions of the norm activation theory to findings on the relationship between general values, environmental beliefs, and behaviour. The propensity to act in an environmentally friendly way is thus associated with the relative values individuals attach to themselves, other people, nature, and the anticipated consequences for the most valued objects (Stern, 2000, p. 413). More specifically, people tend to act pro-environmentally to minimize or prevent environmental challenges that affect whatever they value most out of the three value structures (i.e., self, other people, or nature).

Figure 3 displays the conceptual framework of the value-belief-norm-theory. Stern (2000) asserts that the logical progression, as proposed in the value-belief-norm model, is that environmental values (i.e., egoistic, altruistic, and biosphere) influence the ecological worldview (i.e., beliefs) people share, which influences the beliefs about the adverse consequences of a given threat on the valued object and the perceived ability to reverse that particular threat. These beliefs lead to a sense of obligation (i.e., personal norms), which influences behaviour. Importantly, Stern (2000) defines the conditions under which value

orientations influence beliefs and pro-environmental behaviour. He argues that value orientations influence beliefs and pro-environmental behaviour when the threats contain value-congruent information rather than value-incongruent information because value-congruent information is given more weight than value-incongruent information. Consistent with this position, Hansla (2011, p. 771) described the rationale for a logical connection between values and beliefs by stating that "[…] a value orientation engages a top-down process that biases individuals to select and believe in information that is congruent with the value orientation and to deny value-incongruent information". In a similar vein, De Groot and Steg (2010, p. 376) underlined the influence of values on personal norms and intention asserting that "[…] people feel morally obliged to act following their prevalent values".

Figure 3

The value-belief-norm theory
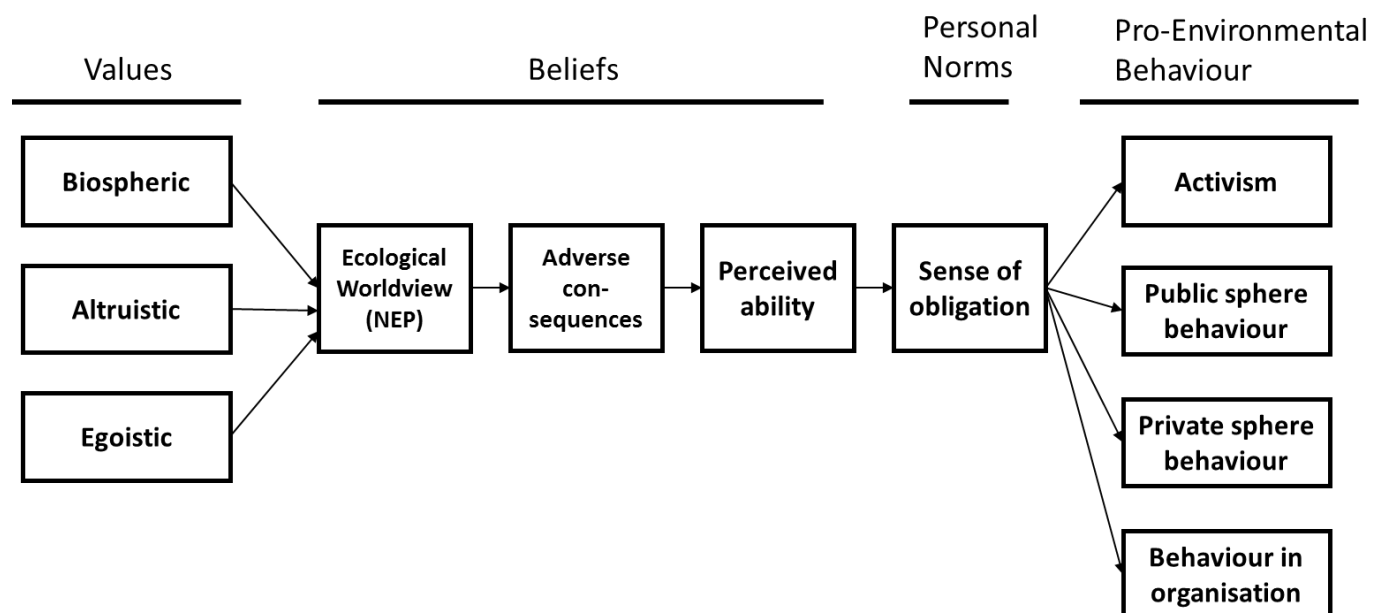
Several studies applied the value-belief-norm theory and provided empirical support for its validity in explaining pro-environmental behaviour (e.g., De Groot & Steg, 2010; Gamble, Juliusson, & Gärling, 2008; Hansla; Oreg & Katz-Gerro, 2006; Stern, 2000; Hansla, 2011; Steg, Dreijerink, & Abrahamse, 2005). For instance, Oreg and Katz-Gerro (2006) reported that the value-belief-norm model accounted for 19 per cent of the variance in consumer behaviour, 35 per cent of the variance in willingness to donate blood and 30 per cent of the variance in environmental citizenship.

Regarding the effects of values on pro-environmental behaviour as proposed in the value-belief-norm model, research showed that biospheric value orientations consistently and positively correlate with pro-environmental behaviour (Ibtissem, 2010; Jia et al., 2017; Schultz, 2002), whereas the effects of both egoistic and altruistic value orientations are rather ambiguous (Hornsey et al., 2016; Schultz et al., 2004). For instance, egoistic value orientation is significantly negatively correlated with pro-environmental behaviour in some studies (e.g., Schmuck & Vlek, 2003; Schultz et al., 2004), while in other studies the relationship was not statistically significant (e.g., Olaizola et al., 2014). Likewise, altruistic value orientation is significantly positively correlated with pro-environmental behaviour in some studies (e.g., Sloot et al., 2018) but not at all in others (e.g., Bouman, Steg, & Kiers, 2018; Kis, Verschoor, & Sargisson, 2019). The researchers provided various explanations for the inconsistent effects of egoistic and altruistic values on pro-environmental behaviours. For instance, Bouman et al. (2018) stated that although altruistic value orientations are positively related to pro-environmental behaviour most of the time, the relationship can turn negative when those altruistic values conflict with biosphere values. The case in point is the scenario in which the choice is between, for instance, donating to a humanitarian or environmental organization that stands for strong altruistic values but tends to inhibit pro-environmental choices. In a similar vein, while individuals who strongly endorse egoistic values are less likely to show strong pro-

environmental behaviours, this pattern might not hold when a given pro-environmental behaviour results in personal benefits (De Dominicis, Schultz, & Bonaiuto, 2017). For instance, saving energy might imply saving money, which might result in egoistic values being positively related to pro-environmental behaviour. Likewise, Sloot et al. (2018) found a positive relationship between pro-environmental lobbying and egoistic values, which they attributed to sub-values within the egoistic value scale such as *influencing* others. The authors argue that people with a high level of egoistic value orientations may perform pro-environmental lobbying for the sake of exerting their influencing power on others and gaining satisfaction, not necessarily to benefit the environment. Congruent with this assertion, De-Dominicis et al. (2017) concluded that self-interested individuals will behave more pro-environmentally when their behaviour results in a personal benefit.

Overall, the three psychological theories discussed above have confirmed through numerous studies their relevance in explaining and predicting pro-environmental behaviours (e.g., Hansla et al., 2008; Klöckner, 2013). Regardless of their distinct features in terms of their basic premises, the three theories share some attributes. Among others, they emphasize the importance of the internal motivational factors as antecedents of pro-environmental behaviours. While the theory of planned behaviour considers intention as an internal motivational factor, the norm activation theory and the value-belief-norm theory propose awareness of consequences and feeling of responsibility as internal motivational drivers of behaviours in question.

On the other hand, the theory of planned behaviour differs from the other two theories (i.e., the norm activation theory and the value-belief-norm theory) in that it presents a rational view of behaviour, whereas the norm activation theory and the value-belief-norm theory are stressing the role of morality. As Bamberg and Möser (2007, p. 16) stated, the theory of planned behaviour is based on a hedonistic model of human beings because it assumes that people are

motivated intentionally to maximize benefits or minimize imaginary or actual threats and risks. In other words, an action is guided by the rational evaluation of behavioural consequences. Hence, according to the theory of planned behaviour, people engage in pro-environmental behaviour because they 1) exhibit positive attitudes towards the protection of a given environmental facet, 2) have favourable social norms encouraging environmental protection, 3) demonstrate a high level of perceived ability and skills to perform the pro-environmental behaviour in question, and 4) have strong intentions to act pro-environmentally. The norm activation theory and value-belief-norm theory, on the other hand, are based on the assumption that pro-environmental behaviour is a function of internalized moral standards and altruistic attributes of the human being. Hence, pro-environmental behaviour is not determined by reward and punishment principles, but by feelings of strong moral obligations (Schwartz, 1977). These deep internal feelings drive people to engage in pro-environmental behaviour.

In sum, according to Weiner (2000), internal attribution seems to be an important cognitive process contributing to the development of moral norms. That is, the internal attribution of a harmful behaviour often triggers emotional reactions such as the feeling of guilt. Guilt, which is defined as a "painful feeling of regret that is aroused when the actor causes, anticipates causing or is associated with an aversive event" (Weiner, 2000, p. 385), is an important pro-social emotion because it results in a felt obligation (i.e., personal norm) to compensate for the caused damage (Baumeister et al., 1998). Several studies provided empirical evidence that moral norms and emotions contribute to explaining pro-environmental behaviours like energy conservation (Black, Stern, & Elworth, 1985), recycling (Guagnano, Stern, & Dietz, 1995), travel mode choice (Hunecke et al., 2001), and pro-environmental consumption (Thøgersen, 1996).

In sum, the three psychological theories outlined above have provided important theoretical frameworks guiding the identification of potentially relevant factors that explain

different forms of pro-environmental behaviours not only across different groups but also across different cultures (Hofstede, 2001; Schwartz, 2006). The theories and the related empirical findings informed the current research which aims at developing a comprehensive model that explains pro-environmental behaviour.

THEORETICAL FRAMEWORK OF THE CURRENT RESEARCH

The envisioned comprehensive model to explain pro-environmental behaviour will mainly build upon the value-belief-norm theory. More specifically, we opted to apply the value-belief-norm theory because of its efficacy to capture the drivers of pro-environmental behaviours from a morality and value perspective. While environmental researchers do seemingly not agree on the interplay between attitudes, beliefs, concerns, and other psychological processes, they do, however, recognize the important role that morality and values play as primary antecedents of environmental action (De Groot & Steg, 2010; Stern, 2000; Oreg & Katz-Gerro, 2006; Nordlund & Garvill, 2003).

Several types of environmental-friendly behaviour (e.g., limited car use, energy conservation, food choices, etc.) require the individual to restrain from egoistic tendencies to benefit collective interests (e.g., environmental quality), which in turn requires moral judgments. For instance, travelling by car saves time, it is flexible and comfortable but has substantial negative environmental consequences such as air pollution, noise, and high consumption of non-renewable energy. As stated by Nordlund and Garvill (2002, p. 742) "In everyday life individuals repeatedly face choices where their decisions have positive consequences for themselves and negative consequences for the environment or negative consequences for themselves and positive consequences for the environment". In other words, people must often make short-term sacrifices to protect long-term collective interests. In this regard, the value-belief-norm theory is assumed to provide an elaborated theoretical approach for the moral and value imperatives underpinning the decisions that people make in favour of or against the environment.

Therefore, in the current research, we aimed at examining the role of personal values and other constructs anchored in the value-belief-norm theory and their associations with social factors such as the material conditions in which people grow up and the cultural orientations

people share. To explore these interplays, it is necessary to elucidate the basic characteristics of the value-belief-norm theory. Consequently, the next section presents a detailed description of the constructs of the value-belief-norm theory; namely, value orientations, environmental beliefs, personal norms, and their associations with pro-environmental behaviour.

Value orientations, environmental beliefs, personal norms and pro-environmental behaviour

Human values are defined as "deeply rooted, abstract motivations that guide, justify or explain attitudes, norms, opinions" (Schwartz, 2003, p. 262). They contain universal content and convey what is important to people's life (e.g., achievement, security, dignity, etc.). Values guide perceptions, goals, beliefs, and attitudes (Maio et al., 2010). More specifically, Maio et al. (2010) view them as mental representations, and Schwartz (1992) defined them as cognitive structures that can be retrieved from memory when needed. Although values are abstract, they can be measured by directly asking people to rate their importance (Schwartz, 2003; 1992;). Schwartz (1992) proposed that values differ around two dimensions. Either they refer to self-transcendence or self-enhancement. Various studies have shown that people who give priority to self-transcendent (collective) values are more willing to engage in different forms of altruistic, cooperative, or pro-environmental behaviour than people who give priority to self-enhancement (individual) values (e.g., Hansla, 2011; Nordlund & Garwill, 2003; Schwartz, 1992). The three value orientations proposed in the value-belief-norm theory (i.e., biospheric, altruistic, and egoistic) correspond with self-transcendence and self-enhancement values. For instance, as altruistic and biospheric value orientations are inner urges dealing with thinking and acting for the well-being of other people and living organisms, they correspond with the self-transcendence value dimension. Egoistic value orientations, on the other hand, which predominantly deal with self-bound gratifications, correspond with self-enhancement values.

Various researchers emphasize the comparative advantage of considering values as important antecedents to explain environmental behaviour (e.g., Blankenberg & Alhusen, 2018; De Groot & Steg, 2007; Ibtissem, 2010; Jia et al., 2017; Nordlund & Garvill, 2002; Stern et al., 1999; Stern, 2000; Williams & Watson, 2007). For instance, De Groot and Steg (2007, p. 319) stated that "[…] the total number of values that people possess is relatively small. Therefore, relative to other antecedents of behaviour (e.g., attitudes, needs, etc.), values provide an economically efficient instrument for describing and explaining similarities and differences between persons, groups, nations, and cultures". Another advantage of using values as antecedents of environmental behaviours is that they are target-specific (e.g., the self, people in general, or the biosphere) and that their attention is directed toward value-congruent information. Various studies have shown that the more people value concerns beyond a person's immediate own interests (i.e., self-transcendent such as altruistic, or biospheric values), the more they are likely to engage in pro-environmental behaviour (e.g., Blankenberg & Alhusen, 2018; Jia et al., 2017). However, it has also been noted that values do not only directly affect behaviour but that they seem to be mediated by other factors such as behaviour-specific beliefs and personal norms (e.g., Bulunga & Thondhlana, 2018; Klöckner, 2013; Nordlund & Garvill, 2002).

Beliefs, on the other hand, are commonly understood as assumptions people share about themselves, others, and their environment. Different authors conceptualize beliefs in different ways. For instance, Corral-Verdugo et al. (1995, p. 671) define beliefs as "a tendency or disposition to describe or relate objects, events or situations, using individual or conventional premises". In a slightly different way, Blankenberg and Alhusen (2018, p. 8) describe beliefs as "information associated with the attributes of objects". Moreover, beliefs influence attitudes and behaviour. For instance, Klöckner (2013) posited that the sum of beliefs (cognitive and affective) about specific behaviour results in attitudes towards that behaviour. Beliefs about the

environment comprise conventional and social aspects of environmentally protective behaviour. Based on this conviction, studies focusing on various aspects of conservation practices such as recycling and re-use revealed that environmental beliefs are inherently linked to those specific pro-environmental behaviours (e.g., DeYoung, 2000; Ebreo & Vinning, 1994).

The most general pro-environmental belief is conceptualized as the New Environmental Paradigm. This paradigm was developed in response to the growing trend of environmental problems as a result of human activities to gauge the ecological worldview (Dunlap & Van Liere, 1978). The New Environmental Paradigm focuses on beliefs about human and environment relationships which are conceived of "[….] human's ability to upset the balance of nature, the existence of limits to growth for human societies, and humans' right to rule over the rest of nature" (Dunlap et al., 2000, p. 427). The authors stress that the New Environmental Paradigm scale taps into people's belief systems about the environment and suggest that it seems reasonable to regard a coherent set of these beliefs as constituting a paradigm or worldview that influences attitudes and beliefs toward more specific environmental issues (Dunlap et al., 2000, p. 428).

The New Environmental Paradigm has been widely used during the past decades when examining pro-environmental behaviours involving samples ranging from the general public to specific sectors such as environmentalists, farmers, ethnic minorities, and college students (Brymer & Gray, 2010; Casey & Scoot, 2006; Dunlap & Van Liere,1978; Dyck et al., 2003; Hawcroft & Milfont, 2010; Kopnina, 2011; Lalonde & Jackson, 2002). These studies reported a significant relationship between the New Environmental Paradigm and different pro-environmental behaviours such as outdoor recreational activities and natural sports (Brymer & Gray, 2010), and mountain climbing (Dyck et al., 2003). Moreover, Casey and Scoot (2006) reported that the revised New Environmental Paradigm, together with age, gender, and education explained about 32 per cent variance of environmental concern.

According to the value-belief-norm theory, the source of belief for pro-environmental behaviour is an ecological worldview (Stern, 2000). Hence, as a core component of the value-belief-norm theory, environmental beliefs play an important role in shaping pro-environmental behaviour through cognitive processes that seek consistency in people's mindsets. For instance, once a person holds beliefs about environmental degradation as a critical challenge to society, she or he strives to seek information about environmental degradation and supports every action related to environmental protection to retain mental consistency between her or his beliefs and deeds. This, in turn, leads to committing oneself to any action related to combating this environmental challenge, which is linked to the third component of the value-belief-norm theory; namely, personal norms.

Personal norms constitute a part of the self-concept that portrays how an individual perceives her- or himself. According to De Groot and Steg (2010, p. 376), personal norms are "[...] moral obligations to perform or refrain from specific behaviour". Thus, personal norms essentially serve as a set of individual rules for action or inaction in which compliance to such rules provides intrinsic rewards, while failure to do so induces intrinsic punishment. Ibtissem (2010, p. 132) substantiated this assertion by stating that "conformism to personal norms creates self-esteem, pride, security and every other favourable auto-evaluation", whereas "non-conformism to personal norms induces the loss of self-esteem, auto-depreciation, and sentiment of guilt".

The importance of personal norms in influencing pro-environmental behaviour was indicated in various studies (e.g., Gkargkavouzi, Halkos & Mastsiori, 2019; Nordlund & Garvil, 2002; Stern et al., 1999). For instance, Nordlund and Garvill (2003, p. 345) concluded that personal norms had a greater ability to influence recycling behaviour when people's awareness of the environmental consequences of this behaviour was high. A national survey of

respondents from 420 U.S. households also reported personal norms as a primary predictor of environmental-friendly consumer behaviour (Stern et al., 1999).

In conclusion, the value-belief-norm theory provides an appropriate account of the general predisposition to act with environmental intent that likely leads to environmentally desirable actions (Stern, 2000). The theory stipulates that pro-environmental behaviour stems from the salience of personal values, from beliefs that those values are under threat, and from felt obligations that lead to initiating actions that can help alleviate these threats and restore the values (Stern, 2000; Stern et al., 1999). That is, once people realize that whatever they value is under a threat by environmental challenges, they are likely to engage in pro-environmental behaviour because of their strong environmental beliefs and feeling of moral obligation to alleviate those threats at any cost.

The value-belief-norm model has been tested in several studies and yielded commendable results (e.g., Jia et al., 2017; Nordlund & Garvill, 2002; Stern et al., 1999; Stern, 2000; Steg & Abrahamse, 2005). Some authors limited themselves to testing parts of the theory (e.g., Nordlund & Garville, 2003), while others tested the theory as a whole (e.g., Cotton et al., 2016; Steg et al., 2005). Overall, the empirical findings consistently showed that self-transcendence value orientations (e.g., biospheric and altruistic values) predict a range of pro-environmental behaviours such as recycling, energy-saving, green consumption (e.g., Bulunga & Thondhlana, 2018; Jia et al., 2017; Schultz, 2002; Steg et al., 2005). On the other hand, self-enhancement value orientations (e.g., egoistic values) are negatively associated with pro-environmental actions across a range of pro-environmental behaviours such as recycling, energy-saving, or reducing car driving (e.g., Gifford & Nilsson, 2014; Jia et al., 2017; Nordlund & Garvill, 2002; Saladié & Santos-Lacueva, 2016). Consequently, the current research explored the relationships between values, beliefs, and norms in influencing pro-environmental behaviour (Studies 1-3). More specifically, we hypothesized that:

Hypothesis 1

Biospheric and altruistic value orientations are directly and indirectly positively, whereas egoistic value orientation is directly and indirectly negatively related to pro-environmental behaviour through environmental beliefs and personal norms.

Values, beliefs, and norms do not exist in a social vacuum (Tajfel, 1972). They are influenced by the social and cultural contexts in which people live. Pertinent to this preposition, Hargreaves (2008, p. 19) underlined that "behaviour is fundamentally social and should not be assumed to begin inside individuals' heads". The author further argues the importance of considering the social context where people are interacting in everyday life as a platform for promoting and shaping pro-environment behaviour (Hargreaves, 2008). In a similar vein, Oreg and Katz-Gerro (2006, p. 470) proposed that social contexts such as family, community, and institutions within which individuals behave determine their attitudes and beliefs that ultimately guide their behaviour. Stern (2000, p. 413; see also Stern et al., 1999), who developed the value-belief-norm theory, also stressed the imperative of considering broader dimensions of the social context to extend our understanding of pro-environmental behaviours.

Therefore, the present research further aimed to explore the interplay between social and cultural contexts and the components of the value-belief-norm theory in predicting pro-environmental behaviour. More specifically, the current research explored the contributions of social class and cultural orientations to the interplay between value orientations, environmental beliefs, and personal norms as outlined in the value-belief-norm theory to explain pro-environmental behaviour.

Social class and pro-environmental behaviour

Social class is defined as a multifaceted concept incorporating material and financial resources (e.g., housing unit, income), social status (e.g., education), and work status (Oakes & Rossi, 2003). In other words, it is a form of social hierarchy that arises from "[….] the number of material resources an individual possesses", known as *objective* social class (Oakes & Rossi, 2003, p. 774); and an individual's "[...] perceived social rank in society relative to others", known as *subjective* social class (Kraus, Piff, & Keltner, 2009, p. 994). Essentially, the material and financial resources that people possess depict their social status by determining their capacity to access and utilize valued goods and quality services. For instance, people from the upper social class can afford to build luxury houses, enrol in prestigious schools/colleges, and attend high-standard health care services, leisure, and recreational facilities.

Researchers increasingly agree that social class (i.e., objective and subjective) shapes people's social cognitions, emotions, and behaviours (Easterbrook, Kuppens, & Manstead, 2019; Kraus et al., 2012; Manstead, 2018). For instance, research has shown that low social class and upper social class individuals differ in their perceived control (Kraus et al., 2012), prejudice (Kuppens et al., 2018), collective angst (Jetten et al., 2017; Grandin et al., 2021), unethical decision making (Piff et al., 2012), support for redistribution (Brown-Iannuzzi et al., 2015; see also the overview from Manstead, 2018), and mindfulness (Van Doesum, Tybur, & Van Lange, 2016). More specifically, research showed that low social class individuals are more empathetic, socially engaged, interdependent, and generous and give more support to charity relative to upper social class individuals (Kraus, Pfiff, & Keltner, 2010; Piff et al., 2012).

The social-cognitive perspective on social class essentially argues that "[...] the differences in resources and perceptions of social rank define upper- and lower-class contexts which tend to guide class-specific ways of self-concept, perception of the social environment, and relating to other individuals'' (Kraus et al., 2012, p. 554). More specifically, Kraus et al.

(2012) propose that low social class and upper social class individuals interpret their social environment differently which contributes to the differential formation of their self-concept and other cognitive, emotional, and behavioural outcomes. More distinctively, the authors argue that low social class individuals construe their social environment as *conceptualism*, which refers to a psychological orientation that is motivated by external constraints, outside threats, and other individuals (Kraus et al., 2012, p. 554). Upper social class individuals, on the other hand, are assumed to construe their environment as *solipsism*, which refers to a psychological orientation that is motivated by internal states such as emotions and by personal goals (Kraus et al., 2012, p. 552). In short, the social-cognitive perspective on social class characterizes low social class individuals as outward-looking and upper social class individuals as inward-looking in responding to their environment which determines the process of self-development and their self-concept. In other words, the scarcity of material and social resources of low social class individuals leads them to explain and solve issues from a low personal control perspective, while abundantly available material resources lead upper social class individuals to explain and solve issues from a high personal control perspective (Kraus et al., 2012). The differences between perceived and experienced personal control result from the fact that low social class individuals are exposed to increased vulnerability and external threats such as uncertainty in employment, housing, safety, and health than upper social class individuals (see Kraus et al., 2012). These persistent threats to which individuals from low social class contexts are exposed foster the development of a *threat detection system* (Blascovich & Mendes, 2000; Manstead, 2018; Pickett & Gardner, 2005; Williams & Watson, 2007), with the result that people who grow up and live in such environments have a heightened vigilance to threat.

Social class seemingly also informs how people feel, think, and behave about the natural environment (Eom, Kim, & Sherman, 2018; Hornsey et al., 2016; Kraus et al., 2012).

For instance, Eom et al. (2018), who conducted a representative study in the US, reported that support for pro-environmental policies was stronger among individuals with a higher socioeconomic status (i.e., objective social class) relative to people with lower socioeconomic status. Likewise, Hornsey et al. (2016), based on a meta-analysis covering 117 studies across 56 nations, concluded that people with higher income and education (i.e., objective social class) tend to report stronger beliefs that climate change is occurring and that humans are responsible for it than people with lower income and education.

Similarly, in their transnational study of factors influencing pro-environmental behaviour, Gifford and Nilsson (2014) compared participants sampled from rich and poor countries and reported that residents from rich countries prefer general environmental improvement measures over economic growth whereas residents from poorer countries prefer economic growth over environmental protection. Explanations for social class effects on pro-environmental attitude and behaviour range from striving for a good environment following increased revenue, and economic capacity to allocate resources for improving the environment to shifting from materialist to post-materialist values stressing self-development and well-being (Gifford & Nilsson, 2014; Kraus et al., 2012).

The results of studies about social class effects on pro-environmental behaviour differ, however, from findings in earlier studies comparing industrialized and developing countries. For instance, Dunlap, Gallup, and Gallup (1993) indicated that respondents from developing countries such as Nigeria and India expressed higher levels of concern about environmental problems than respondents from industrialized nations such as the Netherlands and Denmark. These findings were supported by a later study conducted by Gifford et al. (2009) who reported that citizens of poorer countries (e.g., Hungary, Nigeria) were more concerned about local environmental problems than citizens of wealthy countries (e.g., the Netherlands, US).

Moreover, studies examining the influence of socio-economic factors on pro-environmental actions on individual and household levels reported that higher socio-economic status individuals do not necessarily show greater support for and engage in pro-environmental actions when compared to lower socio-economic status individuals (De Silva & Pownall, 2014; 2010; Longhi, 2013; Whitmarsh & O'Neill; Zorić & Hrovatin, 2012). However, according to Whitmarsh and O'Neill (2010), household income did not have any direct effect on pro-environmental behaviour. Zorić and Hrovatin (2012) also underlined that neither education nor income predicted pro-environmental behaviours such as recycling, water conservation, and buying environmental-friendly products. However, Longhi (2013), based on a detailed analysis of panel data and using a pro-environmental behaviour index, found that higher wages and higher household income correlate negatively with pro-environmental behaviour. Consistent with these findings, De Silva and Pownall (2014) reported, for instance, that income negatively predicts intentions to perform pro-environmental behaviours such as using public transportation instead using one's car.

Therefore, the findings concerning the effects of social class on pro-environmental actions are best described as ambiguous. The reasons for this ambiguity might be twofold. Firstly, it might arise from the fact that the effect of social class on pro-environmental behaviour depends on the specific type of pro-environmental actions (Pearson et al., 2017). For instance, upper social class individuals might show a propensity towards recycling but not to the use of public transport, as the latter might elicit a sense of discomfort and uneasiness for their lifestyle. Conversely, low social class individuals might show fewer intentions to recycling practices probably due to lack of access to recycling facilities in their neighbourhoods, while they opt to use public transport as they cannot afford to own a car. Secondly, previous research focused mainly on the direct effects of social class. If one assumes that social class influences how people perceive and experience their relationships with others and their

environment, one could also argue that low and upper social classes present different social contexts that determine rather the effects of factors that influence pro-environmental behaviour. Lastly, the ambiguity of findings might also be attributed to the differences in the definition of social class across the studies. That is, social class is explained in terms of the conventional material wealth indices (i.e., objective social class) per se in some studies with little or no consideration of subjective social class perceptions that an individual holds about her or his social standing compared to others in her or his community. Although the two dimensions of social class are interrelated, they are relatively independent, and likely to shape values, beliefs, and norms differently (Eom et al., 2018; Easterbrook et al., 2019; Kraus et al., 2012; Mendoza-Denton & Keltner, 2012; Manstead, 2018). Considering the ambiguous role of social class in predicting pro-environmental behaviour, we first explored its direct effect on pro-environmental behaviour and hypothesized that:

Hypothesis 2

The consideration of social class will improve the predictive power of the value-belief-norm model in explaining pro-environmental behaviour.

Given the findings indicating that low and upper social class individuals differ in their perceptions and experiences (i.e., *contextualize* versus *solipsism*), we would expect that these differences will affect the effects of the different value orientations on pro-environmental behaviour. More specifically, the findings that low social class individuals tend to perceive themselves as interdependent, communal oriented and concerned about others' wellbeing (Piff et al., 2012) suggest that altruistic and biospheric values (i.e., self-transcendent) will be more effective in shaping their pro-environmental behaviour, whereas the findings that upper social class individuals tend to perceive themselves as independent from others and as self-sufficient (Kraus et al., 2012) suggest that egoistic values (i.e., self-enhancement) will be more effective

in shaping their pro-environmental behaviour. Hence, we predicted and tested that social class moderates the effects of value orientations on pro-environmental behaviour in that the positive effects of altruistic and biospheric value orientations will be stronger for low social class individuals, while the negative effect of egoistic value orientation will be stronger for upper social class individuals (Studies 2 and 3). More specifically, we proposed the following hypothesis:

Hypothesis 3

Social class moderates the direct and indirect effects of biospheric, altruistic, and egoistic value orientations on pro-environmental behaviour through environmental beliefs and personal norms in that the positive direct and indirect effects of altruistic and biospheric value orientations on pro-environmental behaviour should be stronger in low than in upper social class individuals, whereas the negative direct and indirect effect of egoistic value orientation should be stronger in upper than in low social class individuals.

As much as a social class might influence pro-environmental behaviours, the present research also considered culture as another social phenomenon that determines the tendency for pro-environmental action or inaction. Hence, relevant literature will be reported in the following section with the main purpose of exploring the social process through which cultural elements shape pro-environmental behaviours in different cultural contexts.

Culture and pro-environmental behaviour

It is widely accepted among researchers that culture is a fundamental social factor describing the most central feature of human actions or inactions in a given situation. Broadly, culture is defined as "the integrated pattern of meanings, beliefs, norms, symbols, and values that individuals share within a society" (Schwartz, 2006, p. 139). Given its pervasive role in shaping an individual's self-concept through imposing social expectations, culture is often described as "social programming of the mind". In line with such a broad description, Maznevski et al. (2002, p. 275) stress that culture as a group-level phenomenon does not only influence people's perceptions, values, and behaviour but also how they interact with each other. In other words, cultural orientations represent societal or group-level guiding principles that describe the pattern of interactions between people as well as with the environment (Schwartz, 2006). Cultural orientations determine individual values, beliefs, norms, and behaviour through a socialization process that a person internalizes as a member of a certain social group (Maznevski et al., 2002). Thus, the search for determinants of pro-environmental behaviour needs to capture societal level variables such as cultural orientations which have a strong bearing on fostering individual values, attitudes, and behaviours related to environmental behaviour.

Researchers attempted to unpack the specific cultural dimensions and their operating processes in influencing different aspects of group and individual behaviours (Markus & Kitayama, 2003; Savani, Markus, & Conner, 2008; Schwartz, 2006). Relevant to the present research is Schwartz's (2006, p. 140) theory of cultural value orientations which specifies three bipolar dimensions of culture, namely 1) *embeddedness* versus *autonomy*, 2) *hierarchy* versus *egalitarianism* and 3) *mastery* versus *harmony*. The *embeddedness* component refers to social order, obedience, and respect for tradition, while *autonomy* refers to broadmindedness, curiosity, and pleasure. The *hierarchy* component refers to authority, while *egalitarianism* is

predominantly linked to social justice. The *mastery* component refers to ambition and daring, while *harmony* is linked to unity with nature and the world at peace (see Schwartz, 2006, p. 142).

According to the proponents of cultural value orientation theory (Schwartz, 2006; Hofstede, 2001), the *harmony* versus *mastery* cultural dimension is a dominant manifestation of human interactions with the social and natural environment while confronting basic societal issues in a given cultural group. Schwartz (2006) argues that members of any cultural group tend to have two options: either retain the status quo and live in conformity with the issues in question (i.e., *harmony* orientation) or strive to change the status quo and resolve the issues in question (i.e., *mastery* orientation).

The *harmony* dimension emphasizes "fitting into the world as it is, trying to understand and appreciate rather than to change, to direct, or to exploit" (Schwartz, 2006, p. 140). Important values of the harmony dimension include peace, unity with nature, and the protection of the environment (Schwartz, 2006, p. 141). On the other hand, the *mastery* dimension denotes "active self-assertion to master, direct and change the natural and social environment to attain group or personal goals" and the values matching with this orientation include competence, ambition, daring, and success (Schwartz, 2006, p. 142).

While the critical role that cultural orientations play in influencing environmentally desirable behaviours leading to environmental protection appears widely accepted, the specific path of this influence is not yet drawn. For instance, Luria, Cnaan, and Boehm (2015) conclude that the exact mechanism underlying the role of societal-level factors such as cultural orientations in shaping pro-social behaviour is not yet understood as most studies focus on individual and contextual factors. The current research aims to address this gap by exploring how the cultural dimension of *mastery-harmony* influences environmental behaviour, as a form of pro-social behaviour.

As stated earlier, the fundamental premise of the value-belief-norm theory is the hierarchical chain of influence in which individual values guide beliefs, personal norms, and the action or inaction of certain behaviours. In this chain of influence, the individual value orientations are located at the top of the hierarchy influencing the next factors in the hierarchical chain. That is, driven by values, beliefs influence personal norms as one is unlikely to develop personal norms (self-obligation) against her or his beliefs nor does she or he take practical actions willingly. However, given that individual values and their effects are the product of cultural pressure through the socialization process as described elsewhere, we argue that cultural orientations influence the effects of individual value orientations, beliefs, and norms and thus the propensity to pro-environmental behaviour.

Specifically, someone who shares the harmony-cultural orientation is likely to value altruistic and biospheric values as she or he is motivated to be helpful, obtains satisfaction from being helpful, and fulfils a personal need when being helpful. Similarly, he or she is likely motivated to care for non-human living organisms by, for instance, obtaining satisfaction from planting trees, consuming organic food, reducing car driving, and so forth. In contrast, someone who shares the mastery-cultural orientation likely tends to exhibit egoistic values. That is, she or he is inclined to fulfil an individual ambition and strive towards enhancing personal gains, without anticipating the adverse consequences of his or her actions on other people or the environment. For instance, a person who is ambitious about maximizing profit from manufacturing wooden furniture might care little or not at all about the environmental consequences of cutting timber. The associated values (e.g., egoistic) might inspire him or her to endorse timber cutting to fulfil the immediate goal (i.e., as inputs for the manufacturing wood products) instead of refraining from doing so by considering the long-term repercussions of tree cutting on environmental quality. Based on the outlined assertions, we again firstly aim

at exploring the role of harmony-mastery cultural orientations in predicting pro-environmental behaviour (Study 2) and hypothesized that:

Hypothesis 4

The consideration of the harmony-mastery cultural orientations will improve the predictive power of the value-belief-norm model in explaining pro-environmental behaviour.

We further hypothesized that:

Hypothesis 5

Harmony-mastery cultural orientations moderate the direct and indirect effects of biospheric, altruistic, and egoistic value orientations on pro-environmental behaviour through environmental beliefs and personal norms in that the positive direct and indirect effects of biospheric and altruistic value orientations will be stronger in individuals who share harmony-cultural orientations than in individuals who share mastery-cultural orientations, whereas the negative direct and indirect effect of egoistic value orientation will be stronger in individuals who share mastery-cultural orientations than in individuals who share harmony-cultural orientations.

In addition to extending the value-belief-norm theory by considering social class and cultural dimensions, and testing its validity in the context of a developing country, the present research also aimed at exploring the effects of environmental information and demographic factors as correlates of pro-environmental behaviour, which will be outlined in the following section.

Environmental information and pro-environmental behaviour

It is a common approach to promote environmentally friendly behaviours through providing and sharing information about environmental problems (e.g., deforestation, climate change, air, and water pollution, etc.) and outlining behavioural options to mitigate these problems (Stern, 2000). Providing environment-related information is aimed at raising awareness about the seriousness of the environmental crisis and increasing knowledge about possible solutions (Abrahamse et al., 2005; Williams & Watson, 2007). Environmental information might be distributed *formally* as, for instance, policies, media reports, environmental publications, public lectures, and academic courses, or *informally* as, for instance, discussions held in social settings like family, friends, and social gatherings.

Early studies on the relationship between environmental information and pro-environmental behaviour have, however, reported inconsistent and sometimes contradicting results. For instance, Abrahamse and Steg (2005) pointed out that despite increases in environmental awareness and interest, opinion polls indicated that a large proportion of people remain inactive concerning environmental protective behaviours. Likewise, Kempton, Boster and Hartly (1995) found a lack of knowledge regarding environmental issues to be equally prevalent among environmentalists as they are among non-environmentalists. These findings correspond with the reasoning of Stern (2000, p. 468) who argues that environmental information alone has little impact on pro-environmental behaviour as people might face external barriers. Previous research suggests also that environmental information seems ineffective due to barriers internal to the individual. For instance, Steg and Vlek (2009) emphasize that the different effects of information on pro-environmental behaviour depend on how the information is framed or packaged. The authors argue that as individuals have different value orientations and thus tend to value different objects, framing or tailoring of messages may be required to vary across different value orientations to make information effective.

Proponents of environmental information generally argue that properly framed information positively influences environmental concern and pro-environmental behavioural intention (Espinosa et al., 2008; Steg & Vlek, 2009; Thøgersen, 2005), as they might reinforce the influence of value orientation. As Steg and Vlek (2009, p. 315) propose, "since people are likely to express environmental concern when they are aware that environmental problems have adverse consequences for valued objects, information that makes salient such consequences may accordingly influence environmental concern". In line with this, Zorić and Hrovatin (2012) showed that awareness in combination with education impacts people's willingness to participate in a green electricity program. Likewise, a study by Meleddu and Pulina (2016) revealed that individuals' awareness of ecotourism is related to their willingness to financially support future ecotourism projects implying that people are indeed willing to pay today for a sustainable future. Consequently, the present research proposed the following hypothesis on the relationship between environmental information and pro-environmental behaviour.

Hypothesis 6

Environmental information source is positively related to pro-environmental behaviour.

Socio-demographic factors and pro-environmental behaviour

The current research considered age, gender, and place of origin as socio-demographic factors associated with pro-environmental behaviour. Although many empirical studies examined these effects (e.g., Blankenberg & Alhusen, 2018; Klöckner, 2013; Stern et al.,1999), the findings were inconsistent and ambiguous. For instance, some studies reported that younger people tend to be more concerned about environmental issues than older people (Iwata, 2001; Otto & Kaiser, 2014; Yilmaz, Boone, & Andersen, 2004), whereas others found either positive relationships (increase in the level of pro-environmental behaviour as age increases) or no

relationship at all between age and pro-environmental behaviour (e.g., Longhi, 2013; Menz & Welsch, 2012). Researchers proposed different explanations for these ambiguous findings. For example, Longhi (2013) argued that because older individuals have more life experiences, they express more concern about environmental hazards. Blankenberg and Alhusen (2018), on the other hand, contend that age influences distinctive pro-environmental behaviours differently along the life cycle. Accordingly, younger people engage more in outdoor and socially "active" behaviours (e.g., joining environmental groups, outdoor recreation activities), while older people are more inclined to home-based activities (e.g., reading an environmental magazine, or recycling). This view implies that pro-environment behaviour exists among all age groups, whilst the types of pro-environmental behaviour might differ corresponding to the age group in focus. Moreover, Yilmaz et al. (2004) proposed that there is a positive relationship between the respondents' age and their pro-environmental behaviour because as people grow older their experiences with nature along with their knowledge about environmental issues increases (see also Alp et al., 2008; Wiernik et al., 2013). Overall, it appears that the relationship between age and pro-environmental behaviour is explained by different activities exhibited at different ages, accumulated life experiences, a sense of accountability demonstrated at an older age and social pressure exerted by significant others.

Similar to age, the results concerning the relationship between gender and pro-environmental behaviour are also inconsistent across studies. On the one hand, some studies indicate that men are more active, knowledgeable, and concerned about the environment than women (e.g. Lee, Park, & Han, 2013), while other studies found that women exhibit a higher level of pro-environmental behaviour than men (Hunter, Hatch & Johnson, 2004; Lee, 2009; Longhi, 2013; Lynn & Longhi, 2011; McCright & Xiao, 2014). The latter studies provided a range of reasons why women are more concerned about environmental protection than men. Among others, women are typically more emotionally engaged, show empathy about

environmental devastation and its effects on the human being, believe less in technological solutions, and are more willing to change compared to men (e.g., Longhi, 2013; McCright & Xiao, 2014). Furthermore, in some cultures, women are more attached to pro-environmental behaviour due to socio-structural factors that make them on average more aware of the adverse consequences of environmental challenges. For instance, women are more likely to be involved in domestic routines such as gardening and taking care of pets or other domestic animals. The latter is assumed to make it easier for women to recognize the importance of preventing environmental harm to the welfare of plants and animals (Longhi, 2013; McCright & Xiao, 2014). It is also important to note that some earlier studies argued that gender does not influence environmental concern and that the differences in the level of environmental behaviour between men and women, if any, are attributed to variance in perceptions among individuals rather than to gender per se (e.g., Blocker & Eckberg, 1997).

Place of origin, which commonly refers to different geographical settings such as rural, semi-urban, and urban, is also characterized by inconsistent results in explaining pro-environmental attitudes and behaviour. For instance, Chen et al. (2011) reported that people living in larger cities are more likely to engage in pro-environmental behaviours than people living in smaller cities. Another study revealed that urban Germans tended to show greater verbal commitment to environmental issues but were not different from rural Germans in other forms of environmental concern (Bogner & Wiseman, 1997). On the other hand, a study comparing students who grew up in rural areas with those growing up in urban contexts in the UK reported that the former showed more positive orientations toward the natural environment than the latter (Hinds & Sparks, 2008). Conversely, an earlier study by Lutz, Simpson-Housley, and de Man (1999) reported relatively high levels of environmental concern among both rural and urban dwellers among British Columbia residents. Likewise, Ramkisson, Weiler and Smith (2012) found that people who live near the natural environment show greater concern about

nature and show sensitivity to environmental issues than those living away from such places. Besides, some studies indicated that regardless of urban or rural settings, the level of pro-environmental behaviour is contingent upon the perceived threats to the wellbeing of residents (e.g., Bak, 2018; Gifford & Nilsson, 2014). That is, once residents believe that their well-being is threatened by environmental problems, people in both urban and rural settings are likely to engage in environmental protection. Therefore, intending to contribute to the ongoing discourse about the relationship between age, gender, place of origin, and pro-environmental behaviour, the following hypotheses were proposed:

Hypothesis 7

There is a positive significant relationship between age and pro-environmental behaviour.

Hypothesis 8

Gender influences pro-environmental behaviour in that females show stronger pro-environmental behaviour than males.

Hypothesis 9

The level of pro-environmental behaviours across the three geographical settings differs, in that participants from urban origins show stronger pro-environmental behaviour than participants from semi-urban and rural origins.

THE CONTEXT OF THE PRESENT RESEARCH

The current research was conducted in Ethiopia, one of the developing countries located in the Horn of Africa. Ethiopia with a total population of 110 million is the second most populous African nation after Nigeria (CSA, 2012). Ethiopia is considered one of the most biodiverse regions in the world consisting of different geographical zones, warm and cold atmospheric temperatures altering throughout the year, and diverse natural resources (EPA, 1997). On the other hand, Ethiopia is one of the most degrading countries because of severe deforestation disrupting the balance of the ecosystem (Colby Environmental Policy Group, 2011; World Bank, 2020; EPA, 1997). Consequently, the country has been facing various environmental challenges over the past decades including a decline in soil fertility, water pollution, loss of biodiversity, soil erosion, poor waste management, and excessive use of fuelwood (biomass) as a source of energy (Colby Environmental Policy Group, 2011). Several studies and official reports have shown staggering trends in these environmental issues. For instance, the average annual deforestation rate is 1% which is high compared to other Sub-Saharan African countries (World Bank, 2012). Likewise, land degradation is one of the most serious environmental problems in the country with estimated annual costs ranging from 2% to 6.75% of agricultural GDP (CSA, 2012). Moreover, about 95% of Ethiopia's energy supply for household consumption comes from biomass (e.g., wood fuel), contributing to carbon emission and in-house pollution which causes acute respiratory illnesses (Colby Environmental Policy Group, 2011). Electrification mainly for lighting is limited and concentrated in urban areas. Thus, only about one in every four households (23%) has access to electricity, with a very large disparity between urban and rural households (85% versus 5%, respectively) (CSA, 2012; Yacob, 2008).

Out of these different environmental issues prevailing in Ethiopia, the current research focused on energy conservation (e.g., electricity conservation) and solid waste management in

the urban context with particular reference to university residential buildings. Various researchers indicated that collecting and managing waste is an enormous challenge for countries across the world (Yesuf et al., 2007). The problem is often magnified in urban areas which experience an increasing influx of people from rural areas due to economic opportunities and this dense concentration of people leads to a substantial amount of waste generation. Consistent with this contention, the Colby Environmental Policy Group (2011) argues that the problem of waste management is exacerbated in developing countries like Ethiopia because of the influx of people moving to urban areas and settling in informal settlements. This reality can be observed in Ethiopia's capital Addis Ababa, which is under increasing pressure to manage waste efficiently. For instance, the daily waste generation in Addis Ababa is 0.252 kg per capita and will continue to grow due to the trend of urbanisation (César & Ekbom, 2013; Cheever, 2011; Nigatu, Sundaraa, & Bizunesh, 2011). The inefficient solid waste management by municipalities increases the accumulation of waste on open waste disposal sites causing environmental pollution through broken pipes (e.g., water and soil) and the burning of waste (air pollution) which in turn affects people's health negatively. Thus, improving waste management practices should be among the top priorities for the city administration to ensure environmental protection at the household, community, and institutional levels.

In a similar vein, there is a pressing need for the conservation of electricity in Ethiopia. Given that Ethiopia has set its vision to reach middle-income status by 2025 (César & Ekbom, 2013; Colby Environmental Policy Group. 2011; World Bank Group, 2020), a stable supply of adequate energy is a requisite for industrialization and domestic consumption. Although access to electricity through the national grid has shown a dramatic improvement over the past decades with an increase from 16% in 2008 to 44% in 2019 (The World Bank Group, 2020), population growth, urbanization rate, as well as infrastructure expansion have made it difficult to meet the surge for sustainable energy need in the country. On the other hand, energy loss in Ethiopia

stands at 20%, which is higher than the international average of 13.5% (Work Bank, 2020). Therefore, energy conservation efforts have to be implemented at the individual, household, and institutional levels to cope with the higher energy demands.

Both waste disposal and energy consumption are daily practices carried out by individuals and groups, which require human-environment interactions in the household, community, and institutional settings. Importantly, the majority of existing studies addressing environmental problems in Ethiopia focused mainly on the biophysical, socio-economic, and infrastructure aspects, with little or no attention to the psychological dimensions such as values, beliefs, norms, attitudes, and socio-cultural elements that influence the propensity to environmental protection. The present research aims at overcoming this limitation by exploring the psychological and social antecedents of pro-environmental behaviour referring to solid waste disposal and conservation of electricity in the context of higher education institutions.

Various studies revealed that higher education institutions are among the social settings where large populations consume resources with adverse impacts on the environment (e.g., Aleixo, Azeiteiro, & Leal, 2018; Amutenya, Shackleton, & Whittington-Jones, 2009; Alshuwaikhat & Abubakar, 2008; Farinha et al., 2019; Vicente-Molina et al., 2013). For instance, Alshuwaikhat and Abubakar (2008, p. 213) noted that a large number of students in the universities are viewed as "a smaller version of cities" as they consume huge amounts of resources, which results in severe environmental challenges. Therefore, fostering pro-environmental behaviour among university students is expected to have multiplying effects in reducing the negative environmental impact not only on their campuses but also in their subsequent life journeys. Congruent with this view, Green (2013) stressed the strategic role that university students can play in promoting pro-environmental behaviour beyond their campuses. That is, once they are equipped with environmental knowledge and skills, university students often tend to transmit this knowledge and skills to people outside the university's

sphere of influence (Green, 2013). Likewise, Vicente-Molina et al. (2013) underlined that universities have a pivotal role to play in impelling pro-environmental behaviour by raising responsible and competent individuals with knowledge, skills, and values that contribute to environmental protection.

The present research was conducted with students registered with the University of Addis Ababa, which is the oldest and the largest university in the country. The main campus of the University of Addis Ababa, where the present research was conducted, enrols over ten thousand students every year in its undergraduate and postgraduate programs (Teshome, 2005). The university has been providing residential accommodation (i.e., dormitory) and related services to the students with unrestricted access to basic facilities such as water, electricity, and sanitation. These residential buildings of the university generate a large number of solid waste materials. It is commonly observed that used papers, plastic bags, tissue papers, plastic bottles, cigarette packets, scratch cards, and other solid waste are dropped everywhere surrounding the residential buildings, despite the availability of solid waste bin facilities on every sidewalk and every corridor. Likewise, electricity is not only extensively consumed by students but also misused. For instance, lights are left switched on throughout the night in most dormitory rooms and even during the daytime when no one is in the rooms. As one dormitory room is shared among four or more students, it seems that no one feels accountable for switching off the light when it is not needed. These are apparent indicators for failures in taking care of environmental resources in residential buildings, suggesting the necessity of fostering pro-environmental behaviour among university students. Therefore, the present research project is considered to not only contribute to the scientific discourse on pro-environmental behaviour but also provide practical solutions. Hence, the findings of the present research are intended to inform policies and programs of environmental protection for higher education institutions by indicating evidence-based mechanisms for promoting pro-environmental behaviour.

In the following, three cross-sectional studies are reported through which we tested the proposed hypotheses within the context of a higher education institution in Ethiopia. In Study 1, we investigated the applicability of the value-belief-norm theory in predicting pro-environmental behaviour pertinent to the conservation of electricity and disposal of solid waste as well as tested the relationships between demographic factors, environmental information, and pro-environmental behaviour. In Study 2, we extended the value-belief-norm theory by considering social class and cultural orientation and tested whether these social factors influence the direct and indirect effects of value orientations on pro-environmental behaviour through environmental beliefs and personal norms. In Study 3, we extended the value-belief-norm theory by considering social class and social norms and tested again whether these social factors influence the direct and indirect effects of value orientations on pro-environmental behaviour through environmental beliefs and personal norms. The three studies were conducted in the period from 2017 to 2020.

STUDY 1

In line with the overall aim of the current research to explore the applicability of the value-belief-norm theory in the context of a higher institution in Ethiopia, Study 1 tested the hypothesis that biospheric and altruistic value orientations are directly and indirectly positively, whereas egoistic value orientation is directly and indirectly negatively related to pro-environmental behaviour through environmental beliefs and personal norms (Hypothesis 1, see Figure 4). The conceptual model of Study 1 is depicted in Figure 4.

Figure 4

The conceptual model of the value-belief-norm theory
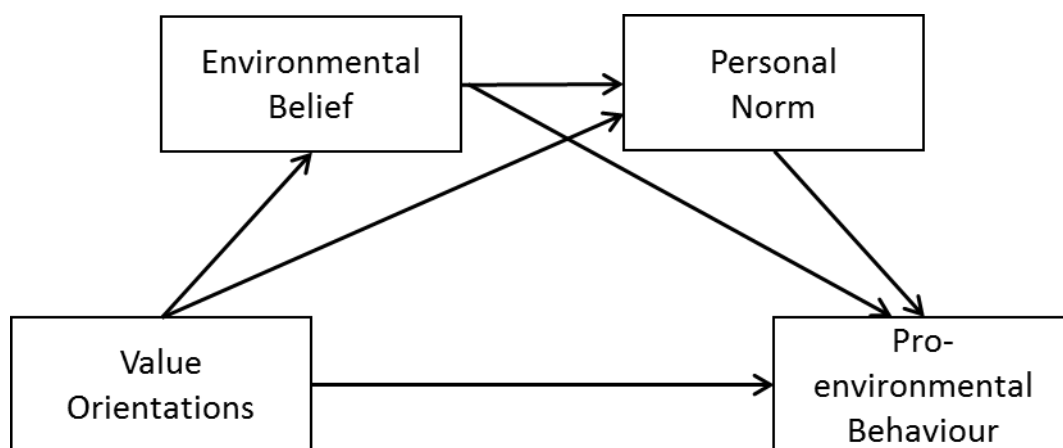
Furthermore, Study 1 explored the association between environmental information sources, gender, age, place of origin, and pro-environmental behaviour. More specifically, we explored whether environmental information sources are positively related to pro-environmental behaviour (Hypothesis 6), whether age and pro-environmental behaviour are positively related (Hypothesis 7), whether gender is related to pro-environmental behaviour in that females show more pro-environmental behaviour than their male counterparts (Hypothesis

8), and whether the geographical origin of our participants is related to pro-environmental behaviour, in that participants from urban origin score higher on pro-environmental behaviour than their counterparts from the semi-urban and rural origin (Hypothesis 9). The hypotheses were tested by applying a cross-sectional survey design and using a self-administered questionnaire as the research instrument.

Participants

A total of 200 undergraduate students, who were residing in the dormitory of the main campus of the University of Addis Ababa, participated in the study. Participants were conveniently approached. The majority of participants were male (n = 160, 80%), while female participants were smaller in number (n = 40, 20%). Participants' age ranged from 18 to 47 years with a mean age of 22.7 years (SD = 4.07). Concerning the place of origin, 86 participants reported being originally from urban, 59 from semi-urban, and 55 from rural areas.

Procedure

Ethical clearance to conduct all three studies was obtained from the University of South Africa (UNISA) and the Research and Publication Office (RPO) of the University of Addis Ababa. Participants were conveniently approached and invited to participate in the study in the lecture rooms after class. They were informed that the study aims at researching students' pro-environmental behaviour, that their participation is voluntary and anonymous, that they can withdraw at any given moment without any consequences, and that data will be analysed on a group level for scientific purposes. Subsequently, the questionnaire was administered to them in hard copy to fill in and they were instructed to hand back the questionnaire to the research assistants. All participants completed the questionnaire instantly and returned it. Given that the participants were university students and that the language of instruction is English at the

university level, it was decided to use the English version of the measurements. The questionnaire assessed participants' demographic information followed by the assessment of environmental beliefs, value orientations, pro-environmental behaviour, personal norms, and environmental information sources. The maximum time required to complete the questionnaire was less than 45 minutes.

Measurements

If not differently stated, participants responded to the statements of the measurements (i.e., items) using an answer format ranging from 1 (*totally disagree*) to 5 (*totally agree*). As the present study was conducted using a paper-pencil questionnaire, items within the respective measurements were not randomly presented. The measures were presented in the same order as follows:

Socio-demographics included gender, age, and place of origin (i.e., urban versus semi-urban versus rural).

Environmental beliefs were assessed using the New Environmental Paradigm scale. The scale consists of 15 items originally developed by Dunlap and Van Liere (1978) and revised in 1980 to measure the worldview/paradigm on environmental affairs (Dunlap & Van Liere, 1980). The items were presented in the following order: (1) "We are approaching the limit of the number of people the Earth can support", (2) "Humans have the right to modify the natural environment to suit their needs", (3) "When humans interfere with nature it often produces disastrous consequences", (4) "Human ingenuity will insure that we do not make the Earth unlivable", (5) "Humans are seriously abusing the environment", (6) "The Earth has plenty of natural resources if we just learn how to develop them", (7) "Plants and animals have as much right as humans to exist", (8) "The balance of nature is strong enough to cope with the impacts of modern industrial nations", (9) "Despite our special abilities, humans are still subject to the

laws of nature", (10) "The so-called "ecological crisis" facing humankind has been greatly exaggerated", (11) "The Earth is like a spaceship with very limited room and resources", (12) "Humans were meant to rule over the rest of nature", (13) "The balance of nature is very delicate and easily upset", (14) "Humans will eventually learn enough about how nature works to be able to control it", and (15) "If things continue on their present course, we will soon experience a major ecological catastrophe". Agreement with the eight odd-numbered and disagreement with the seven even-numbered items reflects an endorsement of the New Environmental Paradigm (see Dunlap et al., 2000). Consequently, the seven even-numbered items were reversed. The Cronbach's alpha for the whole scale was .74. However, the item "The balance of nature is very delicate and easily upset" showed a negative corrected-item total correlation (-.03). We, therefore, decided to exclude this item from further analysis. The 14-item scale had a Cronbach's alpha of .77.

Value Orientations were assessed by the short version of Schwartz's value orientation scale (Schwartz & Sagiv, 1995) as proposed by Stern and his colleagues (1999). The scale consists of the following 13 items assessing egoistic, altruistic, and biospheric value orientations. Egoistic value orientation was assessed by the items: (1) "A person desiring to have control over others or dominance", (2) "A person seeking to have a lot of material possessions and money", (3) "A person claiming for the right to lead or command where ever he/she is", (4) "A person having an impact or influence on people and events", and (5) "A person who is hard-working, striving to perform and achieve" (α = .62). Altruistic value orientation was assessed by the items: (6) "A person who believes in equal opportunity for all men, women, boys, girls, disabled people, etc.", (7) "A person who wishes to live free of war and conflict", (8) "A person who is striving for correcting injustice, and care for the weak", and (9)"A person working for the well-being of others" (α = .78), whereas biospheric value orientation was assessed by the items: (10) "A person who is committed to protecting natural

resources such as water, air, forest, etc.", (11) "A person who wants to live in harmony with other species such as plants and animals", (12) "A person who is fitting into nature - not harming it", and (13) "A person who is dedicated to preserving nature" (α = .84). Participants were requested to indicate the extent to which these value orientation statements describing an imaginary person are likely converging to their respective values. Response options ranged from 1 (*not like me*) to 5 (*very much like me*).

Personal norm was measured using five items adapted from Hopper and Nielsen (1991). The items included were: (1) "I feel I should not throw any waste disposal on the street", (2) "I feel guilty if I do not put garbage into the waste bin", (3) "It would be wrong of me if not switch off electric bulb before going to bed", (4) "I am concerned with maintaining a good environment" and (5) "I have a strong interest in participating on tree planting campaign every year" (α = .70).

Pro-environmental behaviour was assessed by seven items focussing on two types of pro-environmental behaviours: waste disposal practices and electricity saving. The used items were adapted from Oreg and Katz-Gerro (2006) who assessed recycling behaviour. The items were: (1) "When I find litter (i.e., waste disposal like paper, plastic bags, plastic bottles, tissue paper, cigarette packets, etc.) on the ground I pick it up and put it in the waste bin", (2) "I often dispose of solid waste on the street" (reversed), (3) "When I see a person disposing garbage on the street, I do inform him/her not to do it again", (4) "I use hot water when I take a bath" (reversed), (5) "I make sure that the light is switched off before I leave my home", (6) "I make sure that light is switched off before I go to bed" and, (7) "I am willing to involve in environmental protection movement". The item analysis revealed that the items "I often dispose of solid waste on the street" (reversed) and "I make sure that the light is switched off before I leave my home" showed a negative (-.57) and low (.02) corrected item-total correlations, respectively. After discarding these items, the overall scale showed a Cronbach's

alpha of .78.

Environmental information source was measured by items adapted from Weigel and Weigel (1978) to assess the use of different information sources about environmental issues. In the current study, environmental information was assessed through a list of 11 possible sources of information in which three sources (TV, Radio, and Internet) were dropped from further analyses because of the low response rate (less than 5% of the participants selected these sources of information). Thus, the following nine items indicating sources of information were retained in the analysis: (1) discussion with close friends, (2) discussion with classmates, (3) lecturers in the class, (4) family discussion, (5) religious forums, (6) workshops, (7) political leaders, (8) posters, brochures, flyer, and (9) newspapers. Participants were asked to indicate how often they use these sources to inform themselves about environmental issues using an answer format ranging from 1 (*never*) to 5 (*always*).

Results

Preliminary analysis

In a first step, exploratory factor analysis was conducted on the nine items assessing the sources of environmental information. The factorability of the items was examined using the recognized criteria such as inter-item correlations, the Kaiser-Meyer-Olkin (KMO) measure, Bartlett's test of sphericity, and the anti-image matrix (Neill, 2008; Williams, Onsman, & Brown, 2010). Firstly, it was observed that all nine items showed moderate inter-item correlations (i.e., Pearson Correlation coefficients of at least .3) with at least one other item. Secondly, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy reached .74, which is above the commonly recommended value of .6 (Williams, Onsman, & Brown, 2010). Thirdly, Bartlett's test of sphericity was statistically significant, $\chi^2(36) = 427.772$, $p < .001$, which implies that the data was amicable to conduct a factor analysis. Lastly, the diagonal of

the anti-image correlation matrix was also all above .65 suggesting the adequacy of sampling (Neill, 2008). Overall, these indicators imply that factor analysis was suitable for all nine items.

Principal components analysis was used as the aim was to identify the factors describing key sources of environmental information. Three out of nine possible factors explained 36.2%, 17.61%, and 12.26% of the variance, respectively (see Table 1). The three-factor solution, which explained a total of 66.06% of the variance, was preferred based on their Eigenvalues larger than 1. As it was assumed that the key sources of environmental information might overlap, direct oblimin rotation was applied to best define the factor structure. In each of the three factors were three items with primary loadings above .5. The items "lecturers in class", "family discussions" and "religious forums" showed double loadings (see Table 1). The decision, to allocate the items to the respective factors was determined by content. The Cronbach's alpha for each factor was .68 or larger as reported in Table 1. Overall, the results of the exploratory factor analysis implied distinguishing between friends/peers, family/community, and public settings as sources of environmental information (see Table 1).

Table 1

Exploratory factor analysis of items on sources of environmental information, Study 1

Items	Factors			Dimensions
	1	2	3	
Discussion with close friends	**.84**			Friends/peers
Discussion with classmates	**.84**			
Lecturers in the class	**.54**	.43	.35	
Family discussion	**.57**	**.58**		Family/community
Religious forums	.44	**.77**		
Workshops		**.83**		
Political leaders			**.76**	Public settings
Posters, brochures, flyers			**.77**	
Newspapers			**.82**	
% of variance explained	36.2%	17.61%	12.26%	
Cronbach's alpha (α)	.70	.75	.68	

Note. Only factor loadings larger than .3 are reported and those larger than .5 are indicated in bold.

In a second step, the means, standard deviations, and intercorrelations of the principal variables were computed which are reported in Table 2. The results revealed that the three value orientations (i.e., biospheric, altruistic, and egoistic) were positively correlated with pro-environmental behaviour. However, environmental beliefs and personal norms did neither correlate with the three value orientations nor with pro-environmental behaviour. On the other hand, friends/peers and family/community as sources of environmental information positively

correlated with egoistic and biospheric value orientations, respectively, and with pro-environmental behaviour.

In sum, the results of the preliminary analyses supported the proposed relationships and previous research that biospheric, altruistic, and egoistic value orientations are associated with pro-environmental behaviour (Bulunga & Thondhlana, 2018; Chan & Bishop, 2013). Contrary to our assumptions and previous findings, environmental beliefs and personal norms were neither associated with the value orientations nor with pro-environmental behaviour. Friends/peers as a source of environmental information were associated with egoistic value orientation and with pro-environmental behaviour, while family/community as a source of environmental information was related to altruistic and biospheric value orientations and pro-environmental behaviour. However, public settings as a source of environmental information were neither related to the three value orientations nor pro-environmental behaviour.

Table 2

Means, standard deviations, and intercorrelations of principal variables, Study 1 (N =200)

	1	2	3	4	5	6	7	8	9
M	2.76	3.72	3.54	3.83	4.23	3.13	2.28	3.11	3.47
SD	0.94	0.93	1.02	0.49	0.74	0.97	1.08	0.99	0.93
Min	1	1	1	2.40	1	1	1	1	1
Max	5	5	5	4.37	5	5	5	5	5

1. Biospheric value

orientation

2. Altruistic value   .70***

orientation

3. Ecogistic value   .29**   .23**

orientation

	1	2	3	4	5	6	7	8
4. Environmental belief	.06	.03	.03					
5. Personal norms	.11	.11	.10	.26**				
6. Friends/peers source	.16*	.10	.08	.19	.08			
7. Family/ Community source	.27**	-.04	.20**	.06	-.04	.24**		
8. Public settings source	.07	.09	.14	.07	.00	.29***	.22*	
9. Pro-environmental behavior	.71***	.45***	.29**	.09	.01	.17*	.27*	.08

Note. $*p < .05, **p < .01, ***p < .001$ (2-tailed)

Main analysis

To test Hypothesis 1, which stated that biospheric and altruistic value orientations are directly and indirectly positively, whereas egoistic value orientation is directly and indirectly negatively related to pro-environmental behaviour through environmental beliefs and personal norms, we estimated the direct and indirect effects of biospheric, altruistic and egoistic value orientations on pro-environmental behaviour through environmental beliefs and personal norms in three serial mediation models using SPSS PROCESS macro (PROCESS Model #6, Hayes, 2018). In the first model (Model 1), biospheric value orientation was entered as the independent variable, environmental beliefs and personal norms as mediator variables in series, and pro-environmental behaviour as the dependent variable, as well as altruistic and egoistic value orientations as covariates. In the second model (Model 2), altruistic value orientation was entered as the independent variable, environmental beliefs and personal norms as mediator variables in series, pro-environmental behaviour as the dependent variable, and biospheric and

egoistic value orientations as covariates. In the third model (Model 3), egoistic value orientation was entered as the independent variable, environmental beliefs and personal norms as mediator variables in series, pro-environmental behaviour as the dependent variable, and biospheric and altruistic value orientations as covariates. In all three models, we used bootstrapping with 5000 iterations at a 95% confidence interval.

All three models significantly predicted pro-environmental behaviour as determined by the model summary, $R^2 = 0.533$, $F(5, 193) = 44.05$, $p < .001$[1]. The estimates of the direct effects of value orientations (i.e., biospheric, altruistic, and egoistic) and their indirect effects through environmental beliefs and personal norms on pro-environmental behaviour are reported in Table 3. The results imply that pro-environmental behaviour was only statistically significantly predicted by biospheric value orientation, $beta = 0.446$, $SE = 0.041$, CI [0.366, 0.528]. These results were not surprising as the preliminary analysis already suggested that neither environmental beliefs nor personal norms significantly correlated with pro-environmental behaviour. Consequently, Hypothesis 1, which stated that biospheric and altruistic value orientations are directly and indirectly positively, whereas egoistic value orientations are directly and indirectly negatively related to pro-environmental behaviour through environmental beliefs and personal norms, was only supported concerning the direct effect between biospheric value orientation and pro-environmental behaviour.

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[1] The overall model summaries for the dependent variable (pro-environmental behaviour) were identical for all three models as the variables included were the same.

Table 3

Direct and indirect effects of biospheric, altruistic and egoistic value orientations on pro-environmental behaviour through environmental beliefs and personal norms, Study 1

	Beta	SE	t	p	LLCI	ULCI
Direct effects on environmental beliefs						
Constant	3.716	0.166	22.326	<.001	3.388	4.045
Biospheric value orientation	0.033	0.048	0.676	.499	-0.063	0.129
Altruistic value orientation	-0.011	0.050	-0.237	.812	-0.110	0.086
Egoistic value orientation	0.014	0.042	0.347	.728	-0.069	0.098
Direct effects on personal norms						
Constant	2.511	0.407	6.159	< .001	1.707	3.315
Biospheric value orientation	0.012	0.063	0.195	.845	-0.112	0.137
Altruistic value orientation	0.046	0.065	0.714	.475	-0.081	0.174
Egoistic value orientation	0.057	0.055	0.1.042	.298	-.051	.166
Environmental beliefs	0.325	0.093	3.498	< .001	0.141	0.508
Direct effects on pro-environmental behaviour						
Constant	1.754	0.291	6.017	< .001	1.179	2.329
Biospheric value orientation	0.446	0.041	10.791	< .001	0.366	0.528
Altruistic value orientation	-0.065	0.042	-0.527	.128	-0.148	0.018

Egoistic value orientation	0.070	0.036	1.935	.054	-0.001	0.141
Environmental beliefs	0.091	0.062	1.146	.144	-0.031	0.215
Personal norms	-0.092	0.047	-1.970	.050	-0.185	0.000

Indirect effects of biospheric value orientation on pro-environmental behaviour (Model 1)

	Effect	BootSE	Boot LLCI	Boot ULCI
Biospheric value orientation * environmental beliefs	0.003	0.005	-0.006	0.016
Biospheric value orientation * personal norms	-0.001	0.006	-0.015	0.011
Biospheric value orientation * environmental beliefs * personal norms	-0.001	0.001	-0.005	0.001

Indirect effects of altruistic value orientation on pro-environmental behaviour (Model 2)

	Effect	Boot SE	Boot LLCI	Boot ULCI
Altruistic value orientation * environmental beliefs	-0.001	0.005	-0.014	0.009
Altruistic value orientation * personal norms	-0.004	0.007	-0.021	0.006
Altruistic value orientation * environmental beliefs * personal norms	0.004	0.001	-0.003	0.004

Indirect effects of egoistic value orientations on pro-environmental behaviour (Model 3)

	Effect	Boot SE	Boot LLCI	Boot ULCI
Egoistic value orientation * environmental beliefs	0.002	0.008	-0.013	0.025
Egoistic value orientation * personal norms	-0.009	0.009	-0.029	0.006
Egoistic value orientation * environmental beliefs * personal norms	-0.001	0.002	-0.008	0.003

Additionally, we tested whether gender, age, and place of origin as well as the sources of environmental information (i.e., friends/peers, family/community, and public settings) or the combination of the former and latter moderate the direct and indirect effects of value orientation on pro-environmental behaviour (see Figure 4) using *PROCESS* (Model #3, Hayes, 2018). Eventually, only the model that tested the relationship between biospheric value orientation and pro-environmental behaviour assuming a moderated moderation effect of gender and family/community as a source of environmental information fitted the data, $R^2 =$ 0.524, $F(9,184) = 22.5$, $p < .001$, implying that biospheric value orientation, gender, and family/community as a source of environmental information jointly explained significant variance of pro-environmental behaviour. The indices for direct and interaction effects are reported in Table 4.

The two-way interaction between family/community as a source of environmental information and biospheric value orientation was not statistically significant, while the two-way interaction between gender and family/community as a source of environmental information, *beta* = -0.702, *SE* = 0.314, *CI* [-1.323, -0.081], and most importantly the three-

way interaction between gender, family/community as a source of environmental information, and biospheric value orientation, *beta* = 0.176, *SE* = 0.086, *CI* [0.006, 0.347], were statistically significant (see Table 4). The latter effect suggests that the influence of biospheric value orientation on pro-environmental behaviour is indeed conditional upon the interplay between gender and environmental information sources in family/community settings.

The conditional effects of gender and family/community as a source of environmental information on the relationship between biospheric value orientation and pro-environmental behaviour are summarized for females and males in Table 5. As the results of the unstandardized simple slope analysis imply, the effect of biospheric value orientation on pro-environmental behaviour was not significant at 1 SD below the mean of family/community as a source of environmental information in female participants, *Effect* = 0.234, *Boot*SE = 0.141, *Boot*CL [-0.043, 0.512], while the effect significantly increased as the level of family/community as a source of environmental information increased (i.e., at the mean and 1 SD above mean), *Effect* = 0.393, *Boot*SE = 0.086, *Boot*CL [0.222, 0.563], and *Effect* = 0.604, *Boot*SE = 0.104, *Boot*CL [0.397, 0.811], respectively. This pattern was, however, not observed in male participants in that the effect of biospheric value orientation was fairly the same at the three levels of family/community as a source of environmental information (1 SD below mean, at the mean, and 1 SD above the mean, see Table 5). These results imply that the influence of biospheric value orientation on pro-environmental behaviour through family/community as a source of environmental information is contingent upon the gender of the participants. That is, increasing environmental information at the family/community level appeared to increase the effect of biospheric value orientation on pro-environmental behaviour in female participants, whereas this effect was more or less the same in their male counterparts. More specifically, the more environmental information is available from families for females the more the influence of biospheric value orientation results in pro-environmental behaviour. Overall, these results

suggest that gender and family/community as a source of environmental information determine the relationship between biospheric value orientation and pro-environmental behaviour for females, implying the conditionality of the direct influence of biospheric value orientation on pro-environmental behaviour.

Table 4

Moderated moderation effects of gender and source of environmental information on the relationship between biospheric value orientation and pro-environmental behaviour, Study 1

	Direct and interaction effects on pro-environmental behaviour					
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	3.716	0.166	22.326	$< .001$	3.388	4.045
Biospheric value orientation	0.949	0.314	3.016	$< .001$	0.328	1.570
Gender	1.929	0.976	1.975	$< .05$	0.002	3.856
Biospheric value orientation *gender	-0.489	0.275	1.776	.0774	-1.033	0.054
Family/community	0.818	0.375	2.178	$< .05$	0.077	1.559
Biospheric value orientation *family/community	.0.194	0.102	-1.904	.0585	-0.396	0.007
Gender*family/community	-0.702	0.314	-2.231	$< .01$	-1.323	-0.081
Biospheric value orientation *gender*family/ community	0.176	0.086	2.042	$< .05$	0.006	0.347

Table 5

Conditional direct effects of biospheric value orientation on pro-environmental behaviour upon family sources of information for females and males, Study 1

	Effect	Boot SE	t	p	Boot LLCI	Boot ULCI
	Females					
1 SD Below Mean	0.234	0.141	1.665	.097	-0.043	0.512
Mean	0.393	0.086	4.550	< .001	0.222	0.563
1 SD Above Mean	0.604	0.104	5.768	< .001	0.397	0.811
	Males					
1SD Below Mean	0.429	0.053	8.045	< .001	0.324	0.535
Mean	0.411	0.047	8.675	< .001	0.317	0.505
1 SD Above Mean	0.387	0.067	5.773	< .001	0.254	0.519

We further assessed the relationship between environmental information sources (i.e., friends/peers, family/community, and public settings as sources), age, gender, place of origin, and pro-environmental behaviour to test Hypotheses 6 to 9. Hypothesis 6, which stated that sources of environmental information are positively associated with pro-environmental behaviour, was tested using linear regression analysis in which friends/peers, family/community, and public settings as sources of information were entered into the model as independent variables and pro-environmental behaviour as the dependent variable. The overall model was statistically significant, $R^2 = .09$, $F(4,187) = 4.77$, $p < .001$. The results

partially supported Hypothesis 6 as family/community as a source of environmental information was positively and significantly associated with pro-environmental behaviour, *beta* = 0.239, *p* < .001, whereas friends/peer and public settings as sources of environmental information were not significantly related to pro-environmental behaviour, *beta* = 0.069, *p* > .05, and *beta* = - 0.023, *p* > .05, respectively.

Likewise, age and pro-environmental behaviour showed a statistically significant positive, although weak, relationship, *r* = .14, *p* < .05. An independent samples t-test was conducted to assess the difference in pro-environmental behavior between females, *M* = 3.31, *SD* = 0.56, and males, *M* = 3.25, *SD* = 0.06, which was not statistically significant, *t*(198) = -0.625, *p* > .05. Likewise, the outcome of one-way analysis of variance (ANOVA) revealed that participants from rural, *M* = 3.1, *SD* = 0.11, semi-urban, *M* = 3.08, *SD* = 0.13, and urban areas, *M* = 3.05, *SD* = 0.09, did not significantly differ in their pro-environmental behaviour, *F*(2,189) = 2.56, *p* > .05.

In addition, we used linear multiple regression analysis to complement the bivariate procedures performed in the former analyses. Dummy coding was used for gender (male coded as 0 and female as 1). As the place of origin consisted of three groups, three dummy variables were formed: urban versus rural (coded as 1 and 0, respectively), semi-urban versus rural (coded as 1 and 0, respectively), and urban versus semi-urban (coded as 1 and 0, respectively). The three dummy variables of the place of origin were entered into the regression models separately (i.e., one at a time) together with gender and age. The results showed that the overall models were not statistically significant entering either rural versus urban, urban versus semi-urban, or semi-urban versus rural as places of origin into the models, R^2 = 0.03, *F*(3,126) = .05, *p* > .05; R^2 = 0.04, *F*(3,100) = 2.33, *p* > .05; and R^2 = .02, *F*(3.139) = 0.99, *p* > .05, respectively. Hence, the hypotheses that a positively significant relationship exists between age and pro-environmental behaviour (Hypothesis 7), that gender is associated with pro-environmental

behaviour in that females score higher than their male counterparts (Hypothesis 8), and that place of origin is associated with pro-environmental behaviours, in that participants from urban origin score higher on pro-environmental behaviour than their counterparts from the semi-urban and rural origin (Hypothesis 9) were not supported in Study 1.

Discussion

The purpose of Study 1 was twofold: firstly, to explore the applicability of the value-belief-norm theory in explaining the pro-environmental behaviour in the context of a higher education institution in Ethiopia. Secondly, to assess the associations between age, gender, place of origin as well as sources of environmental information (i.e., friends/peers, family/community, and public settings) and pro-environmental behaviour. The overall results of Study 1 implied that the proposed conceptual model of the value-belief-norm theory (Figure 4) explained a statistically significant proportion of the variation in pro-environmental behaviour of university students. However, the proposed positive indirect effects of biospheric, the positive direct and indirect effects of altruistic value orientation, and the negative direct and indirect effects of egoistic value orientation on pro-environmental behaviour through environmental beliefs and personal norms (Hypothesis 1) were not statistically significant, implying that neither environmental beliefs nor personal norms intervened the relationships between value orientations and pro-environmental behaviour. These findings were not only contrary to Hypotheses 1 but also to previous studies, which, for instance, affirmed the positive indirect effects of biospheric and altruistic value orientations on pro-environmental behaviours through environmental beliefs and personal norms (Abrahamse et al., 2007; Landon, Woosnam, & Boley, 2018; Ibtissem, 2010; Nordlund & Garvill, 2002; Steg et al., 2005; Stern, 2000), and the negative indirect effect of egoistic value orientation on pro-environmental behaviour through environmental beliefs and personal norms in various contexts (Ibtissem, 2010; Landon

et al., 2018). The only factor of the value-belief-norm theory that was positively and directly associated with pro-environmental behaviour was biospheric value orientation in the present study.

Motivated by these unexpected results, we additionally tested for possible moderator effects not considered in the value-belief-norm theory. Results showed that both gender and family/community as a source of environmental information moderated the relationship between biospheric value orientation and pro-environmental behaviour. More specifically, the effect of biospheric value orientation on pro-environmental behaviour was found to be conditional on whether females experienced a medium or high level of environmental information from family/community as a source. However, this conditional effect was not observed in male participants. On this ground, it can be concluded that the more female participants are exposed to environmental information at the family/community level, the stronger they respond to their biospheric values orientations with pro-environmental behaviour. This finding appears to justify the importance of environmental information in boosting people's awareness of environmental issues and fostering pro-environmental behaviour as reported in past studies (e.g., Abrahamse et al., 2005).

Overall, although Study 1 did not support the hypothesized indirect effects of value orientations on pro-environmental behaviour through environmental belief and personal norms, biospheric value orientation stood out as a strong predictor of pro-environmental behaviour. This result is congruent with previous findings, which showed that biospheric value orientation was consistently and positively correlated with pro-environmental behaviour (e.g., Jia et al., 2017; Ibtissem, 2010; Landon et al., 2018).

Concerning the second aim of Study 1, which explored the association between environmental information sources and pro-environmental behaviour (Hypothesis 6) as well as the relationships between age, gender, and place of origin (Hypotheses 7, 8, and 9, respectively)

and pro-environmental behaviour, the results revealed firstly, that the proposed positive relationship between environmental information sources and pro-environmental behaviour (Hypothesis 6) was only supported for family/community as sources of information which is in line with past studies that reported, for instance, that environmental information from credible sources plays a pivotal role in fostering pro-environmental behaviour (Steg & Vlek, 2009; Zorić & Hrovatin, 2012). It is worth mentioning that Radio, TV, and the Internet were not selected as sources of environmental information, which might be due to limited access rather than that these sources are considered less informative.

Secondly, the hypothesized positive relationship between age and pro-environmental behaviour (Hypothesis 7) was supported by the result of bivariate correlation analysis, which was, however, rather weak. This weak effect of age is contradictory to previous studies, which reported a strong positive correlation between age and pro-environmental behaviour (e.g., Blankenberg & Alhusen, 2018). The weak association between age and pro-environmental behaviour in the current study might be attributed to the narrow differences in the age distribution of the participants, as the majority of them (about 90%) were in the age group of 20-25 years old. Moreover, researchers who examined the link between age and different types of pro-environmental behaviours concluded that people of different age groups opt for different environmental actions, pertinent to their age cohort (e.g., Blankenberg & Alhusen, 2018).

Likewise, the proposed gender effect on pro-environmental behaviour that posited females to show more pro-environmental behaviour compared to males was not supported in Study 1 (Hypothesis 8). This result corresponds to findings of previous studies which also did not find a gender effect on pro-environmental behaviour (Blocker & Eckberg, 1997). It, however, contradicts the findings of more recent studies, which revealed that females exhibit a higher level of pro-environmental behaviour than males (McCright & Xiao, 2014; Lee, 2009; Longhi, 2013; Lynn & Longhi, 2011; McCright & Xiao, 2014), and those that reported males

to be more concerned about the environment than females (e.g., Lee, Park, & Han, 2013). Most of these studies attributed gender differences in environmental concern to patterns of traditional gender socialization in which females take on roles as caregivers and nurturers that might lead them to stronger embrace a worldview of caring for nature and the environment than males do (e.g., Lynn & Longhi, 2011). We would argue that these traditional social norms related to gender are reshaped through education, narrowing the distinction between males and females in many of the socially ascribed characteristics. This assertion might explain the weak association between gender and pro-environmental behaviour observed in the current study in that, as the participants are university students, their educational attainment likely reduced the differences between male and female participants in terms of their propensity to pro-environmental behaviour.

Lastly, that participants' place of origin (i.e., urban, semi-urban, and rural areas) is associated with pro-environmental behaviour (Hypothesis 9), in that participants from urban origin tend to show relatively more pro-environmental behaviour, was also not supported. This finding contradicts previous findings that reported people residing in larger cities to be more likely to engage in pro-environmental behaviour than their counterparts living in towns (Chen et al., 2011). However, it partially corresponds with findings by Bogner and Wiseman (1997) who reported no differences in environmental concern between urban and rural respondents. In the same vein, some recent studies described that the level of pro-environmental behaviour is contingent upon the perceived threats to the wellbeing of residents, regardless of urban or rural settings (e.g., Bak, 2018; Gifford & Nilsson, 2014). In light of these findings, the lack of association between the geographical origin of the participants and pro-environmental behaviour as it was assessed in the present study (i.e., saving electricity and waste disposal practices) suggests that once people have internalized perceptions of caring for the environment for the sake of their well-being it does not matter where they live (or used to live).

In conclusion, Study 1 revealed various unexpected results, which require further exploration. Firstly, only biospheric value orientation predicted pro-environmental behaviour, which implies that participants, who endorse biospheric values tend to exhibit pro-environmental behaviour. However, neither environmental beliefs nor personal norms seemingly play a role in this interplay. It is worth asking why biospheric value orientation failed to transfer its effect through pro-environmental beliefs and personal norms as proposed by the value-belief-norm theory. Some earlier studies reported that eco-centric values (such as biospheric values) are incapable to influence environmental beliefs and personal norms as the latter two are more associated with altruistic value orientations (e.g., Ibtissem, 2010; Werff & Steg, 2016). For instance, Werff and Steg (2016, p. 108) proposed that biospheric values are more related to nature and the environment than altruistic values. Therefore, given that altruistic value orientation was not a statistically significant predictor of pro-environmental behaviour in the present study, it seems reasonable to speculate that biospheric values have directly influenced pro-environment behaviour, showing that the participants might endorse pro-environmental actions for the sake of caring for nature and the environment, regardless of their environmental beliefs and personal norms.

That environmental beliefs and personal norms were not significantly related to pro-environmental behaviour might be attributed to the context of the study. That is, environmental beliefs which were assessed by the New Environmental Paradigm are linked to an ecological worldview that is most probably shaped by persistent public discourses and social movements around environmental issues aiming at imparting environmental knowledge, values, and attitudes (Fuchs, 2017; Kollmus & Agyeman, 2002). For instance, Fuchs (2017) notes that a key requirement for advancing environmental beliefs is citizen-driven governance where environmental issues are understood as nested within wider society. In the context of Ethiopia, these endeavours are limited at all levels which likely explains the lack of associations between

environmental beliefs and pro-environmental behaviour. Likewise, the absence of wider public and social movements around environmental issues might undermine the activation of personal norms, which is intrinsic motivation due to the moral obligation to perform pro-environmental behaviour (Klöckner, 2013) and ascription of responsibility for the consequences of not taking environmental actions.

Alternatively, our results, which did not support the proposed hierarchical influence of the constructs in the value-belief-norm model (i.e., value orientations → environmental beliefs → personal norms → pro-environmental behaviour) might also be attributed to response inaccuracy, which is inherently rooted in self-reported measures and observed in most survey research (Kamper, Maher, & Mackay, 2009). Moreover, participants in Study 1 were undergraduate students with rather low proficiency in the English language, which might have hindered their level of comprehension of the statements in the questionnaire leading to response inconsistency. This, in turn, might have increased the measurement error that limited its full compatibility with the original theoretical framework of the value-belief-norm theory.

Based on the findings and outlined limitations of Study 1, the subsequent Study 2 intended to overcome the limitations by administering the questionnaire to postgraduate students who have better English language proficiency. Furthermore, albeit the demographic factors (i.e., age, gender, and geographical settings) did not play significant roles in predicting pro-environmental behaviour in Study 1, we argue that pro-environmental behaviour is not only influenced by value orientations, environmental beliefs, and personal norms but also by the social class and cultural values shared by people. Hence, Study 2 opted to explore additional factors such as social class and cultural domains and to examine their interplay with the value-belief-norm theory in predicting pro-environmental behaviour.

STUDY 2

Study 2 had two main aims. Firstly, we re-tested the hypotheses that age is positively and significantly related to pro-environmental behaviour (Hypothesis 7) and gender is associated with pro-environmental behaviour in that females show more pro-environmental behaviour than their male counterparts (Hypothesis 8). We further re-assessed the value-belief-norm theory by re-testing the hypothesis that biospheric and altruistic values are directly and indirectly positively, whereas egoistic values are directly and indirectly negatively related to pro-environmental behaviour through environmental beliefs and personal norms (Hypothesis 1).

The second aim of Study 2 was to extend the value-belief-norm model by considering the role of social class and cultural orientation in explaining pro-environmental behaviour. We posited that the inclusion of social class and cultural orientation into the value-belief-norm model will improve the predictive power of the model to explain pro-environmental behaviour (Hypothesis 2 and Hypothesis 4). We further hypothesized that social class and/or cultural orientation alter the magnitude and direction of influences of value orientations, environmental beliefs, and personal norms on pro-environmental behaviour. More specifically, it was hypothesized that social class moderates the direct and indirect effects of biospheric, altruistic, and egoistic value orientation on pro-environmental behaviour through environmental beliefs and personal norms in that the positive effects of biospheric and altruistic value orientations should be stronger in low than in upper social class individuals, whereas the negative effects of egoistic value orientations should be stronger in upper than in low social class individuals (Hypothesis 3). The conceptual framework of Hypothesis 3 is depicted in Figure 5.

Figure 5

The conceptual framework for moderating function of social class
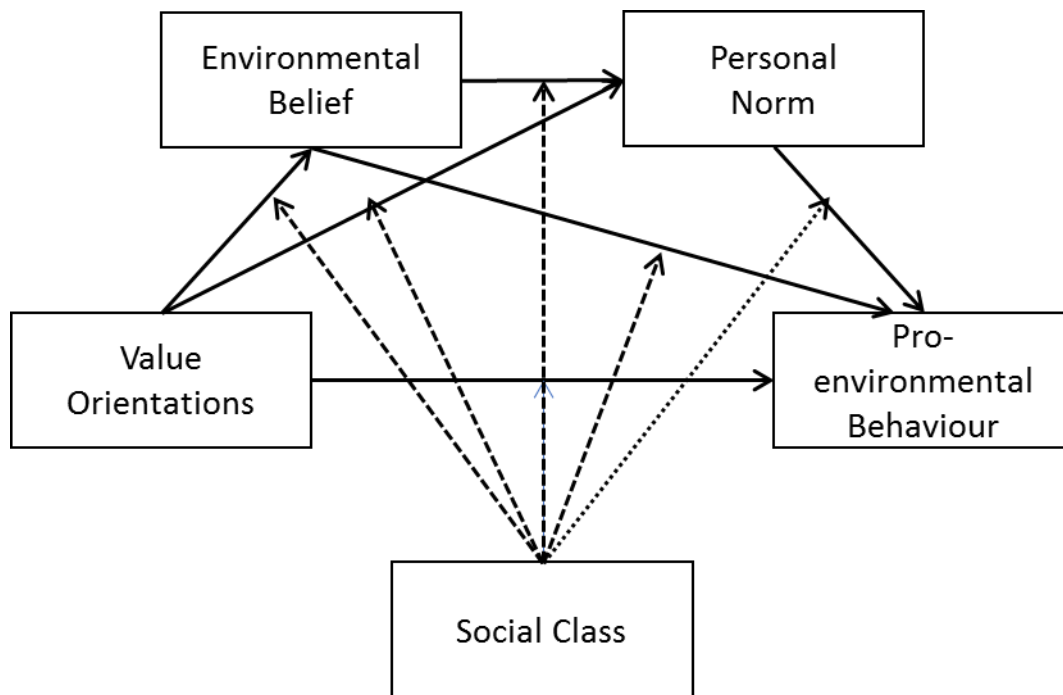
We further hypothesized that harmony-mastery cultural orientations moderate the direct and indirect effects of biospheric, altruistic, and egoistic value orientations on pro-environmental behaviour through environmental beliefs and personal norms in that the positive effects of biospheric and altruistic value orientations will be stronger in individuals who share harmony-cultural orientations than individuals who share mastery-cultural orientations, whereas the negative effects of egoistic value orientation will be stronger in individuals who share mastery-cultural orientations than in individuals who share harmony-cultural orientations (Hypothesis 5). The conceptual framework of Hypothesis 5 is shown in Figure 6. The hypotheses were again tested by applying a cross-sectional survey design and using a self-administered questionnaire as the research instrument.

Figure 6

The conceptual framework for moderating function of cultural orientation
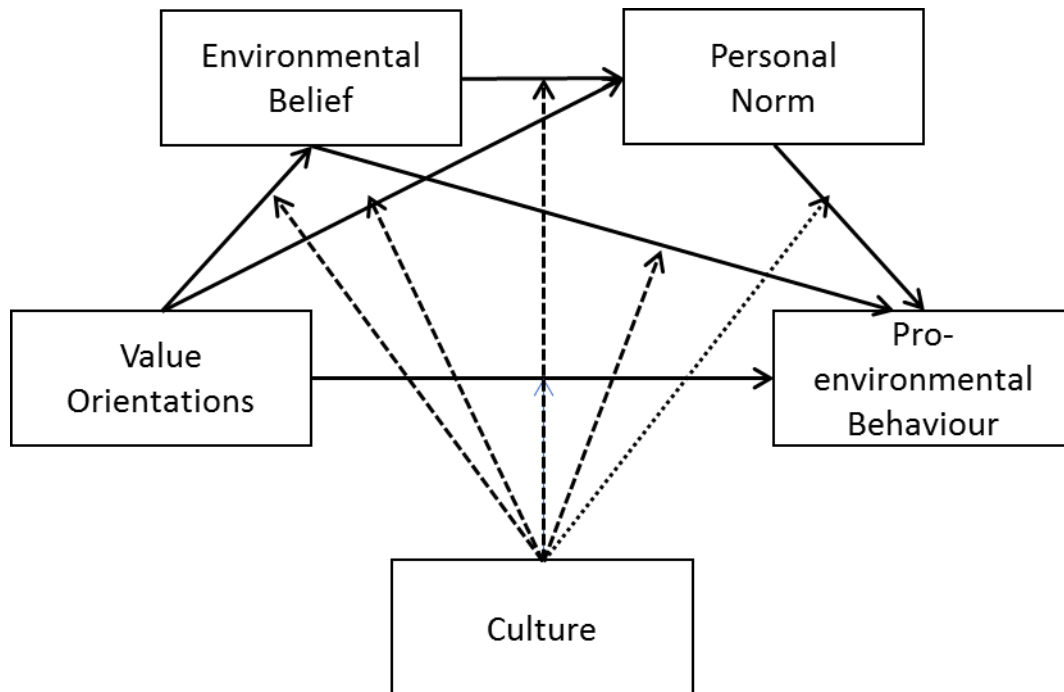
Participants

Study 2 targeted postgraduate students who were conveniently approached at the University of Addis Ababa. In total, 300 participants took part in Study 2 of which 177 (59%) were males and 123 (41%) were females. Participants' age ranged from 22 to 57 years with a mean age of 27 years ($SD = 5.07$).

Procedure

Like in Study1, participants in Study 2 were conveniently approached after their lectures. They responded to the questionnaire in the respective lecture rooms. The participants were informed about the purpose of the study and asked to provide consent before taking part in the survey. Like in Study 1, participants were informed about the aim of the study to research

pro-environmental behaviour, that participation is voluntary and anonymous, that they can withdraw at any given moment without any consequences, and that data will be analysed on a group level for scientific purposes. Following informed consent, the research assistants handed out the questionnaire to the participants who handed it back to the research assistants. The questionnaire used in Study 2 consisted of the same measurements applied in Study 1 such as demographic characteristics, value orientations, environmental beliefs, personal norms and pro-environmental behaviour, and the additional measures assessing social class and cultural orientations. The maximum time required to complete the questionnaire was less than 45 minutes.

Measurements

In Study 2, the same measures were used as in Study 1 to assess demographics (i.e., age, and gender), biospheric value orientation ($\alpha = .86$), altruistic value orientation ($\alpha = .78$), egoistic value orientation, environmental beliefs ($\alpha = .82$), and personal norms ($\alpha = .68$). The item analysis of the measure of egoistic value orientation revealed that the item "A person who is hard-working, striving to perform and achieve" showed a rather low correct item-total correlation (.013). We, therefore, decided to omit this item from the egoistic value orientation measure, which resulted in the increase of Chronbach's alpha from .76 to .82. Different to Study 1, Study 2 did not assess the source of environmental information and the place of origin (i.e., urban versus semi-urban versus rural areas) of our participants. If not differently stated, participants responded to the measurements using an answer format ranging from 1 (*totally disagree*) to 5 (*totally agree*).

Pro-environmental behaviour was slightly differently assessed from Study 1 as two items were changed to improve clarity. The original item "I am involved in environmental protection movements" was rephrased into "I used to be involved in the environmental

protection club when I was in high school"; and the "I have been participating in tree planting campaigns" was additionally included. All other items were the same as used in Study 1. The item analysis of the measure of pro-environmental behaviour revealed that the two reversed items "I dispose of waste on the street" and "I use hot water when I take a bath" showed negative correct item-total correlations (-.44, and -.75, respectively). We, therefore, decided to remove these two items from the pro-environmental behaviour measure (α = .87).

Social class was assessed as objective social class using monthly income and housing conditions which ranged from congested, descent to luxurious. That is, the participants were requested to report their monthly income. Likewise, participants were requested to indicate the quality of their housing as congested, descent, or luxurious, which was coded as 1, 2 and 3, respectively. The Spearman rho correlation coefficient of the two variables was -.06 (p > .05), indicating that these two indicators did not correlate. Thus, for further analysis, we used monthly income as an indicator of objective social class. Using median split, we distinguished participants from low social class (800-7000 Birr) and upper social class (7001-16000 Birr).

Cultural orientation was measured using Kluckhohn and Strodtbeck's Cultural Perspectives Questionnaire (Hills, 2002), which assesses the following six basic cultural orientations: autonomy versus embeddedness, harmony versus mastery, and egalitarianism versus hierarchy. In the present study, we focused on the harmony versus mastery cultural dimension, which refers to human relations to the broader environment. The following items were applied: (1) "Our purpose and natural role are to maintain a balance among the elements of the environment, including ourselves", (2) "Our purpose and natural role are to control nature and the environment around us" (reversed), and (3) "Our purpose and natural role are to understand and subjugate ourselves to the plan determined by a larger natural or supernatural element". The answer format ranged from 1 (*strongly disagree*) to 5 (*strongly agree)*. High scores on the scale imply harmony while low scores indicate mastery. The item analysis of the

measure of cultural orientation revealed that the item "Our purpose and natural role is to maintain a balance among the elements of the environment, including ourselves" showed a negative correct item-total correlation (-.0.14). We, therefore, decided to remove this item from the cultural orientation measure measure ($r = .69$, $p < .001$).

Results

Preliminary analysis

The means, standard deviations, and intercorrelations of the principal variables are reported in Table 6. The results revealed that all variables of the value-belief-norm model correlated significantly with pro-environmental behaviour. Notably, only egoistic value orientation was negatively associated with pro-environmental behaviour, while biospheric value orientation, altruistic value orientation, environmental beliefs, and personal norms correlated positively with pro-environmental behaviour, which is consistent with our assumptions. Cultural orientation correlated positively with biospheric value orientations, environmental beliefs, and pro-environmental behaviour. However, objective social class (i.e., monthly income) was only associated with personal norms but not with any other variable.

Overall, the results of the preliminary analysis showed that the predictor variables of our proposed model are significantly related to pro-environmental behaviour, unlike the results in Study 1. Thus, the proposed relationships among the variables in the model were more aligned to the posited hypotheses in Study 2 than they were in Study 1.

Table 6

Means, standard deviations, and intercorrelations of principal variables, Study 2 (N = 300)

	1	2	3	4	5	6	7	8
M	4.17	3.89	0.07	3.43	4.10	4.06	7017	4.12
SD	0.84	0.94	1.06	0.65	0.68	0.73	2865	0.86
Min	1.75	1	1	1.33	1	2.5	800	1.67
Max	5	5	5	4.73	5	5	16000	5
1. Biospheric value orientation								
2. Altruistic value orientation	-.03							
3. Ecogistic value orientation	-.08	-.03						
4. Environmental beliefs	-.03	.28***	.06					
5. Personal norms	.02	.22***	-.18**	.10†				
6. Cultural orientation	.25***	.10	.02	.22***	.03			
7. Social class (Income)	-.04	-.05	.00	.03	.19**	.08		
8. Pro-environmental behaviour	.31***	.29***	-.14*	.14*	.31***	.43***	-.08	

Note. † < .10, * p < .05 **p < .01, *** p < .001 (2-tailed).

Main analysis

Firstly, we tested the hypotheses related to the association between demographic factors and pro-environmental behaviour, which stated that age is positively and significantly related to pro-environmental behaviour (Hypothesis 7) and that gender is associated with pro-environmental behaviour in that females show more pro-environmental behaviour than their male counterparts (Hypothesis 8). Pearson correlation and the independent samples t-test were used to test Hypothesis 7 and Hypothesis 8, respectively. The result revealed that age correlated significantly and negatively, although weakly, with pro-environmental behaviour, $r = -.12$, $p < .05$, unlike the proposed positive correlation. On the other hand, the independent samples t-test showed that the difference in pro-environmental behaviour between female, $M = 4.46$, $SD = 0.69$, and male participants, $M = 3.89$, $SD = 0.89$, was statistically significant, $t(293.174) = 6.17$, $p < .001$, indicating that females reported indeed more propensity to pro-environmental behaviour than males, which is in line with Hypothesis 8.

Secondly, we re-tested Hypothesis 1 that biospheric and altruistic value orientations are directly and indirectly positively, whereas egoistic value orientation is directly and indirectly negatively related to pro-environmental behaviour through environmental beliefs and personal norms. Hence, we estimated the direct and indirect effects of biospheric, altruistic, and egoistic value orientations on pro-environmental behaviour through environmental beliefs and personal norms in three separate serial mediation models using *PROCESS* (Model #6; see Hayes, 2018). In the first model (Model 1), biospheric value orientation was entered as the independent variable, environmental beliefs and personal norms as mediator variables, and pro-environmental behaviour as the dependent variable, while altruistic and egoistic value orientations were entered as covariates (Model 1, see Table 7). In the second model, we entered altruistic value orientation as the independent variable, environmental beliefs and personal norms as mediators, pro-environmental behaviour as the dependent variable, and biospheric

and egoistic value orientations as covariates (Model 2, see Table 7). In the third model, we entered egoistic value orientation as the independent variable, environmental beliefs and personal norms as mediators, pro-environmental behaviour as the dependent variable, and biospheric and altruistic value orientations as covariates (Model 3, see Table 7). In all analyses, we used again bootstrapping with 5000 iterations at a 95% confidence interval.

The overall estimates for all three models were statistically significant, $R^2 = .2600$, $F(5,290) = 20.38$, $p < .001$[2], explaining 26% of the variance of pro-environmental behaviour. The results revealed that both biospheric and altruistic value orientations are positively and directly related to pro-environmental behaviour, *beta* = 0.318, *SE* = 0.051, *CI* [0.216, 0.420], and *beta* = 0.206, *SE* = 0.049, *CI* [0.109, 0.303] (see Table 7), respectively, which supports Hypothesis 1. Moreover, altruistic value orientations are positively and indirectly related to pro-environmental behaviour through personal norms, *Effect* = 0.044, *Boot*SE = 0.021, *Boot*CL [0.011, 0.093]. The latter result implies that altruistic value orientations are associated with moral obligations to act pro-environmentally. Lastly, although egoistic value orientations were not directly related to pro-environmental behaviour (see Table 7), they were negatively indirectly related through personal norms, *Effect* = -0.032, *Boot*SE = 0.013, *Boot*CL [-0.061, -0.010].

As in Study 1, biospheric value orientation influenced pro-environmental behaviour directly but not indirectly (see Table 7), implying that personal norms and environmental beliefs do not play a role in the relationship between biospheric value orientations and pro-environmental behaviour which corresponds with previous findings (e.g., Bouman, Stege & Kiers, 2018). Consistent with Hypothesis 1, personal norms played a mediating role in the relationship between altruistic and egoistic value orientations and pro-environmental behaviour

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[2] The overall model summaries for the dependent variable pro-environmental behavior were identical for all three models as the variables included were the same.

as proposed by the value-belief-norm theory. More specifically, our results partially support the proposed chain of influences in which the value orientations (i.e., altruistic and egoistic) affect personal norms, which in turn influence pro-environmental behaviour (Hypothesis 1).

Table 7

Direct and indirect effects of biospheric, altruistic, and egoistic value orientations on pro-environmental behaviour through environmental beliefs and personal norms, Study 2

Direct effects on environmental beliefs						
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	2.609	0.272	9.57	< .001	2.073	3.146
Biospheric value orientation	-0.015	0.043	-0.34	.728	-0.101	0.070
Altruistic value orientation	0.194	0.038	4.99	< .001	0.117	0.271
Egoistic value orientation	0.042	0.034	1.23	.218	-0.025	0.110
Direct effects on personal norms						
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	3.598	0.323	11.12	< .001	2.962	4.235
Biospheric value orientation	0.008	0.045	0.190	.849	-0.080	0.097
Altruistic value orientation	0.148	0.042	3.53	< .001	-0.065	0.231
Egoistic value orientation	-0.107	0.035	-2.99	< 0.01	-0.178	-0.036
Environmental beliefs	0.065	0.060	1.08	.279	-0.053	0.184
Direct effects on pro-environmental behaviour						

	Beta	SE	t	p	LLCI	ULCI
Constant	0.598	0.443	1.35	.177	-0.273	1.471
Biospheric value orientation	0.318	0.051	6.14	< .001	0.216	0.420
Altruistic value orientation	0.206	0.049	4.19	<.001	0.109	0.303
Egoistic value orientation	-0.061	0.041	-1.47	.141	-0.144	0.020
Environmental beliefs	0.104	0.069	1.49	.135	-0.032	0.241
Personal norms	0.299	0.067	4.44	<.001	0.166	0.431

Indirect effects of biospheric value orientation on pro-environmental behaviour through environmental beliefs and personal norms (Model 1)

	Effect	BootSE	BootLLCI	BootULCI
Biospheric value orientation * environmental beliefs	-0.002	0.005	-0.013	0.008
Biospheric value orientation * personal norms	0.002	0.016	-0.031	0.037
Biospheric value orientation * environmental beliefs * personal norms	0.000	0.001	-0.003	0.002

Indirect effects of altruistic value orientation on pro-environmental behaviour through environmental beliefs and personal norms (Model 2)

	Effect	BootSE	BootLLCI	BootULCI

	Effect	BootSE	BootLLCI	BootULCI
Altruistic value orientation * environmental beliefs	0.020	0.011	-0.001	0.045
Altruistic value orientation * personal norms	0.044	0.021	0.011	0.093
Altruistic value orientation * environmental beliefs * personal norms	0.003	0.003	-0.003	0.012

Indirect effects of egoistic value orientation on pro-environmental behaviour through

environmental beliefs and personal norms (Model 3)

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
Egoistic value orientation * environmental beliefs	0.004	0.004	-0.002	0.014
Egoistic value orientation * personal norms	-0.032	0.013	-0.061	-0.010
Egoistic value orientation * environmental beliefs * personal norms	0.000	0.001	-0.001	0.003

The second aim of Study 2 was to extend the value-belief-norm model by considering

the factors of social class and cultural orientation (Hypothesis 2 and Hypothesis 4) and to test

whether the assumptions proposed by the value-belief-norm theory are conditional upon social

class (Hypotheses 3) and cultural orientation (Hypotheses 5).

Model Extension

Firstly, we tested to what extent the inclusion of social class and cultural orientation into the value-belief-norm model improves the explained variance of pro-environmental behaviour (Hypotheses 2 and 5). We used stepwise linear regression analysis to assess two models. In the first step, we entered the constructs of the value-belief-norm model (i.e., biospheric, altruistic, and egoistic value orientations, environmental beliefs, and personal norms as predictor variables of pro-environmental behaviour, Model 1), and in the second step, we added cultural orientation and social class in the model as predictor variables (Model 2). The results revealed that the overall model estimates for Model 1, $R^2 = .247$, $F(5,290) = 20.38$, $p < .001$, and for Model 2, $R^2 = .371$, $F(7, 288) = 25.83$, $p < .001$, were statistically significant. More importantly, the change statistics showed a significant increase in the explained variance of pro-environmental behaviour after including social class and cultural orientation in the model, $\Delta R^2 = 0.126$, $F(2,288) = 29.56$, $p < .001$. These results suggest that social class and cultural orientation accounted for a 12.6% increase in the variance of pro-environmental behaviour. Significant predictors were cultural orientation, *beta* = .361, $p < .001$, followed by personal norms, *beta* = .264, $p < .001$, biospheric value orientation, *beta* = .211, $p < .001$, altruistic value orientation, *beta* = .194, $p < .001$, and social class, *beta* = -.135, $p < .01$ (see Table 8). Social class and cultural orientation are negatively and positively related to pro-environmental behaviour, respectively, implying that the more monthly income is reported the less do participants act pro-environmentally, and the more participants are harmony-oriented in their cultural orientations the more they act pro-environmentally. In sum, both social class and cultural orientation are relevant factors to be considered when extending the value-belief-norm theory to build a comprehensive conceptual framework for predicting pro-environmental behaviour.

Table 8

Regression coefficients of the predictors of pro-environmental behaviour, Study 2

	Unstandardized Coefficients		Standardized Coefficients		
	B	SE	Beta	t	p
Model 1 (Constant)	0.599	0.443		1.351	.1.78
Biospheric value orientation	0.319	0.052	.311	6.141	< .001
Altrusitic value orientation	0.207	0.049	.226	4.119	< .001
Egoistic value orientation	-0.062	0.042	-.076	-1.474	.141
Environmental beliefs	0.104	0.070	.079	1.498	.135
Personal norms	0.299	0.067	.235	4.446	< .001
Model 2 (Constant)	-0.103	0.369		-2.260	.808
Biospheric value orientation	0.216	0.041	.227	5.356	< .001
Altruistic value orientation	0.178	0.039	.193	4.406	< .001
Egoistic value orientation	-0.068	0.033	-.103	-2.492	.076
Environmental beliefs	0.006	0.065	.005	0.100	.921
Personal norms	0.336	0.063	.264	5.326	< .001
Social class	0.162	0.032	.210	-2.836	< .05

Cultural orientation	0.523	0.052	.439	7.328	< .001

Conditional effects of social class and cultural orientation

We further tested Hypotheses 3 and 5 which proposed the conditionality of the value-belief-norm model upon social class and cultural orientation. Because social class and cultural orientation present independent constructs according to Pearson's intercorrelation (see Table 6), we tested their moderation function separately. Moreover, to test the moderation effect of social class, we used income as a group variable that distinguished between low social class and upper social class individuals. Thus, Hypotheses 3 and 5 were tested using moderated mediation analyses in *PROCESS* (Model # 92, see Hayes, 2018). In all models, we used bootstrapping with 5000 iterations at a 95% confidence interval.

The moderating function of social class.

Hypothesis 3 stated that social class moderates the direct and indirect effects of biospheric, altruistic, and egoistic value orientations on pro-environmental behaviour through environmental beliefs and personal norms in that the positive effects of altruistic and biospheric value orientation on pro-environmental behaviour should be stronger in low than in upper social class individuals, whereas the negative effects of egoistic value orientation should be stronger in upper than in low social class individuals (see Figure 5).

Pertinent to Hypothesis 3, we tested the moderation effects of social class on the mediated relationships between the value orientations and pro-environmental behaviour through environmental beliefs and personal norms in three separate models. In the first model, we entered biospheric value orientation as the independent variable, environmental beliefs and

personal norms as mediating variables, pro-environmental behaviour as the dependent variable, social class as the moderator variable, and altruistic and egoistic value orientations as covariates (Model 1). In the second model, altruistic value orientation was entered as the independent variable, environmental beliefs and personal norms as mediator variables, pro-environmental behaviour as the dependent variable, social class as the moderator variable, and biospheric and egoistic value orientations as covariates (Model 2). In the third model, the egoistic value orientation was the independent variable, environmental beliefs and personal norms were entered as the mediator variables, pro-environmental behaviour was entered as the dependent variable, social class was entered as the moderator variable, and biospheric and altruistic value orientations were entered as covariates (Model 3). For all three models, we estimated the moderation effects of social class on the direct relationships between value orientations and pro-environmental behaviour, the indirect effects between value orientations and pro-environmental behaviour through environmental beliefs, between value orientations and pro-environmental behaviour through personal norms, and between value orientations and pro-environmental behaviour through both environmental beliefs and personal norms.

Model 1 which assessed whether social class moderated the direct and indirect effects of biospheric value orientations explained 26.94% of the variance of pro-environmental behaviour, $F(9,286) = 11.71$, $p < .001$. The results of the direct and interaction effects are reported in Table 9. None of the interaction terms was statistically significant, implying that social class does not moderate the *direct* effects of biospheric value orientation, pro-environmental beliefs, and personal norms on pro-environmental behaviour. Likewise, the unstandardized slope analysis revealed that social class did also not moderate any of the *indirect* effects, that is the indirect effects between biospheric value orientation and pro-environmental behaviour through environmental beliefs or personal norms or through both environmental beliefs and personal norms (see Table 9). In sum, these results imply that social

class does not moderate the direct or indirect effects of biospheric value orientations on pro-environmental behaviour.

Table 9

The moderating function of objective social class on the direct and indirect relationships between biospheric value orientations and pro-environmental behaviour (Model 1), Study 2

Direct and interaction effects of biospheric value orientation pro-environmental behaviour

	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	0.932	1.224	0.76	.446	-1.477	3.343
Biospheric value orientation	0.105	0.156	0.67	.500	-0.202	0.413
Environmental beliefs	0.192	0.202	0.95	.342	-0.205	0.591
Personal norm	0.400	0.196	2.03	< .05	0.013	0.787
Social class (groups)	-0.271	0.877	-0.30	.757	-1.997	1.455
Biospheric value orientation *social class	0.154	0.109	1.40	.159	-0.061	0.371
Environmental beliefs* social class	-0.057	0.141	-0.40	.684	-0.335	0.220
Person norms* social class	-0.066	0.141	-0.47	.638	-0.343	0.211
Altruistic value orientation	0.196	0.049	3.93	< .001	0.098	0.293

	Effect	BootSE	BootLLCI	BootULCI
Egoistic value orientation	-0.057	0.041	-1.38	0.168	-0.140	0.024

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through environmental beliefs conditional upon social class

	Effect	BootSE	BootLLCI	BootULCI
Low social class	0.001	0.008	-0.013	0.021
Upper social class	-0.004	0.011	-0.034	0.014

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through personal norms conditional upon social class

	Effect	BootSE	BootLLCI	BootULCI
Low social class	0.021	0.025	-0.023	0.078
Upper social class	-0.023	0.018	-0.064	0.011

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through both environmental beliefs and personal norms conditional upon social class

	Effect	BootSE	BootLLCI	BootULCI
Low social class	0.002	0.001	-0.002	0.004
Upper social class	-0.001	0.003	-0.009	0.006

Model 2, which estimated the moderation effect of social class on the direct and indirect effects of altruistic value orientation, explained 26.43% of the variance of pro-environmental behaviour, $F(9, 286) = 11.41$, $p < .001$. The results of the direct and interaction effects are reported in Table 10. As the results imply, none of the interaction terms was statistically significant, meaning that social class did not moderate the *direct* effects of altruistic value orientation, pro-environmental beliefs, and personal norms on pro-environmental behaviour. In contrast, the unstandardized slope analysis revealed that social class did moderate the

indirect effect of altruistic value orientation on pro-environmental behaviour through personal norms, in that the indirect effect was only positively significant in participants from low social class, *Effect*= 0.066, *Boot*SE = 0.037, *Boot*CI [0.009, 0.151], but not from upper social class, *Effect* = 0.023, *Boot*SE = 0.015, *Boot*CI [-0.005, 0.054]. Although this result seemingly supports the assumption of Hypothesis 3 that the positive indirect effect of altruistic value orientation on pro-environmental behaviour should be stronger in low than in upper social class individuals, we need to be cautious in the conclusion as the difference between the two indirect effects was not statistically significant, *Index* = -0.043, *Boot*SE = 0.040, *Boot*CI [-0.135, 0.022]. Nevertheless, the results support the value-belief-norm theory's assumption that altruistic value orientations make individuals feel morally obliged to act pro-environmentally.

Table 10

The moderating function of objective social class on the direct and indirect relationships

between altruistic value orientations and pro-environmental behaviour (Model 2), Study 2

	Direct and interaction effects of altruistic value orientation on pro-environmental behaviour					
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	3.012	0.265	11.35	< .001	2.490	3.535
Altruistic value orientation	0.200	0.050	3.94	< .001	0.100	0.300
Environmental beliefs	0.111	0.070	1.58	.113	-0.026	0.250
Personal norm	0.301	0.068	4.43	< .001	0.167	0.435
Social class (groups)	-0.095	0.093	-1.02	.307	-0.278	0.088
Altriustic value orientation *social class	-0.004	0.100	-0.04	.966	-0.202	0.194
Environmental beliefs* social class	-0.064	0.146	-0.43	.660	-0.353	0.224
Person norms* social class	-0.072	0.144	-0.49	.617	-0.356	0.212
Biospheric value orientation	0.313	0.052	5.98	< .001	0.210	0.416
Egoistic value orientation	-0.060	0.042	-1.44	.150	-0.143	0.022

Conditional indirect effect of altruistic value orientation on pro-environmental behaviour through environmental beliefs conditional upon social class

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
Low social class	0.029	0.017	-0.002	0.066
Upper social class	0.012	0.019	-0.021	0.057

Conditional indirect effect of altruistic value orientation on pro-environmental behaviour through personal norms conditional upon social class

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
Low social class	0.066	0.037	0.009	0.159
Upper social class	0.023	0.015	-0.005	0.054

Conditional indirect effect of altruistic value orientation on pro-environmental behaviour through both environmental beliefs and personal norms conditional upon social class

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
Low social class	0.002	0.005	-0.009	0.013
Upper social class	0.004	0.006	-0.004	0.022

Lastly, Model 3, which estimated the moderating function of social class on the direct and indirect effects of egoistic value orientation, explained 27.19% of the variance of pro-environmental behaviour, $F(9, 286) = 11.86$, $p < .001$. Like in the previous two models, social class did not moderate the *direct* effects of value orientation (egoistic), environmental beliefs, and personal norms on pro-environmental behaviour because none of the interaction terms was statistically significant (see Table 11). The unstandardized slope analysis revealed that social class did, however, moderate the *negative indirect* effect of egoistic value orientation on pro-environmental behaviour through personal norms, in that the negative indirect effect was only significant in participants from low social class, *Effect* = -0.044, *Boot*SE = 0.020, *Boot*CL [-

0.092, -0.010], but not from upper social class, *Effect* = -0.015, *Boot*SE = 0.013, *Boot*CL [-0.045, 0.009]. However, the difference between the two indirect effects was not statistically significant, *Index* = 0.029, *Boot*SE = 0.025, *Boot*CL [-0.016, 0.083]. The present results contradict the assumption in Hypothesis 3 that the negative effect of egoistic value orientation should be stronger in upper than in low social class individuals. Although the present results suggest the opposite, we should be careful in our conclusion as the difference between the negative indirect effects found in low social class participants did not differ statistically from the nonsignificant negative indirect effect found in upper social class participants.

Table 11

The moderating function of objective social class on the direct and indirect relationships between egoistic value orientations and pro-environmental behaviour (Model 3), Study 2

Direct and interaction effects of egoistic value orientations on pro-environmental behaviour						
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	2.095	0.299	6.98	< .001	1.505	2.686
Egoistic value orientation	-0.060	0.041	-1.44	.150	-0.142	0.022
Environmental beliefs	0.116	0.070	1.65	.098	-0.021	0.0253
Personal norm	0.306	0.067	4.52	< .001	0.173	0.439
Social class (groups)	-0.095	0.092	-1.03	.301	-0.278	0.086
Egoistic value orientation*social class	-0.151	0.087	1.72	.085	-0.324	0.021

Environmental beliefs* social class	-0.044	0.141	-0.31	.755	-0.322	0.234
Person norms* social class	-0.114	0.142	-0.80	.424	-0.395	0.166
Biospheric value orientation	0.309	0.052	5.93	< .001	0.206	0.411
Altruistic value orientation	0.192	0.049	3.86	< .001	0.094	0.290

Conditional indirect effect of egoistic value orientation on pro-environmental

behaviour through environmental beliefs conditional upon social class

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
Low social class	0.003	0.006	-0.006	0.018
Upper social class	0.006	0.010	-0.012	0.029

Conditional indirect effect of egoistic value orientation on pro-environmental

behaviour through personal norms conditional upon social class

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
Low social class	-0.044	0.020	-0.092	-0.010
Upper social class	-0.015	0.013	-0.045	0.009

Conditional indirect effect of egoistic value orientation on pro-environmental

behaviour through both environmental beliefs and personal norms conditional upon

social class

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
Low social class	0.001	0.001	-0.002	0.003
Upper social class	0.001	0.002	-0.003	0.007

In sum, the results of Study 2 revealed that neither of the direct effects between value orientations on pro-environmental behaviour was conditional on social class. However, the positive indirect effect of altruistic value orientations on pro-environmental behaviour through personal norms, which was stronger in low social class participants, supported Hypothesis 1. In contrast, the negative indirect effect of egoistic value orientations on pro-environmental behaviour through personal norms, which was also stronger in low social class participants, contradicted Hypothesis 1. Since low and upper social class individuals did not statistically differ in these indirect effects, it is advisable to be cautious in the interpretation.

The moderating function of cultural orientation.

Hypothesis 5 stated that harmony-mastery cultural orientations moderate the direct and indirect effects of biospheric, altruistic, and egoistic value orientations on pro-environmental behaviour through environmental beliefs and personal norms in that the positive effects of biospheric and altruistic value orientations will be stronger in individuals who share harmony-cultural orientations than in individuals who share mastery-cultural orientations, whereas the negative effects of egoistic value orientation will be stronger in individuals who share mastery-cultural orientations than in individuals who share harmony-cultural orientations (see Figure 6).

We tested the moderation effects of harmony-mastery cultural orientations on the mediated relationships between value orientations (i.e., biospheric, altruistic, and egoistic) and pro-environmental behaviour through environmental beliefs and personal norms again in three separate moderated mediation models using *PROCESS* (Model # 92, see Hayes, 2018). In all models, we used bootstrapping with 5000 iterations at a 95% confidence interval.

In Model 1, we entered biospheric value orientation as the independent variable, environmental beliefs and personal norms as mediator variables, pro-environmental behaviour as the dependent variable, cultural orientation as the moderator variable, and altruistic and

egoistic value orientations as covariates. Model 1 explained 36.93% of the variance of pro-environmental behaviour, $F(9, 286) = 18.60$, $p < .001$. Neither the direct effects (i.e., from biospheric value orientations, environmental beliefs, and personal norms) on pro-environmental behaviour (see non-significant interaction terms in Table 12) nor the indirect effects of biospheric value orientation on pro-environmental behaviour through environmental beliefs and/or personal norms (see unstandardized slope analysis in Table 12) were conditional upon cultural orientations. Thus, we did not find any empirical evidence in support of Hypothesis 5 that the positive effects of biospheric value orientations will be stronger in individuals who share harmony-cultural orientations than in individuals who share mastery-cultural orientations.

Table 12

The moderating function of cultural orientation on the direct and indirect relationships between biospheric value orientations and pro-environmental behaviour (Model 1), Study 2

Direct and interaction effects of biospheric value orientations on pro-environmental behaviour						
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	-0.381	1.789	-0.21	.831	-3.904	3.140
Biospheric value orientation	0.269	0.240	1.11	0.264	-0.204	0.742
Environmental beliefs	-0.145	0.374	-0.38	0.698	-0.882	0.742
Personal norm	0.416	0.276	1.50	0.132	-0.127	0.959
Cultural orientation	0.449	0.447	1.00	0.315	-0.430	1.330
Biospheric value orientation * cultural orientation	-0.011	0.061	-0.18	0.857	-0.132	0.110
Environmental beliefs* cultural orientation	0.036	0.089	0.40	0.686	-0.140	0.213

Person norms* cultural orientation	-0.028	0.065	-0.43	0.664	-0.158	0.101
Altruistic value orientation	0.188	0.046	4.08	< .001	0.097	0.280
Egoistic value orientation	-0.073	0.039	-1.85	.064	-0.150	0.004

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through environmental beliefs conditional upon cultural orientation

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	0.001	0.006	-0.013	0.016
At the Mean	0.000	0.004	-0.009	0.010
1SD abobe the Mean	-0.004	0.011	-0.030	0.019

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through personal norms conditional upon cultural orientation

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	-0.001	0.036	-0.077	0.072
At the Mean	0.002	0.014	-0.027	0.032
1SD abobe the Mean	0.004	0.025	-0.040	0.054

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through both environmental beliefs and personal norms upon cultural orientation

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	-0.002	0.006	-0.017	0.011
At the Mean	-0.001	0.001	-0.006	0.001
1SD abobe the Mean	0.004	0.005	-0.002	0.018

In Model 2 we entered altruistic value orientation as the independent variable, environmental beliefs and personal norms as mediator variables, pro-environmental behaviour as the dependent variable, cultural orientation as the moderator variable, and biospheric and

egoistic value orientations as covariates. Model 2 explained 39.07% of the variance of pro-environmental behaviour, $F(9, 286) = 30.37$, $p < .001$. The interaction term between altruistic value orientation and cultural orientation was statistically significant (see Table 13), implying that the *direct* effect between altruistic value orientation and pro-environmental behaviour was moderated by cultural orientations. More specifically, the unstandardized slope analysis revealed that the positive direct effect of altruistic value orientations on pro-environmental behaviour is strongest under the condition of low scores of cultural orientations (i.e., 1 SD below mean, implying mastery-cultural orientation), *Effect* = 0.397, *Boot*SE = 0.078, *Boot*CL [0.240, 0.554], less strong but still significant at mean level, *Effect* = 0.204, *Boot*SE = 0.045, *Boot*CL [0.114, 0.294], and not significant at all under the condition of high scores of cultural orientations (i.e., 1 SD above mean, implying harmony-cultural orientation), *Effect* = 0.011, *Boot*SE = 0.072, *Boot*CL [-0.130, 0.153] (see Table 13). Because participants in the present study scored on average rather high on the cultural orientation scale ($M = 4.06$, $SD = 0.73$), it might be more appropriate to refer to low harmony-cultural rather than mastery-cultural orientation. Nevertheless, these results contradict the assumption of Hypothesis 5 that the positive effects of altruistic value orientations will be stronger in individuals who share harmony-cultural orientations than in individuals who share mastery-cultural orientations.

Table 13

The moderating function of cultural orientation on the direct and indirect relationships between altruistic value orientations and pro-environmental behaviour (Model 2), Study 2

	Beta	SE	t	p	LLCI	ULCI
Direct and interaction effects of altruistic value orientations on pro-environmental behaviour						
Constant	3.418	0.247	13.78	< .001	2.930	3.90
Altruistic value orientation	0.192	0.045	4.23	< .001	0.103	0.282

Environmental beliefs	0.027	0.065	0.42	.673	-0.101	0.157
Personal norm	0.281	0.062	4.48	< .001	0.157	0.405
Cultural orientation	0.396	0.059	6.60	< .001	0.278	0.514
Altruistic value orientation * cultural orientation	-0.193	0.060	-3.17	< .01	-0.312	-0.073
Environmental beliefs* cultural orientation	0.110	0.091	1.20	.227	-0.069	0.290
Person norms* cultural orientation	0.031	0.067	0.46	.642	-0.101	0.163
Biospheric value orientation	0.228	0.049	4.64	< .001	0.131	0.325
Egoistic value orientation	-0.077	0.038	-2.01	< .05	-0.153	-0.001

Conditional direct effect of altruistic value orientation on pro-environmental behaviour

conditional upon cultural orientation

	Effect	*Boot*SE	*t*	*p*	*Boot* LLCI	*Boot* ULCI
1SD below the Mean	0.397	0.078	4.97	< .001	0.240	0.554
At the Mean	0.204	0.045	4.46	< .001	0.114	0.294
1SD abobe the Mean	0.011	0.072	0.156	.875	-0.130	0.153

Conditional indirect effect of altruistic value orientation on pro-environmental behaviour through

environmental beliefs conditional upon cultural orientation

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	-0.007	0.012	-0.037	0.011
At the Mean	0.003	0.010	-0.016	0.024
1SD abobe the Mean	0.033	0.022	-0.007	0.083

Conditional indirect effect of altruistic value orientation on pro-environmental behaviour through personal norms conditional upon cultural orientation

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	0.059	0.037	-0.001	0.140
At the Mean	0.045	0.017	0.012	0.081
1SD abobe the Mean	0.025	0.027	-0.023	0.087

Conditional indirect effect of altruistic value orientation on pro-environmental behaviour through both environmental beliefs and personal norms upon descriptive norms

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	0.006	0.005	-0.002	0.020
At the Mean	0.004	0.003	-0.001	0.011
1SD abobe the Mean	-0.009	0.010	-0.033	0.007

Lastly, in Model 3 we entered egoistic value orientation as the independent variable, environmental beliefs and personal norms as mediator variables, pro-environmental behaviour as the dependent variable, cultural orientation as the moderator variable, and biospheric and altruistic value orientations as covariates. Model 3 explained 36.95% of the variance of pro-environmental behaviour, $F(9,286) = 18.62$, $p < .001$. None of the direct effects (i.e., biospheric value orientations, environmental beliefs, and personal norms on pro-environmental behaviour) was conditional upon cultural orientations (see Table 14). On the other hand, the unstandardized slope analysis further revealed that the negative indirect effect of egoistic value orientation on pro-environmental behaviour through personal norms was conditional upon cultural orientation, in that the negative indirect effects were increasingly stronger under the condition of harmony-cultural orientation on the mean level and 1 SD above the mean, *Effect* = -0.030, *Boot*SE = 0.011, *Boot*CL [-0.054, -0.008], and *Effect* = -0.048, *Boot*SE = 0.021,

*Boot*CL [-0.096, -0.012], respectively (see Table 14). These findings contradict the assumption in Hypothesis 5 which stated that the negative effects of egoistic value orientation will be stronger in individuals who share mastery-cultural orientations than in individuals who share harmony-cultural orientations.

Table 14

The moderating function of cultural orientation on the direct and indirect relationships

between egoistic value orientations and pro-environmental behaviour (Model 3), Study 2

	Beta	SE	t	p	LLCI	ULCI
Constant	2.460	0.285	8.63	< .001	1.899	3.021
Egoistic value orientation	-0.072	0.039	-1.86	.063	-0.150	0.004
Environmental beliefs	0.000	0.066	0.00	.992	-0.130	0.132
Personal norm	0.302	0.063	4.73	< .001	0.176	0.427
Cultural orientation	0.413	0.061	6.74	< .001	0.293	0.534
Egoistic value orientation * cultural orientation	0.019	0.053	0.36	.717	-0.085	0.124
Environmental beliefs* cultural orientation	0.035	0.089	0.39	.696	-0.141	0.211
Person norms* cultural orientation	-0.022	0.067	-0.33	.735	-0.155	0.109
Biospheric value orientation	0.223	0.051	4.37	< .001	0.122	0.323
Altruistic value orientation	0.189	0.046	4.09	< .001	0.098	0.280

Direct and interaction effects of egoistic value orientations on pro-environmental behaviour

Conditional indirect effect of egoistic value orientation on pro-environmental behaviour

through environmental beliefs conditional upon cultural orientation

	Effect	BootSE	BootLLCI	BootULCI
1SD below the Mean	0.001	0.007	-0.061	0.019
At the Mean	-0.000	0.002	-0.006	0.005
1SD abobe the Mean	0.003	0.010	-0.013	0.029

Conditional indirect effect of egoistic value orientation on pro-environmental behaviour

through personal norms conditional upon cultural orientation

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	-0.007	0.022	-0.061	0.030
At the Mean	-0.030	0.011	-0.054	-0.008
1SD abobe the Mean	-0.048	0.021	-0.096	-0.012

Conditional indirect effect of egoistic value orientation on pro-environmental behaviour

through both environmental beliefs and personal norms upon cultural orientation

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	-0.004	0.006	-0.018	0.007
At the Mean	0.001	0.001	-0.001	0.003
1SD abobe the Mean	-0.004	0.005	-0.017	0.001

In sum, as found for the social class as moderator, cultural orientation neither influenced the direct nor the indirect effects of biospheric value orientation on pro-environmental behaviour. However, the direct effect of altruistic value orientation on pro-environmental behaviour was conditional on cultural orientation, in that participants who share less harmony-cultural orientation (due to the skewed distribution of the measure) are those who act pro-environmentally because of their shared altruistic value orientations. This result contradicts Hypothesis 5 which stated pro-environmental behaviour action due to altruistic value orientations should be found in participants who share harmony-cultural orientation. On the other hand, although the direct effect of egoistic value orientation on pro-environmental behaviour was not conditional on participants' cultural orientation, its indirect effect through personal norms was conditional, but different from what was predicted. Hypothesis 5 predicted the negative effects of egoistic value orientation to be stronger in individuals who share mastery-cultural orientations but we found the opposite in our data.

Discussion

The overall aim of Study 2 was to retest the effects of age and gender on pro-environmental behaviour (Hypotheses 7 and 8, respectively) and re-assess the effects of value orientations on pro-environmental behaviour through environmental beliefs and personal norms as postulated in the value-belief-norm theory (Hypothesis 1). Furthermore, Study 2 extended the value-belief-norm theory by exploring the role of social class and cultural orientation (Hypotheses 2 to 5).

The results of Study 2 showed firstly that age was negative, although weakly, associated with pro-environmental behaviour, unlike in Study 1 where a weak and positive relationship was observed. This result of Study 2 suggests that the propensity to pro-environmental behaviour decreases with age, which did not support Hypothesis 7 which proposed a positive relationship between age and pro-environmental behaviour. It is, however, important to be reminded that the age of our participants was skewed as only 10% of the participants were older than 32 years. Nevertheless, the trend of our results corresponds with findings of previous studies that reported younger people to be more concerned about environmental issues than older people (e.g., Otto & Kaiser, 2014; Yilmaz et al., 2004). Moreover, Study 2 found gender differences in pro-environmental behaviour. Supporting Hypothesis 8, female participants showed significantly stronger pro-environmental behaviour when compared to male participants. This finding, which was not observed in Study 1, corresponds with findings of previous studies demonstrating that females exhibit a higher level of pro-environmental behaviour than males (e.g., Longhi, 2013; Lynn & Longhi, 2011; McCright & Xiao, 2014).

Secondly, the test of the value-belief-norm theory revealed that both biospheric and altruistic value orientations were directly positively associated with pro-environmental behaviour, which supported Hypothesis 1. Notably, in both Study 1 and Study 2, biospheric value orientation was only directly related to pro-environmental behaviour, which implies that

biospheric value orientations are neither associated with environmental beliefs nor personal norms in influencing pro-environmental behaviour. Previous studies reported similar observations describing that biospheric value orientations are rather directly related to pro-environmental behaviour as biospheric values reflect a concern for the environment in itself, without a clear link to human beings (Bouman et al., 2018).

Moreover, altruistic value orientations were positively and indirectly related to pro-environmental behaviour through personal norms, which is also in line with Hypothesis 1 as well as previous research that underlined the role of altruistic value orientations in influencing pro-environmental behaviours (e.g., Dunlap et al., 2000; Hansla et al., 2008; Nilsson et al., 2016; Steg & De Groot, 2008; Steg, Dreijerink, & Abrahamse, 2005; Stern, 2000). For instance, Nilsson, Griggs, and Visbeck (2016), as well as De Groot and Steg (2008), reported that both altruistic and biospheric value orientations were positively associated with environmental concern and propensity to pro-environmental behaviour. Contrary to our assumption, egoistic value orientations were neither directly nor indirectly related to pro-environmental behaviour, replicating the findings of Study 1.

In both Study 1 and Study 2, environmental beliefs did not mediate the relationships between value orientations and pro-environmental behaviour. Although these findings do not support our assumptions, they are somehow in line with previous findings based on the value-belief-norm theory which reported the relationship between environmental beliefs (i.e., the New Environmental Paradigm) and pro-environmental behaviour to be generally weak (e.g., Steg et al., 2005). Different from the findings of Study 1, personal norms mediated the relationship between altruistic value orientations and pro-environmental behaviour in Study 2, which supported Hypothesis 1. Hence, Study 2 partially supported the proposed chain of influence between value orientations (i.e., altruistic), personal norms, and pro-environmental behaviour (Hypothesis 1).

Thirdly, Study 2 extended the value-belief-norm theory by considering social class and cultural orientations to improve the conceptual model in explaining pro-environmental behaviour. The results revealed that the consideration of social class and cultural orientation contributed indeed to explaining an additional variance of pro-environmental behaviour. Given that the value-belief-norm theory focuses mainly on factors residing within the person (i.e., values, beliefs, and norms), the inclusion of the contextual factors of social class and cultural orientation presents a valuable input in explaining pro-environmental behaviour.

Furthermore, Study 2 explored the moderation functions of social class and cultural orientation in the relationships between value orientations, environmental beliefs, personal norms, and pro-environmental behaviour. Our results revealed firstly, that neither of the direct effects of biospheric, altruistic, and egoistic value orientations on pro-environmental behaviours was conditional upon social class. However, social class moderated the indirect relationships between altruistic and egoistic value orientations and pro-environmental behaviour through personal norms. More specifically, the positive indirect effect of altruistic value orientation on pro-environmental behaviour through social norms was indeed stronger in low than in upper social class individuals, which is in line with Hypothesis 3. Yet, different from our assumption, the negative effect of egoistic value orientation was stronger in low social class participants. It is important to note that, these results do not sufficiently support or contradict Hypothesis 3 because no statistical differences were identified in these indirect effects between low and upper social class individuals. The latter might have been caused by the fact that Study 2 assessed only objective social class, without considering subjective social class. Previous research underlined that subjective social class is a psychological orientation that influences several human attitudes and behaviours (Kraus et al., 2012). The authors underscored that subjective social class plays an important role in behavioural domains protecting the environment (Kraus et al., 2012). Consolidating this view, a more recent study

by Grandin et al. (2021), which assessed both objective and subjective social class, revealed that although the subjective social class is similarly correlated with pro-environmental attitude and behaviour as objective social class, it appears to have a more consistent effect on pro-environmental behaviour than objective social class. Thus, we aimed to re-assessing the role of social class in the subsequent Study 3 by distinguishing between objective and subjective social class.

The results of Study 2 further revealed that the direct and indirect relationships between biospheric value orientation and pro-environmental behaviour were not conditional on cultural orientation. However, cultural orientation significantly moderated the positive and the negative indirect effects of altruistic and egoistic value orientations, respectively, on pro-environmental behaviour through personal norms. That is, the positive effect of altruistic value orientation was stronger in the participants sharing less harmony-cultural orientation compared to the participants sharing more harmony-cultural orientation, while the negative effect of egoistic value orientation was stronger in the participants sharing more harmony-cultural orientation than participants sharing less harmony-cultural orientation. Both results were contrary to the assumptions in Hypothesis 4. These ambiguous results concerning the effect of cultural orientations on the interplay between value orientations, personal norms, and pro-environmental behaviour might have originated from the fact that the measurement of the harmony-mastery cultural dimensions did not discriminate sufficiently between harmony-cultural orientation and mastery-cultural orientation. As we were not able to identify previous research conducted in Ethiopia that used the same or a similar measurement, we could not substantiate the findings within this societal context. Hence, we considered social norms, instead of cultural orientations in the subsequent Study 3.

Previous studies reported that social norms are important social factors that influence a wider spectrum of human attitudes and behaviour including pro-environmental behaviour

(Cialdini & Jacobson, 2021; Nigbur, Lyons, & Uzzell, 2010). Social norms have mainly been described as informal understandings of what one is expecting of others and what others expect of oneself (Cialdini & Jacobson, 2021; Cialdini et al., 2006; Cialdini, Reno, & Kallgren, 1990). Social norms are shared values and principles that govern people's behaviour. More specifically, social norms are individuals' beliefs about the prevalence and appropriateness of attitudes and behaviours in a particular group (Cialdini & Jacobson, 2021).

Social norms are formed in the process of interactions between members of certain social groups and/ or communities which are sustained because people share the need to signal membership in a group, the desire to coordinate, the fear of being sanctioned, and/or because people tend to follow the lead of others (e.g., Blondé, et al., 2021; Culiberg & Elgaaied-Gambier, 2015; Cialdini & Jacobson, 2021; Nigbur et al., 2010). As social norms are group-specific, their normativity depends on the respective social group (e.g., gender, age, nationality, communities, culture, and social class). For instance, Blondé et al. (2021) examined differences in health-related behaviours across social classes and reported that health-related behaviours were perceived to be more normative by upper and middle social class individuals than by low social class individuals. The authors stressed that intentions to perform healthy behaviours were stronger among those who highly identified with the upper and middle social class and when they perceived healthy behaviours as highly normative of that class, which points to the role of conformity in the formation and maintenance of social norms (Blondé et al., 2021).

Social norms also influence personal norms as they determine what is right or wrong in a particular group context such as a socio-cultural context (Bamberg & Moser., 2007). Moreover, the consideration of social norms in environmental research speaks also to a critique often made towards dominant psychological theories explaining pro-environmental behaviour such as the theory of planned behaviour (Ajzen, 1991), norm activation theory (Schwartz, 1977), and value-belief-norm theory (Stern et al., 1999), which conceptualize pro-

environmental action from an individualistic perspective (Fritsche et al., 2018). Yet, the climate change issues and related environmental challenges are large-scale crises that require to be solved collectively (Fritsche et al., 2018), and thus require the consideration of social norms as determinants of pro-environmental behaviour.

Social norms are conceptualized as either descriptive or injunctive norms (Cialdini & Jacobson, 2021; Cialdini & Trost, 1998). Descriptive social norms refer to the expected behaviour in a particular situation. Observing how the majority of people of an important group behave does inform about acceptable behaviour. The more people behave similarly in a particular situation (e.g., switching off the light before leaving the room), the more the behaviour is seen as normative (Cialdini & Jacobson, 2021; Cialdini & Trost, 1998). In contrast, injunctive norms specify how people *should behave*; that is injunctive norms refer to the perception of what people approve or disapprove of (Cialdini & Trost, 1998; Nigbur et al., 2010). In other words, descriptive norms refer to *what most people do*, whereas injunctive norms describe *what most people approve of doing*. Previous research showed that pro-environmental behaviour is influenced by both descriptive as well as injunctive norms, although the effect of descriptive norms is seemingly stronger (e.g., Cialdini & Jacobson, 2021; Culiberg & Elgaaied-Gambier, 2015; Thøgersen, 2008).

Although descriptive and injunctive norms are closely related to behavioural outcomes, various researchers reported that the distinct effects of descriptive and injunctive norms on targeted behaviour vary depending on several factors (e.g., Crowy, Gerrans & Speelman, 2010; Morris et al., 2015; Smith et al., 2012). For instance, Smith et al. (2012) found that descriptive norms were related to the intention of college students to consume alcohol, whereas social approval (injunctive social norms) failed to achieve a significance level. Likewise, Schultz et al. (2007) highlighted the influence of descriptive norms on hotel guests' participation in one of a hotel's towel-reuse programs. In a similar line, Smith et al. (2012) reported that when

descriptive and injunctive norms conflict, descriptive norms are predictive of behaviour in focus. In contrast, Neighbors et al. (2008) revealed a positive association between gambling behaviour and the perceived approval of friends and family (injunctive norms). Similarly, Crowy et al. (2010), studying the social norm against littering, found that injunctive norms were more robust in their behavioural impact across situations than descriptive norms.

Although the importance of social norms has been studied extensively concerning various behaviours in the context of developed countries, less attention has been given to pro-environmental behaviour in the context of developing countries (Farrow, Grollean, & Ibanez, 2019), albeit developing countries tend to experience higher levels of environmental degradation and lower levels of environmental protection relative to developed countries. Given the growing recognition of the role of social norms in climate change-related behaviours including environmental protection (e.g., Cialdini & Jacobson, 2021; Fornara et al., 2011) or health and environmental behaviour (e.g., Lapinski et al., 2017), Study 3 aims at providing some insights on the role that descriptive and injunctive environmental social norms play in determining pro-environmental behaviour. Thus, we aim at exploring how descriptive and injunctive social norms are related to pro-environmental behaviour and influence the relationships between biospheric, altruistic, and egoistic value orientations and pro-environmental behaviour through environmental beliefs and personal norms as predicted by the value-belief-norm theory. We propose that:

Hypothesis 10

The consideration of descriptive and injunctive social norms, that are related to pro-environmental behaviour, does improve the value-belief-norm model in explaining pro-environmental behaviour.

Furthermore, we predicted that:

Hypothesis 11

Descriptive and injunctive social norms moderate the direct and indirect relationships between value orientations and pro-environmental behaviour through environmental beliefs and personal norms in that the positive effects of biospheric and altruistic value orientations are stronger in participants who perceive pro-environmental social norms as commonly shared and practised (i.e., descriptive) and approved of by significant others (i.e, injunctive) than in participants who perceive pro-environmental social norms as less practised (i.e., descriptive) and disapproved of by significant others (i.e., injunctive), whereas the negative effect of egoistic value orientation on pro-environmental behaviour is stronger in participants who perceive pro-environmental social norms as less practised (i.e., descriptive) and disapproved of (i.e., injunctive) than in participants who perceive them as commonly practised and approved of.

STUDY 3

Study 3 pursued three main aims. Firstly, we aimed to re-testing the assumptions of the value-belief-norm theory in explaining pro-environmental behaviour, and secondly, at exploring the conditional effects of social class and descriptive and injunctive pro-environmental social norms on pro-environmental behaviour. More specifically, Study 3 tested firstly the hypothesis that biospheric and altruistic value orientations are directly and indirectly positively and egoistic value orientations are directly and indirectly negatively related to pro-environmental behaviour through environmental beliefs and personal norms (Hypothesis 1, see Figure 4).

Secondly, we aimed at testing the hypothesis that objective and subjective social class moderate the direct and indirect relationships between value orientations and pro-environmental behaviour through environmental beliefs and personal norms in that the positive effects of biospheric and altruistic value orientations on pro-environmental behaviour will be relatively stronger in participants from low objective and subjective social class, whereas the negative effect of egoistic value orientation on pro-environmental behaviour will be relatively stronger in participants from upper objective and subjective social class (Hypothesis 3). The conceptual framework is depicted in Figure 7.

Figure 7

The conceptual framework for moderating function of objective/subjective class
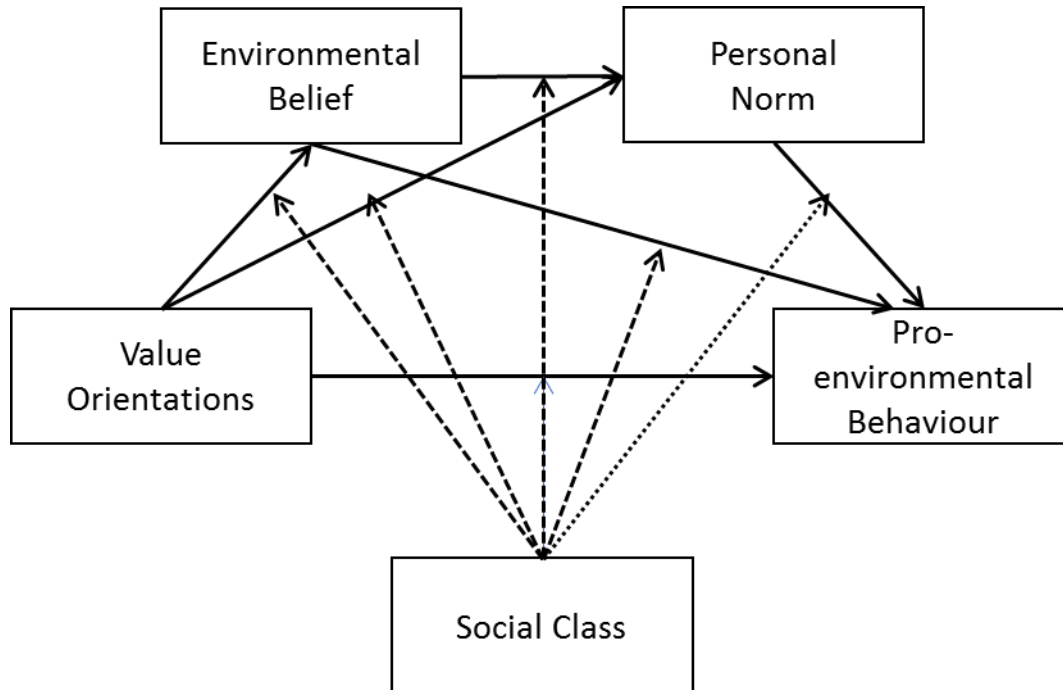
Thirdly, we aimed at testing the hypothesis that the consideration of descriptive and injunctive social norms in the value-belief-norm model improves to explain variance in pro-environmental behaviour (Hypothesis 10). Furthermore, it was hypothesised that descriptive and injunctive social norms moderate the direct and indirect relationships between biospheric, altruistic, and egoistic value orientations and pro-environmental behaviour through environmental beliefs and personal norms in that the positive effects of biospheric and altruistic value orientations are relatively stronger in participants who perceive pro-environmental social norms as commonly shared and practised (i.e., descriptive) and approved of by significant others (i.e., injunctive) than in participants who perceive pro-environmental social norms as less common and disapproved of; whereas the negative effect of egoistic value orientation on pro-environmental behaviour is relatively stronger in participants who perceive pro-

environmental social norms as less common and practised (i.e., descriptive) and disapproved of by significant others (i.e., injunctive), than in participants who perceive pro-environmental social norms as common and approved of (Hypothesis 11). The conceptual framework is depicted in Figure 8. The hypotheses of Study 3 were again tested by applying a cross-sectional survey design.

Figure 8

The conceptual framework for moderating function of descriptive/injunction pro-environmental social norms
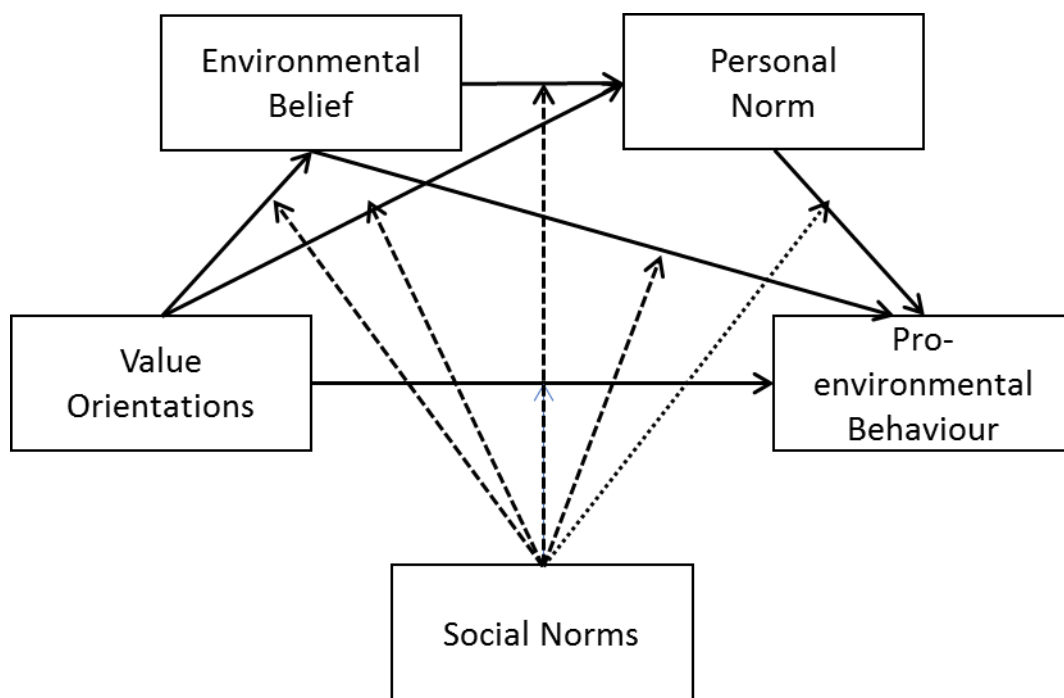
Participants

In total, 300 conveniently sampled postgraduate students enrolled at Addis Ababa University participated in Study 3. Of these participants, 196 (65%) were male and 104 (35%) were female. Participants' age ranged from 18 to 48 years with a mean age of 24.5 years (*SD* = 4.59).

Procedure

Like in the previous two studies, data were collected through a self-administered questionnaire. As in Studies 1 and 2, participants in Study 3 were approached after their lectures and responded to the questionnaire in their respective lecture halls. Before they were asked to provide consent to participate in the study, participants were informed about the purpose of the study, that their participation is voluntary and anonymous, that they can withdraw at any given moment without any consequences, and that data will be analysed on a group level for scientific purposes. Following informed consent, research assistants handed out the questionnaire to the participants who completed it and handed it back to the research assistants, which assured a 100% return rate of the questionnaire. The maximum time required to complete the questionnaire was less than 45 minutes.

Measurements

In Study 3, we used the same measures as in Study 2 to assess demographics, biospheric value orientation (α = .78), altruistic value orientation (α = .85), egoistic value orientation, environmental beliefs, personal norms, pro-environmental behaviour, and objective social class. The item analysis of the measure of egoistic value orientation revealed that the item "A person who is hard-working, striving to perform and achieve" showed again a negative correct item-total correlation (-.320), that we, consequently, omitted it from the egoistic value orientation measure (α = .86). Likewise, the item analysis of environmental beliefs measure (i.e., New Environmental Paradigm scale) revealed that the item "If things continue on their present course, we will soon experience a major ecological catastrophe" showed a negative correct item-total correlation (-.336). Thus, we omitted this item from the measure of the environmental belief (α = .79). We identified also in the personal norm measure one item (i.e., "I have a strong interest in participating in tree planting campaign every year") that showed a

low correct item-total correlation (.20). After omitting this item, the scale had a Cronbach's alpha of .61. Like in Study 1, two items of the pro-environmental behaviour measure ("I dispose of the waste on the street" and "I use hot water when I take a bath") showed a negative corrected item-total correlation (-.20 and -.47, respectively). After discarding these items, the scale had a Cronbach's alpha of .74.

The two indicators assessing objective social class (i.e., monthly income and housing status) correlated negatively with each other according to Spearman's rho, $r(298) = -.22$, $p < .001$, which might have been caused by the fact that the distribution of housing status was skewed. Like in Study 2, we decided, therefore, to only include monthly income as objective social class distinguishing via median split participants from low social class (500-5000 Birr) and upper social class (5001-58000 Birr). Different from Study 2, Study 3 also assessed subjective social class and descriptive and injunctive pro-environmental social norms using the following measures.

Subjective social class was assessed using the MacArthur scale of subjective social class (Giatti, Camelo, & Rodrigues, 2012). Participants were presented with a ladder consisting of 10 rungs and asked to position themselves concerning income, education, and occupation. They were instructed to indicate by ticking the appropriate number, where they would position themselves concerning income, education, and occupation relative to the best-off Ethiopians at the top of the ladder and the worst-off Ethiopians at the bottom of the ladder. The three variables were averaged and combined to the subjective social class variable ($\alpha = .87$).

Pro-environmental social norms were assessed as both injunctive and descriptive norms using items adapted from Fornara et al. (2011). The items for descriptive pro-environmental social norms were: "Most of the people who are important to me do act pro-environmentally" and "Most people I have to do with act to protect the environment" ($r = .29$, $p < .001$), and the items for injunctive pro-environmental social norms were: "Most people who

are important to me think that I should act pro-environmentally" and "Most people I have to do with think that I should act pro-environmentally" ($r = .39, p < .001$). The answer format for both measures ranged from 1 (*strongly disagree*) to 5 (*strongly agree*).

Results

Preliminary analysis

The means, standard deviations, and intercorrelations of the principal variables are reported in Table 15. All independent variables, except objective social class, significantly correlated with pro-environmental behaviour, as the dependent variable. Similar to the pattern observed in Study 2, biospheric and altruistic value orientations positively and significantly correlated with pro-environmental behaviour. Different to Study 2, egoistic value orientations were not significantly negatively correlated with pro-environmental behaviour. However, like in Study 2, personal norms were positively and significantly correlated with pro-environmental behaviour in Study 3. Differently from Studies 1 and 2, environmental beliefs correlated significantly with pro-environmental behaviour. Subjective social class was significantly correlated with pro-environmental behaviour, whereby objective social class did not correlate at all with pro-environmental behaviour. Notably, both injunctive and descriptive social norms significantly and positively correlated with pro-environmental behaviour.

Table 15

Means, standard deviations, and intercorrelations of principal variables, Study 3 (N= 300)

	1	2	3	4	5	6	7	8	9	10
M	4.13	3.02	3.93	3.38	4.17	5699	3.59	3.56	3.06	3.92
SD	0.73	1.17	0.96	0.66	0.63	4792	0.99	1.08	1.30	0.75
Min	1.75	1	1	1.75	1	500	1.67	1	1.	1.67
Max	5	5	5	5	5	58000	5	5	5	5
1. Biospheric Value orientation	-									
2. Altruistic Value orientation	.01	-								
3. Egoistic Value orientation	.07	-.41***	-							
4. Environmental beliefs	.10	.55***	-.35***	-						
5. Personal norms	.13*	.11*	.04	.24***	-					
6. Objective social class (Income)	.04	.31***	-.20**	.16**	.08	-				
7. Subjective social class	.10	.61***	-.27***	.80**	.25***	.13*	-			
8. Descriptive pro-environmental social norm	.12*	.43***	-.16**	.70***	.26***	-.01	.88***	-		

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9. Injunctive pro-environmental social norm	.10	.67***	-.32***	.79***	.23***	.24***	.92***	.72***	-
10. Pro-environmental behavior	.25***	.37***	-.10	.68***	.33***	-.01	.66***	.78***	.54***	-

Note. * *p* < .05 ***p* < .01; ****p* < .001 (2-tailed)

In sum, the results of the preliminary analysis revealed that most predictor variables considered in Study 3 showed significant associations with pro-environmental behaviour as the dependent variable. As theoretically assumed, biospheric and altruistic value orientations, environmental beliefs, and personal norms as well as descriptive and injunctive pro-environmental social norms were positively related to pro-environmental behaviour. The preliminary analysis showed also that subjective social class was strongly correlated with environmental belief ($r = .80$, $p < .001$), descriptive pro-environmental social norms ($r = .88$, $p < .001$), and injunctive pro-environmental social norms ($r = .92$, $p < .001$), implying that subjective social class shares an extensive amount of variance with these variables. Consequently, given the multi-collinearity of subjective social class with environmental beliefs and social norms, it was decided to not consider the subjective social class in any subsequent analysis.

Main analysis

Firstly, we re-tested Hypothesis 1 which states that biospheric and altruistic value orientations are directly and indirectly positively, whereas egoistic value orientations are directly and indirectly negatively related to pro-environmental behaviour through environmental beliefs and personal norms. Hence, we estimated in three separate models the direct and indirect effects of biospheric, altruistic, and egoistic value orientations on pro-environmental behaviour through environmental beliefs and personal norms by conducting three serial mediation analyses using *PROCESS* (# Model 6; see Hayes, 2018). In the first model (Model 1), biospheric value orientation was entered as the independent variable, environmental beliefs and personal norms as mediator variables, and pro-environmental behaviour as the dependent variable, while altruistic and egoistic value orientations were entered as covariates. In the second model, we entered altruistic value orientation as the

independent variable, environmental beliefs and personal norms as mediators, pro-environmental behaviour as the dependent variable, and biospheric and egoistic value orientations as covariates. In the third model, we entered egoistic value orientation as the independent variable, environmental beliefs and personal norms as mediators, pro-environmental behaviour as the dependent variable, and biospheric and altruistic value orientations as covariates. In all analyses, we used bootstrapping with 5000 iterations at a 95% confidence interval.

The overall model estimates, $R^2 = .556$, $F(5, 291) = 72.7$, $p < .001$[3], suggest that value orientations, environmental beliefs, and personal norms jointly explained 55.6% of the variance of pro-environmental behaviour. Table 16 reports the direct and indirect effects of value orientations on pro-environmental behaviour. As the results show, biospheric and altruistic value orientations are directly associated with pro-environmental behaviour, *beta* = 0.258, *SE* = 0.037, $p < .001$ and *beta* = 0.280, *SE* = 0.037, $p < .001$, respectively. Egoistic value orientations were not directly associated with pro-environmental behaviour, *beta* = 0.026, *SE* = 0.045, $p = .564$. As predicted by Hypothesis 1, biospheric and altruistic value orientations were positively and indirectly related to pro-environmental behaviour through environmental beliefs as well as through both environmental beliefs and personal norms (see Table 16). Also supporting Hypothesis 1, egoistic value orientations were negatively and indirectly related to pro-environmental behaviour through environmental beliefs as well as through both environmental beliefs and personal norms (see Table 16). Thus, in line with the value-belief-norm theory, these results imply that altruistic and biospheric value orientations transmitted their effects to both environmental beliefs and personal norms which in turn influence pro-environmental behaviour.

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[3] The overall model summaries for the dependent variable pro-environmental behavior were identical for all three models as the variables included were the same.

Overall, the results of Study 3 demonstrate the chain of influences from the antecedent variables on pro-environmental behaviour through beliefs and norms as proposed in the original value-belief-norm theory. That is, biospheric and altruistic value orientations increase the effect of environmental beliefs on personal norms, and thus pro-environmental behaviour, whereas egoistic value orientations decrease the effect of environmental beliefs on personal norms, and thus reduce pro-environmental behaviour. Or to put it differently, participants who share biospheric and altruistic value orientations are more likely to endorse environmental beliefs and consequently experience moral obligations (activation of personal norms) to act pro-environmentally. On the other hand, participants who share egoistic value orientations reject environmental beliefs and consequently will not experience any moral obligations to act pro-environmentally.

Table 16

Direct and indirect effects of value orientations on pro-environmental behaviour through environmental beliefs and personal norms, Study 3

Direct effects on environmental beliefs						
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	2.354	0.238	9.912	$< .001$	1.886	2.821
Biospheric value orientation	0.097	0.039	2.473	$< .05$	0.019	0.174
Altruistic value orientation	0.332	0.027	12.33	$< .001$	0.279	0.385
Egoistic value orientation	-0.093	0.033	-2.811	$< .01$	-0.158	-0.028
Direct effects on personal norms						
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	3.046	0.346	8.793	$< .001$	2.364	3.728

	Beta	SE	t	p	LLCI	ULCI
Biospheric value orientation	0.031	0.049	0.631	.528	-0.067	0.129
Altruistic value orientation	-0.031	0.042	-0.749	.454	-0.114	0.051
Egoistic value orientation	0.03	0.042	0.735	.463	-0.052	0.114
Environmental beliefs	0.287	0.074	3.892	$< .001$	0.142	0.432

Direct effects on pro-environmental behaviour

	Beta	SE	t	p	LLCI	ULCI
Constant	-0.663	0.322	-2.059	$< .05$	-1.298	-0.029
Biospheric value orientation	0.169	0.041	4.100	$< .01$	0.088	0.251
Altruistic value orientation	0.001	0.034	0.027	.979	-0.067	0.069
Egoistic value orientation	0.100	0.035	2.865	$< .05$	0.031	0.169
Environmental beliefs	0.807	0.063	12.89	$< .001$	0.683	0.927
Personal norms	0.182	0.048	2.865	$< .01$	0.031	0.169

Indirect effects of biospheric value orientation on pro-environmental behaviour through

environmental beliefs and personal norms (Model 1)

	Effect	Boot SE	Boot LLCI	Boot ULCI
Biospheric value orientation *through* environmental beliefs	0.078	0.033	0.015	0.144
Biospheric value orientation *through* personal norms	0.006	0.011	-0.018	0.029
Biospheric value orientation *through*	0.005	0.003	0.006	0.012

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environmental beliefs *and*

personal norms

Indirect effects of altruistic value orientation on pro-environmental behaviour through environmental beliefs and personal norms (Model 2)

	Effect	Boot SE	Boot LLCI	Boot ULCI
Altruistic value orientation *through* environmental beliefs	0.268	0.034	0.203	0.334
Altruistic value orientation *through* personal norms	-0.006	0.007	-0.022	0.006
Altruistic value orientation *through* environmental beliefs *and* personal norms	0.017	0.009	0.004	0.037

Indirect effects of egoistic value orientation on pro-environmental behaviour through both environmental beliefs and personal norms (Model 3)

	Effect	Boot SE	Boot LLCI	Boot ULCI
Egoistic value orientation *through* environmental beliefs	-0.075	0.031	-0.139	-0.018
Egoistic value orientation *through* personal norms	0.006	0.008	-0.009	0.024
Egoistic value orientation *through* environmental beliefs *and* personal norms	-0.005	0.003	-0.012	-0.006

Model extension

Secondly, we aimed at exploring the extent to which the inclusion of objective social class (Hypothesis 2) and social norms (Hypothesis 10) improves the proportion of variance explained in pro-environmental behaviour. Accordingly, we used stepwise multiple regression analysis, assessing two models. Firstly, we entered the variables of the value-belief-norm theory into the model (biospheric, altruistic, and egoistic value orientations, environmental beliefs, and personal norms as predictor variables (Model 1, see Table 17). In a second step, we added the variables of social class (i.e., monthly income) and social norms into the regression model (Model 2, see Table 17).

The results revealed that the overall model estimates for Model 1, $R^2 = .548$, $F(5, 291) = 72.72$, $p < .001$, and for Model 2, $R^2 = .709$, $F(8, 288) = 91.10$, $p < .001$, were statistically significant. More importantly, the change statistics showed a significant increase in the explained variance of pro-environmental behavior, after including objective social class and social norms into the model, $\Delta R^2 = 0.161$, $F(3,288) = 54.68$, $p < .001$. These results imply that objective social class and social norms accounted for about a 16% increase in the variance of pro-environmental behavior. Strongest predictors were descriptive pro-environmental social norms, $beta = .596$, $p < .001$, followed by environmental belief, $beta = .508$, $p < .001$, injunctive environmental norms, $beta = -.375$, $p < .001$, and biospheric value orientation, $beta = .155$, $p < .001$ (see Table 17). Important to note is that different from Study 2, social class was not related to pro-environmental behavior in Study 3.

However, Study 3 confirmed that pro-environmental social norms are a relevant factor to be considered when extending the value-belief-norm theory to build a comprehensive conceptual framework for predicting pro-environmental behaviour. More specifically, these results imply that pro-environmental social norms which are perceived to be shared and practised by significant others positively influence participants' pro-environmental behaviour,

whereas pro-environmental social norms, which are perceived to be approved by significant others, negatively influence participants' pro-environmental behaviour.

Table 17

Regression coefficients of the predictors of pro-environmental behaviour, Study 3

	Unstandardized Coefficients		Standardized Coefficients		
	B	SE	Beta	t	p
Model 1 (Constant)	-0.663	0.322		-2.059	.040
Biospheric value orientation	0.169	0.041	.163	4.100	< .001
Altrusitic value orientation	0.001	0.035	.001	0.027	.979
Egoistic value orientation	0.108	0.035	0.128	2.865	.004
Environmental beliefs	0.806	0.035	.698	12.89	< .001
Personal norms	0.182	0.048	.152	3.765	< .001
Model 2 (Constant)	-0.509	0.280		-1.819	.070
Biospheric value orientation	0.161	0.033	.155	4.855	< .001
Altruistic value orientation	0.064	0.031	.100	2.085	.038
Egoistic value orientation	0.059	0.028	.075	2.078	.039
Environmental beliefs	0.587	0.067	.508	8.756	< .001
Personal norms	0.140	0.039	.117	3.556	< .001

Objective social class (monthly income)	-0.000	0.000	-.046	-1.431	.153
Descriptive social norm	0.413	0.033	.596	12.378	< .001
Injunctive social norm	-.216	.036	-.375	-5.932	< .001

Conditional effects of social class and social norms

Thirdly, we performed moderated mediation analyses using *PROCESS* (Model # 92, see Hayes, 2018) to test whether social class and environmental social norms moderate the serial relationships between value orientations, environmental beliefs, personal norms, and pro-environmental behaviour. In all models, we used bootstrapping with 5000 iterations at a 95% confidence interval.

The moderating function of objective social class.

Hypothesis 3 states that objective and subjective social class moderate the direct and indirect relationships between biospheric, altruistic, and egoistic value orientations and pro-environmental behaviour through environmental beliefs and personal norms in that the positive influences of biospheric and altruistic value orientation on pro-environmental behaviour will be stronger in participants of low rather than upper social class, whereas the negative influence of egoistic value orientation on pro-environmental behaviour is stronger in participants of upper than low social class (see Figure 7). Given that subjective social class showed multi-collinearity with other predictor variables (see Table 15) and that monthly income was the only

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indicator for the objective social class that we could apply in Study 3, we only considered the income groups for the moderated mediation analysis of social class.

Firstly, we assessed the moderation effects of social class on the direct and indirect relationships between biospheric value orientations and pro-environmental behaviour through environmental beliefs and personal norms, respectively (Model 1, see Table 18). We entered biospheric value orientation as the independent variable, environmental beliefs and personal norms as mediator variables, pro-environmental behaviour as the dependent variable, objective social class as the moderator variable, and altruistic and egoistic value orientations as covariates (see Table 18). The overall model estimates were statistically significant, $R^2 = .5791$, $F(9, 287) = 43.87$, $p < .001$, showing that the variables in the model jointly explained 57.91% of the variance of pro-environmental behaviour. The results of the direct and interaction effects are reported in Table 18. None of the interaction effects was statistically significant, implying that social class does not moderate the *direct* effects of biospheric value orientation, pro-environmental beliefs, and personal norms on pro-environmental behaviour. However, social class moderated the *indirect* effect between biospheric value orientation and pro-environmental behaviour through environmental beliefs as the unstandardized slope analysis revealed. This indirect effect was significant for upper social class individuals, *Effect* = 0.104, *Boot*SE = 0.021, *Boot*CI [0.016, 0.187], but not for low social class individuals, *Effect* = 0.049, *Boot*SE = 0.047, *Boot*C I[-0.039, 0.143]. Yet, the significant indirect effect of the upper social class individuals did not differ statistically from the nonsignificant effect of the low social class individuals, *Index* = 0.054, *Boot*SE = 0.065, *Boot*CI [-0.081, 0.176]. This result implies that although upper social class individuals who share biospheric value orientations endorse environmental beliefs which makes them more likely to act pro-environmentally than low social class individuals, this difference must be interpreted with caution as it is not statistically significant. Consequently, Hypothesis 3 was neither supported nor rejected by these results. The indirect

effect between biospheric value orientation and pro-environmental behaviour through personal norms or both environmental beliefs and personal norms were not moderated by social class (see Table 18).

Table 18

The moderating function of objective social class on the direct and indirect relationships between biospheric value orientations and pro-environmental behaviour (Model 1), Study 3

Direct and interaction *effects* of biospheric value orientation on pro-environmental behaviour						
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	1.227	0.8599	1.422	.156	-0.469	2.915
Biospheric value orientation	-0.021	0.132	-0.158	.874	-0.281	0.239
Environmental beliefs	0.718	0.161	4.468	< .001	0.402	1.034
Personal norm	0.054	0.172	0.312	.755	-0.285	0.392
Social class (groups)	-1.272	0.536	-2.371	< .05	-2.327	-0.216
Biospheric value orientation *social class	0.128	0.081	1.569	.118	-0.032	0.287
Environmental beliefs* social class	0.055	0.096	0.572	.568	-0.134	0.243
Person norms* social class	0.085	0.101	0.845	.399	-0.113	0.283
Altruistic value orientation	0.022	0.035	0.618	.537	-0.047	0.090
Egoistic value orientation	0.094	0.035	2.698	<. 01	0.025	0.162

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through environmental beliefs			
	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
Low social class	0.049	0.047	-0.039	0.143

Upper social class	0.104	0.043	0.016	0.187

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through personal norms

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
Low social class	0.019	0.016	-0.004	0.059
Upper social class	-0.010	0.021	-0.057	0.030

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through both environmental beliefs and personal norms

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
Low social class	0.003	0.005	-0.003	0.015
Upper social class	-0.005	0.004	-0.001	0.016

Secondly, we estimated the moderation effects of objective social class on the direct and indirect relationships between altruistic value orientation and pro-environmental behaviour through environmental beliefs and personal norms, respectively (Model 2, see Table 19). We entered altruistic value orientation as the independent variable, environmental beliefs and personal norms as mediating variables, pro-environmental behaviour as the dependent variable, objective social class as the moderator variable, and biospheric and egoistic value orientation as covariates. The model was statistically significant, $R^2 = .5756$, $F(9, 287) = 43.26$, $p < .001$, and explained 57.56% of the variance of pro-environmental behaviour. Similar to the previous analysis, none of the interaction effects was statistically significant, implying that social class does not moderate the direct effects of altruistic value orientation, pro-environmental beliefs, and personal norms on pro-environmental behaviour (see Table 19). However, according to the unstandardized slope analysis, social class moderated the *indirect* effect between altruistic value orientation and pro-environmental behaviour through environmental beliefs in that the indirect effect was positively significant for low social class individuals, *Effect* = 0.203, *Boot*SE

= 0.047, *Boot*CI [0.116, 0.298], and for upper social class individuals, *Effect* = 0.346, *Boot*SE = 0.050, *Boot*CI [0.250, 0.446]. The difference was statistically significant, *Index* = 0.143, *Boot*SE = 0.067, *Boot*CI [0.010, 0.276]. These results imply that the indirect effect between altruistic value orientation and pro-environmental behaviour through environmental beliefs is indeed stronger for upper social class individuals. Or to put it differently, sharing biospheric value orientations and thus endorsing environmental beliefs which makes pro-environmentally behaviour more likely is stronger in upper social class individuals than in low social class individuals. This finding, however, contradicted Hypothesis 3. The indirect effects between biospheric value orientation and pro-environmental behaviour through personal norms or both environmental beliefs and personal norms were not moderated by social class (see Table 19).

Table 19

The moderating function of objective social class on the direct and indirect relationships between altruistic value orientations and pro-environmental behaviour (Model 2), Study 3

Direct and interaction effects of altruistic value orientations on pro-environmental behaviour						
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	2.823	0.210	13.43	< .001	2.409	3.237
Altruistic value orientation	0.025	0.036	0.69	.489	-0.046	0.096
Environmental beliefs	0.803	0.064	12.49	< .001	0.677	0.929
Personal norm	0.169	0.050	3.38	< .001	0.071	0.268
Social class (groups)	-0.207	0.061	-3.40	< .001	-0.327	-0.087
Altruistic value orientation *social class	0.024	0.071	0.34	.733	-0.115	0.163
Environmental beliefs* social class	0.027	0.127	0.22	.829	-0.222	0.277

Person norms* social class	0.102	0.1001	1.02	.311	-0.096	0.301
Biospheric value orientation	0.176	0.041	4.29	< .001	0.096	0.258
Egoistic value orientation	0.094	0.035	2.68	< .01	0.025	0.163

Conditional indirect effect of altruistic value orientation on pro-environmental behaviour through environmental beliefs

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
Low social class	0.203	0.046	0.116	0.298
Upper social class	0.346	0.050	0.250	0.446

Conditional indirect effect of altruistic value orientation on pro-environmental behaviour through personal norms

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
Low social class	-0.005	0.006	-0.021	0.006
Upper social class	-0.002	0.015	-0.028	0.031

Conditional indirect effect of altruistic value orientation on pro-environmental behaviour through both environmental beliefs and personal norms

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
Low social class	0.012	0.009	-0.004	0.034
Upper social class	0.014	0.015	-0.008	0.049

Lastly, we estimated the conditionality of the direct and indirect relationships between egoistic value orientation and pro-environmental behaviour through environmental beliefs and personal norms upon social class. We entered egoistic value orientation as the independent variable, environmental beliefs and personal norms as the mediating variable, pro-environmental behaviour as the dependent variable, objective social class as the moderator variable, and biospheric and altruistic value orientation as covariates. The overall model

estimates were statistically significant, $R^2 = .5766$, $F(9, 287) = 43.42$, $p < .001$, and the variables in the model jointly explained 57.66% of the variance of pro-environmental behaviour.

Like in the previous analyses, social class did not moderate the *direct* effects of egoistic value orientation, pro-environmental beliefs, and personal norms on pro-environmental behaviour (see Table 20). Social class moderated, however, the *indirect* effect between egoistic value orientation and pro-environmental behaviour through environmental beliefs, in that the indirect effect was negatively significant for upper social class individuals, *Effect* = -0.089, *Boot*SE = 0.034, *Boot*CI [-0.163, -0.028], but not for the lower social class individuals, *Effect* = -0.058, *Boot*SE = 0.053, *Boot*CI [-0.169, 0.041]. These results imply that sharing egoistic value orientations and thus rejecting environmental beliefs which make pro-environmentally behaviour less likely is stronger in upper social class individuals than in low social class individuals. Yet, the difference between upper and lower social class regarding this effect was, however, not statistically significant, *Index* = -0.031, *Boot*SE = 0.058, *Boot*CI [-0.145, 0.083]. Consequently, even though these findings support Hypothesis 3, they need to be interpreted with caution. Lastly, the indirect effects between biospheric value orientation and pro-environmental behaviour through personal norms or both environmental beliefs and personal norms were not moderated by social class (see Table 20).

Table 20

The moderating function of objective social class on the direct and indirect relationships between egoistic value orientations and pro-environmental behaviour (Model 3), Study 3

Direct and indirect effects of egoistic value orientations on pro-environmental behaviour						
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	3.11	0.211	14.77	< .001	2.698	3.528
Egoistic value orientation	0.103	0.036	2.827	< .01	0.031	0.174
Environmental beliefs	0.809	0.063	12.92	< .001	0.686	0.933
Personal norm	0.162	0.051	3.184	< .01	0.062	0.262
Social class (groups)	-0.206	0.061	-3.395	< .001	-0.325	-0.086
Egoistic value orientation *social class	-0.061	0.070	-0.0867	.387	-0.198	0.077
Environmental beliefs* social class	0.017	0.106	0.164	.869	-0.190	0.225
Person norms* social class	0.112	0.101	1.108	268	-0.087	0.312
Altruistic value orientation	0.026	0.035	0.747	.455	-0.043	0.096
Biospheric value orientation	0.176	0.041	4.293	< .001	0.095	0.257

Conditional indirect effect of egoistic value orientation on pro-environmental behaviour through environmental beliefs upon social class

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
Low social class	-0.058	0.053	-0.169	0.041
Upper social class	-0.089	0.034	-0.163	-0.028

Conditional indirect effect of egoistic value orientation on pro-environmental behaviour through personal norms upon social class

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI

	Effect	BootSE	BootLLCI	BootULCI
Low social class	0.017	0.015	-0.008	0.051
Upper social class	-0.012	0.013	-0.039	0.012

Conditional indirect effect of egoistic value orientation on pro-environmental behaviour through both environmental beliefs and personal norms upon social class

	Effect	BootSE	BootLLCI	BootULCI
Low social class	-0.003	0.005	-0.015	0.004
Upper social class	-0.003	0.004	-0.012	0.002

In sum, the results of Study 3, similar to Study 2, revealed that neither of the direct effects between value orientations on pro-environmental behaviour was conditional on social class. However, different from Study 2, the results of Study 3 showed that the positive indirect effect of biospheric and altruistic value orientations on pro-environmental behaviour through environmental belief was stronger in upper than in low social class individuals. It is important to note that the former effect (i.e., biospheric value orientation on pro-environmental behaviour) did not show a statistically significant difference between upper and low social class, which requires caution in interpreting the result. However, concerning the moderation effect of social class on the relationship between altruistic value orientation on pro-environmental behaviour, the difference between the low and upper social class individuals was statistically significant, showing that sharing altruistic value orientations and thus endorsing environmental beliefs makes pro-environmental behaviour more likely in upper social class individuals than in low social class individuals, which contradicts with the assumption in Hypothesis 3.

Supporting Hypothesis 3, we found that the *negative* indirect effect of egoistic value orientation on pro-environmental behaviour through environmental beliefs was statistically significant for upper social class individuals, but not for low social class individuals. However, the significant indirect effect for upper social class individuals was not statistically different from the nonsignificant indirect effect for low social class individuals, which requires again

caution in interpreting the result. Notably - although contingent upon social class - environmental beliefs played a significant role in mediating the effects of the three value orientations (i.e., biospheric, altruistic, and egoistic) on pro-environmental behaviour. This finding differed from the findings in Study 2 where its mediation role did not reach a significant level in any of these relationships. Conversely, personal norms, which - although contingent upon social class - played a significant role in mediating the relationships between value orientations and pro-environmental behaviour in Study 2, failed to do so in Study 3.

Hypothesis 11 stated that descriptive and injunctive social norms moderate the direct and indirect relationship between value orientations and pro-environmental behaviour through environmental beliefs and personal norms, respectively. More specifically, we proposed that the positive effects of biospheric and altruistic value orientations are stronger in participants who perceive pro-environmental social norms as common (descriptive) and approved of (injunctive) in their groups than in participants who perceive pro-environmental social norms as less common (descriptive) and disapproved of (injunctive), whereas the negative effect of egoistic value orientation on pro-environmental behaviour is stronger in participants who perceive pro-environmental social norms as uncommon (descriptive) and disapproved of (injunctive) than in participants who perceive them as common and approved of (Hypothesis 11, see Figure 8). As descriptive and injunctive environmental social norms correlated with each other, we included the respective social norm as a covariate.

The moderating function of descriptive environmental social norms.

In the first model, we entered biospheric value orientation as the independent variable, environmental beliefs and personal norms as the mediator variables, pro-environmental behaviour as the dependent variable, the descriptive pro-environmental social norm as the moderator variable, and altruistic and egoistic value orientations as well as injunctive social

norms as covariates (Model 1). In the second model, we entered altruistic value orientation as the independent variable, environmental beliefs and personal norms as the mediator variables, pro-environmental behaviour as the dependent variable, descriptive pro-environmental social norms as the moderator variable, and biospheric and egoistic value orientations as well as injunctive social norms as covariates (Model 2). In the third model, we entered egoistic value orientation as the independent variable, environmental beliefs and personal norms as mediator variables, pro-environmental behaviour as the dependent variable, the descriptive pro-environmental social norm as the moderator variable, and biospheric, and altruistic value orientations as well as injunctive social norms as covariates (Model, 3). In all models, we used bootstrapping with 5000 iterations at a 95% confidence interval.

Model 1, which assessed the conditionality of the direct and indirect relationship between biospheric value orientation and pro-environmental behaviour through environmental beliefs and personal norms upon descriptive pro-environmental social norms, was statistically significant, R^2= .6853, $F(9, 287) = 69.44$, $p < .001$, and explained 68.53% of the variance of pro-environmental behaviour. Notably, the interaction term between biospheric value orientation and descriptive pro-environmental social norms was statistically significant, *beta* = -0.071, *SE* = 0.031, *CI* [-0.134, -0.009] (see Table 21), implying that the *direct* effect between biospheric value orientation and pro-environmental behaviour was moderated by descriptive pro-environmental social norms. More specifically, the unstandardized slope analysis revealed that when pro-environmental social norms are perceived as very common (i.e, 1 SD above the mean), the direct effect between biospheric value orientation and pro-environmental behaviour is not significant, *beta* = 0.058, *SE* = 0.054, *CI* [-0.049, 0.025]; whereas when pro-environmental social norms are perceived as common (i.e., at the mean) and as uncommon (i.e., 1 SD below the mean), the direct effect between biospheric value orientation and pro-environmental behaviour is strongest, *beta* = 0.166, *SE* = 0.035, CI [0.096, 0.236] and *beta* =

0.238, *SE* = 0.051, *CI* [0.137, 0.338], respectively. This finding contradicts the proposed assumption in Hypothesis 11.

Descriptive pro-environmental social norms also influence the positive *indirect* effect between biospheric value orientation and pro-environmental behaviour through environmental beliefs, in that this indirect effect is only statistically significant when pro-environmental social norms are perceived as rather uncommon (i.e., 1 SD below the mean; see Table 21). These results, which are also not in line with the assumptions in Hypothesis 11, which stated that the positive effects of biospheric value orientations are stronger in participants who perceive pro-environmental social norms as common (i.e., descriptive) in their groups, imply that individual value orientations as antecedents for pro-environmental behaviour are particularly relevant in social contexts where social norms concerning the environment are absent. Neither the direct effects from environmental beliefs and social norms on pro-environmental behaviour nor the indirect effects between biospheric value orientation and pro-environmental behaviour through personal norms or both environmental beliefs and personal norms were moderated by descriptive pro-environmental social norms (see Table 21).

Table 21

The moderating function of descriptive pro-environmental social norms on the direct and indirect relationships between biospheric value orientations and pro-environmental behaviour (Model 1), Study 3

Direct and interaction effects of biospheric value orientations on pro-environmental behaviour

	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	-0.617	0.887	-0.696	.486	-2.363	1.128
Biospheric value orientation	0.418	0.121	3.452	< .001	0.179	0.656
Environmental beliefs	0.338	0.187	1.802	.072	-0.031	0.707
Personal norm	0.039	0.121	0.323	.746	-0.199	0.277
Descriptive pro-environmental social norms	0.039	0.235	2.105	< .05	0.032	0.0958
Biospheric value orientation * descriptive pro-environmental social norms	-0.071	0.031	-2.280	< .05	-0.134	-0.009
Environmental beliefs* descriptive pro-environmental social norms	0.016	0.045	0.356	.721	-0.073	0.106
Person norms* descriptive norms	0.025	0.034	0.725	.468	-0.043	0.093
Altruistic value orientation	-0.017	0.031	-0.562	.574	-0.078	0.043
Egoistic value orientation	0.070	0.029	2.352	< .05	0.011	0.128

Conditional direct effect of biospheric value orientation on pro-environmental behaviour

upon descriptive pro-environmental social norms

	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*

1 SD below the mean	0.238	0.051	4.670	< .001	0.137	0.338
At the mean	0.166	0.035	4.685	< .001	0.096	0.236
1SD above the mean	0.058	0.054	1.068	.286	-0.049	0.165

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through environmental beliefs upon descriptive pro-environmental social norms

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	0.043	0.021	0.006	0.090
At the Mean	0.022	0.031	-0.002	0.050
1SD abobe the Mean	-0.011	0.018	-0.049	0.025

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through personal norms upon descriptive pro-environmental social norms

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	0.0023	0.015	-0.032	0.031
At the Mean	0.0033	0.008	-0.014	0.021
1SD abobe the Mean	0.0051	0.013	-0.024	0.029

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through both environmental beliefs and personal norms upon descriptive pro-environmental social norms

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	0.001	0.003	-0.001	0.011
At the Mean	0.001	0.001	-0.000	0.004
1SD abobe the Mean	-0.001	0.001	-0.005	0.002

Model 2, which assessed whether the direct and indirect relationships between altruistic value orientation and pro-environmental behaviour through environmental beliefs and personal norms are conditional upon descriptive pro-environmental social norms was statistically

significant, $R^2 = .7002$, $F(9, 287) = 74.49$, $p < .001$, and explained 70.02% of the variance of pro-environmental behaviour. The interaction term between altruistic value orientation and descriptive pro-environmental social norms was statistically significant (see Table 22), implying that the *direct* effect between altruistic value orientation and pro-environmental behaviour was moderated by descriptive pro-environmental social norms. More specifically, the unstandardized simple slope analysis revealed that the positive *direct* effect of altruistic value orientations on pro-environmental behaviour is strongest under the condition that pro-environmental social norms are perceived as very common (i.e., 1 SD above the mean), *beta* = 0.146, *SE* = 0.048, *CI* [0.050, 0.242], the direct effect is not statistically significant when pro-environmental social norms are perceived as somewhat common (i.e., descriptive) at mean level, *beta* = -0.036, *SE* = 0.030, CI [-0.096, 0.023], and it turns into a significantly negative effect when descriptive environmental social norms are perceived as not common (i.e., 1 SD below the mean), *beta* = -0.158, *SE* = 0.043, *CI* [-0.243, -0.074] (see Table 22). This result supports the assumption in Hypothesis 11, which stated that the positive effects of altruistic value orientations are stronger in participants who perceive pro-environmental social norms as commonly shared and practised (i.e., descriptive). Also in line with the assumption of Hypothesis 11, descriptive pro-environmental social norms influenced the *indirect* effect between altruistic value orientation and pro-environmental behaviour through environmental beliefs, in that this positive indirect effect is only statistically significant when descriptive environmental social norms are perceived as common on mean level, *Effect* = 0.043, *Boot*SE = 0.013, *Boot*CI [0.019, 0.074] (see Table 22). The indirect effects between altruistic value orientations and pro-environmental behaviour through personal norms or both environmental beliefs and personal norms were not statistically significant (see Table 22).

Table 22

The moderating function of descriptive environmental social norms on the direct and indirect relationships between altruistic value orientations and pro-environmental behaviour (Model 2), Study 3

Direct and interaction effects of altruistic value orientations on pro-environmental behaviour						
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	2.992	0.175	17.05	< .001	2.647	3.338
Altruistic value orientation	-0.029	0.030	-0.960	.337	-0.088	0.030
Environmental beliefs	0.318	0.067	4.710	< .001	0.185	0.450
Personal norm	0.117	0.041	2.807	< .01	0.035	0.199
Descriptive Norms	0.398	0.035	11.36	< .001	0.329	0.467
Altruistic value orientation * descritive norms	0.122	0.027	4.44	< .001	0.068	0.176
Environmental beliefs* descritive norms	-0.097	0.052	-1.86	.063	-0.201	0.005
Person norms* descritive norms	0.030	0.033	0.90	.368	-0.036	0.097
Biospheric value orientation	0.146	0.034	4.27	< .001	0.079	0.213
Egoistic value orientation	0.076	0.029	2.63	< .01	0.019	0.134

Conditional direct effect of altruistic value orientation on pro-environmental behaviour upon descriptive norms						
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
1 SD below the mean	-0.158	0.043	-3.69	< .001	-0.243	-0.074
At the mean	-0.036	0.030	-1.20	.228	-0.096	0.023
1SD above the mean	0.146	0.048	3.00	< .01	0.050	0.242

Conditional indirect effect of altruistic value orientation on pro-environmental behaviour through environmental beliefs upon descriptive norms

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	0.023	0.019	-0.033	0.044
At the Mean	0.043	0.013	0.019	0.074
1SD abobe the Mean	0.057	0.030	-0.002	0.116

Conditional indirect effect of altruistic value orientation on pro-environmental behaviour through personal norms upon descriptive norms

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	-0.008	0.010	-0.030	0.013
At the Mean	-0.005	0.005	-0.017	0.003
1SD abobe the Mean	0.004	0.009	-0.012	0.026

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through both environmental beliefs and personal norms upon descriptive norms

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	0.000	0.001	-0.002	0.003
At the Mean	0.001	0.002	-0.001	0.006
1SD abobe the Mean	0.003	0.007	-0.009	0.022

Lastly, Model 3 assessed whether the direct and indirect relationships between egoistic value orientation and pro-environmental behaviour through environmental beliefs and personal norms are conditional upon descriptive pro-environmental social norms. Model 3 was statistically significant, $R^2 = .6934$, $F(9, 287) = 72.13$, $p < .001$, and explained nearly 70% of the variance of pro-environmental behaviour. The interaction term between egoistic value orientation and descriptive pro-environmental social norms was statistically significant, *beta* = -0.103, *SE* = 0.028, *CI* [-0.160, -0.046] (see Table 23). The unstandardized slope analysis

implies that the *direct* relationship between egoistic value orientation and pro-environmental behaviour is strongest and positive when pro-environmental social norms are perceived as uncommon (i.e., 1 SD below the mean), *beta* = 0.213, *SE* = 0.049, *CI* [0.115, 0.310], and weakens or even vanishes when pro-environmental social norms are perceived as common (i.e., at the mean), *beta* = 0.109, *SE* = 0.031, *CI* [0.047, 0.171], or as very common (i.e., 1 SD above the mean), *beta* = -0.045, *SE* = 0.043, *CI* [-0.131, 0.040], respectively (see Table 23). This result contradicts the assumption as outlined in Hypothesis 11, which stated that the negative effect of egoistic value orientation on pro-environmental behaviour is stronger in participants who perceive pro-environmental social norms as uncommon (descriptive) than in participants who perceive them as common.

Interestingly, the negative indirect effect of egoistic value orientation on pro-environmental behaviour through environmental beliefs increases to statistical significance when pro-environmental social norms are perceived as common (i.e., at the mean), *Effect* = -0.029, *Boot*SE = 0.014, *Boot*CI [-0.060, -0.003], and very common (i.e., 1 SD above the mean), *Effect* = -0.048, *Boot*SE = 0.018, *Boot*CI [-0.091, -0.017], which does not support Hypothesis 11 either. Like in the previous analyses, the indirect effects between egoistic value orientations and pro-environmental behaviour through personal norms or both environmental beliefs and personal norms were not statistically significant (see Table 23).

Table 23

The moderating function of descriptive environmental social norms on the direct and indirect

relationships between egoistic value orientations and pro-environmental behaviour (Model 3),

Study 3

Direct and interaction effects of egoistic value orientations on pro-environmental behaviour						
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	3.364	0.176	19.11	< .001	3.018	3.711
Egoistic value orientation	0.103	0.030	3.34	< .001	0.042	0.163
Environmental beliefs	0.405	0.064	6.24	< .001	0.277	0.533
Personal norm	0.119	0.042	2.83	< .01	0.036	0.202
Descriptive Norms	0.365	0.034	10.72	< .001	0.298	0.432
Egoistic value orientation * descritive norms	-0.103	0.028	-3.59	< .001	-0.160	-0.046
Environmental beliefs* descritive norms	-0.038	0.048	-0.78	.432	-0.133	0.057
Person norms* descritive norms	0.033	0.034	0.97	.329	-0.034	0.101
Biospheric value orientation	-0.022	0.030	-0.74	.457	-0.082	0.037
Altruistic value orientation	0.150	0.034	4.34	< .001	0.082	0.218

Conditional direct effect of egoistic value orientation on pro-environmental behaviour upon descriptive norms						
	Beta	*SE*	*t*	*p*	*LLCI*	*ULCI*
1 SD below the mean	0.213	0.049	4.30	< .001	0.115	0.310
At the mean	0.109	0.031	3.48	< .001	0.047	0.171
1SD above the mean	-0.045	0.043	-1.04	.295	-0.131	0.040

Conditional indirect effect of egoistic value orientation on pro-environmental behaviour

through environmental beliefs upon descriptive norms

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	-0.012	0.021	-0.061	0.026
At the Mean	-0.029	0.014	-0.060	-0.003
1SD abobe the Mean	-0.048	0.018	-0.091	-0.017

Conditional indirect effect of egoistic value orientation on pro-environmental behaviour

through personal norms upon descriptive norms

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	0.008	0.013	-0.012	0.041
At the Mean	0.004	0.006	-0.005	0.020
1SD abobe the Mean	-0.006	0.010	-0.030	0.010

Conditional indirect effect of egoistic value orientation on pro-environmental behaviour

through both environmental beliefs and personal norms upon descriptive norms

	Effect	*Boot*SE	*Boot*LLCI	*Boot*ULCI
1SD below the Mean	-0.000	0.001	-0.004	0.002
At the Mean	-0.001	0.001	-0.004	0.000
1SD abobe the Mean	-0.003	0.003	-0.012	0.001

In sum, the results revealed that the direct relationships between value orientations and pro-environmental behaviour were conditional upon descriptive pro-environmental social norms, although the direction of influence was in most cases contrary to the proposed assumptions in Hypothesis 11. For instance, it was predicted that the positive effects of biospheric and altruistic value orientations on pro-environmental behaviour are stronger in participants who perceive pro-environmental social norms as commonly shared (i.e., descriptive) than in participants who perceive pro-environmental social norms as less commonly shared (i.e., descriptive). Our results, however, imply that the positive effect of biospheric value orientations on pro-environmental behaviour is stronger in participants who perceive pro-environmental social norms as somewhat shared (i.e., at the mean) or less shared (i.e., below the mean), whereas the effect disappears in participants who perceive pro-environmental social norms as shared and practised by most members of their group (i.e, above the mean). Likewise, the negative direct effect of egoistic value orientation and pro-environmental behaviour, which was assumed to be negatively stronger in participants who perceive pro-environmental social norms as *not* shared by significant others (i.e., descriptive), was stronger and positive in participants who perceive pro-environmental social norms as not shared (i.e., below the mean) and weakened when pro-environmental social norms are perceived as somewhat shared by significant others (i.e., at the mean).

Also inconsistent with Hypothesis 11 was the finding concerning the positive *indirect* relationship between biospheric value orientation and pro-environmental behaviour through environmental beliefs which was found to be only statistically significant in participants who perceive pro-environmental social norms as not shared by significant others (i.e., 1 SD below the mean). Also contrary to Hypothesis 11 was the finding that the negative indirect effect of egoistic value orientation on pro-environmental behaviour through environmental beliefs increased statistically in participants who perceived pro-environmental social norms as

somewhat shared (i.e., at the mean) and commonly shared by significant others (i.e., 1 SD above the mean). Hypothesis 11 was, however, supported by the findings that the direct and indirect positive effects between altruistic value orientation and pro-environmental behaviour through environmental beliefs, respectively, were statistically significant in participants who perceived pro-environmental social norms as very common or common at the mean level.

The moderating function of injunctive environmental social norms.

Applying the same approach as used when assessing the conditionality of the interplay between value orientations, environmental beliefs, personal norms, and pro-environmental behaviour upon descriptive pro-environmental social norms, in the following, we report three models that assessed the moderation function of injunctive pro-environmental social norms. In Model 1, we entered biospheric value orientation as the independent variable, environmental beliefs and personal norms as the mediator variables, pro-environmental behaviour as the dependent variable, injunctive pro-environmental social norm as the moderator variable, and altruistic and egoistic value orientations as well as descriptive pro-environmental social norms as covariates (Model 1, see Table 24). In Model 2, we entered altruistic value orientation as the independent variable, environmental beliefs and personal norms as the mediator variables, pro-environmental behaviour as the dependent variable, injunctive pro-environmental social norms as the moderator variable, and biospheric and egoistic value orientations as well as descriptive pro-environmental social norms as covariates (Model 2, see Table 25). In Model 3, we entered egoistic value orientation as the independent variable, environmental beliefs and personal norms as mediator variables, pro-environmental behaviour as the dependent variable, injunctive pro-environmental social norm as the moderator variable, and biospheric, and altruistic value orientations as well as descriptive pro-environmental social norms as covariates

(Model, 3, see Table 26). In all models, we used bootstrapping with 5000 iterations at a 95% confidence interval.

Model 1, which assessed whether the direct and indirect relationships between biospheric value orientation and pro-environmental behaviour through environmental beliefs and personal norms are conditional upon injunctive pro-environmental social norms, was statistically significant, $R^2 = .5662$, $F(9, 287) = 41.45$, $p < .001$, and explained 56.62% of the variance of pro-environmental behaviour. The interaction term between biospheric value orientation and injunctive pro-environmental social norms was statistically significant, *beta* = 0.294, *SE* = 0.072, *CI* [0.152, 0.436] (see Table 24), and the unstandardized slope analysis implies that the positive direct effect of biospheric value orientation on pro-environmental behaviour is strongest when pro-environmental social norms are perceived as not approved by relevant others (i.e., 1 SD below the mean), *beta* = 0.294, *SE* = 0.072, *CI* [0.152, 0.436], compared to when pro-environmental social norms are perceived as somewhat approved by relevant others (i.e., at the mean), *beta* = 0.198, *SE* = 0.043, *CI* [0.113, 0.283]. However, when pro-environmental social norms are perceived as strongly approved by relevant others (i.e, 1 SD above the mean), biospheric value orientation loses its effect on pro-environmental behaviour, *beta* = 0.092, *SE* = 0.056, *CI* [-0.018, 0.202]. This result contradicts the assumption in Hypothesis 11. Also contradicting Hypothesis 11 is the finding that the positive indirect effect of biospheric value orientations on pro-environmental behaviour through environmental beliefs is found when pro-environmental social norms are not approved, *Effect* = 0.080, *Boot*SE = 0.040, *Boot*CI [0.000, 0.160] (see also Table 24). The indirect effects between biospheric value orientations and pro-environmental behaviour through personal norms or both environmental beliefs and personal norms were not moderated by injunctive pro-environmental social norms (see Table 24).

Table 24

The moderating function of injunctive environmental social norms on the direct and indirect

relationships between biospheric value orientations and pro-environmental behaviour (Model

1), Study 3

	Beta	BootSE	t	p	Boot LLCI	Boot ULCI
Direct and interaction effects of biospheric value orientations on pro-environmental behaviour						
Constant	-1.381	0.846	-1.63	.103	-3.047	0.284
Biospheric value orientation	0.390	0.113	3.45	< .001	0.167	0.612
Environmental beliefs	0.762	0.182	4.16	< .001	0.402	1.122
Personal norm	0.197	0.120	1.64	.101	-0.038	0.433
Injunctive pro-environmental social norms	0.158	0.248	0.63	.523	-0.331	0.648
Biospheric value orientation * injunctive pro-environmental social norms	-0.064	0.030	-2.08	.038	-0.124	-0.003
Environmental beliefs* injunctive pro-environmental social norms	0.027	0.046	0.58	.559	-0.064	0.119
Person norms* injunctive pro-environmental social norms	-0.006	0.039	-0.16	.865	-0.084	0.071
Altruistic value orientation	0.009	0.042	0.22	.823	-0.073	0.092
Egoistic value orientation	0.094	0.035	2.67	< .05	0.025	0.163

Conditional direct effect of biospheric value orientation on pro-environmental behaviour upon injunctive pro-environmental social norms

	Beta	BootSE	t	p	Boot LLCI	Boot ULCI
1 SD below the mean	0.294	0.072	4.08	< .001	0.152	0.436
At the mean	0.198	0.043	4.58	< .001	0.113	0.283
1SD above the mean	0.092	0.056	1.63	.102	-0.018	0.202

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through environmental beliefs upon injunctive pro-environmental social norms

	Effect	BootSE	BootLLCI	BootULCI
1SD below the Mean	0.080	0.040	0.000	0.160
At the Mean	0.043	0.027	-0.011	0.097
1SD abobe the Mean	-0.001	0.035	-0.070	0.013

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through personal norms upon injunctive pro-environmental social norms

	Effect	BootSE	BootLLCI	BootULCI
1SD below the Mean	0.025	0.029	-0.024	0.095
At the Mean	0.008	0.013	-0.016	0.037
1SD abobe the Mean	-0.008	0.013	-0.042	0.013

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour through both environmental beliefs and personal norms upon injunctive pro-environmental social norms

	Effect	BootSE	BootLLCI	BootULCI
1SD below the Mean	0.000	0.005	-0.008	0.014
At the Mean	0.001	0.001	-0.001	0.005
1SD abobe the Mean	-0.000	0.001	-0.004	0.003

Model 2, which focused on the direct and indirect effects of altruistic value orientations on pro-environmental behaviour and their conditionality upon injunctive pro-environmental social norms, was statistically significant, R^2 = .5686, $F(9, 287)$ = 42.03, $p < .001$, and explained 56.86% of the variance of pro-environmental behaviour. Like in Model 1, the only statistically significant interaction term was between altruistic value orientations and injunctive pro-environmental social norms, $beta$ = 0.082, SE = 0.032, CI [0.019, 0.146], whereas the other interaction terms were not statistically significant (see Table 25). The unstandardized slope analysis shows that in line with Hypothesis 11 the positive direct effect of altruistic value orientations on pro-environmental behaviour is strongest and statistically significant when pro-environmental social norms are perceived to be approved by significant others (i.e., injunctive social norms), $beta$ = 0.141, SE = 0.065, CI [0.012, 0.270], compared to when pro-environmental social norms are perceived as somewhat approved (i.e., at the mean), $beta$ = 0.004, SE = 0.042, CI [-0.079, 0.087], or as not approved by significant others (i.e., 1 SD below the mean), $beta$ = -0.120, SE = 0.066, CI [-0.250, 0.010]. Moreover and in line with Hypothesis 11, the unstandardized slope analysis shows that the positive indirect effect of altruistic value orientations on pro-environmental behaviour through environmental beliefs is strongest when pro-environmental social norms are perceived to be approved by significant others, $Effect$ = 0.157, $Boot$SE = 0.036, $Boot$CI [0.093, 0.237]. Indeed, the indirect effect of altruistic value orientations on pro-environmental behaviour through environmental beliefs turns negative when pro-environmental social norms are perceived as being disapproved by relevant others, $Effect$ = -0.188, $Boot$SE = 0.047, $Boot$CI [-0.286, -0.004] (see Table 25). The indirect effects between altruistic value orientations and pro-environmental behaviour through personal norms or both environmental beliefs and personal norms were not moderated by injunctive pro-environmental social norms (see Table 25).

Table 25

The moderating function of injunctive pro-environmental social norms on the direct and indirect relationships between altruistic value orientations and pro-environmental behaviour (Model 2), Study 3

Direct and interaction effects of altruistic value orientations on pro-environmental behaviour

	Beta	*BootSE*	*t*	*p*	*Boot LLCI*	*Boot ULCI*
Constant	2.760	0.213	12.92	< .001	2.340	3.181
Altruistic value orientation	0.008	0.042	0.21	.832	-0.073	0.091
Environmental beliefs	0.768	0.088	8.70	< .001	0.594	0.942
Personal norm	0.175	0.050	3.48	< .001	0.076	0.274
Injunctive pro-environmental social norms	-0.022	0.045	-0.49	.622	-0.110	0.066
Altruistic value orientation * injunctive pro-environmental social norms	0.082	0.032	2.57	< .05	0.019	0.146
Environmental beliefs* injunctive pro-environmental social norms	-0.053	0.055	-0.96	.335	-0.164	0.056
Person norms* injunctive pro-environmental social norms	-0.007	0.039	-0.19	.847	-0.086	0.070
Biospheric value orientation	0.173	0.041	4.22	< .001	0.092	0.254
Egoistic value orientation	0.101	0.035	2.89	< .01	0.032	0.170

Conditional direct effect of altruistic value orientation on pro-environmental behaviour

upon injunctive pro-environmental social norms

	Beta	BootSE	t	p	Boot LLCI	Boot ULCI
1 SD below the mean	-0.120	0.066	-1.81	.071	-0.250	0.010
At the mean	0.004	0.042	0.09	.924	-0.079	0.087
1SD above the mean	0.141	0.065	2.16	< .05	0.012	0.270

Conditional indirect effect of altruistic value orientation on pro-environmental behaviour

through environmental beliefs upon injunctive pro-environmental social norms

	Effect	BootSE	BootLLCI	BootULCI
1SD below the Mean	-0.188	0.047	-0.286	-0.004
At the Mean	-0.005	0.022	-0.048	0.001
1SD abobe the Mean	0.157	0.036	0.093	0.237

Conditional indirect effect of altruistic value orientation on pro-environmental behaviour

through personal norms upon injunctive pro-environmental social norms

	Effect	BootSE	BootLLCI	BootULCI
1SD below the Mean	-0.034	0.024	-0.088	0.004
At the Mean	-0.017	0.011	-0.041	0.001
1SD abobe the Mean	-0.000	0.011	-0.024	0.023

Conditional indirect effect of biospheric value orientation on pro-environmental behaviour

through both environmental beliefs and personal norms upon injunctive pro-environmental

social norms

	Effect	BootSE	BootLLCI	BootULCI
1SD below the Mean	-0.002	0.011	-0.033	0.011
At the Mean	-0.000	0.001	-0.002	0.001
1SD abobe the Mean	0.003	0.006	-0.006	0.016

Lastly, Model 3, which focused on the direct and indirect effects of egoistic value orientations on pro-environmental behaviour and their conditionality upon injunctive pro-environmental social norms, was statistically significant, $R^2 = .5693$, $F(9, 287) = 42.15$, $p < .001$, and explained nearly 57% of the variance of pro-environmental behaviour. Like in the previous two models, the interaction term between value orientation and injunctive pro-environmental social norms was statistically significant, $beta = -0.074$, $SE = 0.027$, CI [-0.129, -0.039] (see Table 26). The unstandardized slope analysis implies that the *direct* effect of egoistic value orientations on pro-environmental behaviour is strongest and positive when pro-environmental social norms are perceived to be not approved by relevant others, $beta = 0.266$, $SE = 0.071$, CI [0.125, 0.407], it reduces when pro-environmental social norms are perceived to be somewhat approved, $beta = 0.154$, $SE = 0.040$, CI [0.074, 0.234], and it becomes nonsignificant when pro-environmental social norms are perceived to be approved by relevant others, $beta = 0.031$, $SE = 0.043$, CI [-0.054, 0.116]. This result contradicts our assumption of Hypothesis 11.

Also contradicting Hypothesis 11, which stated that the negative indirect effect of egoistic value orientation on pro-environmental behaviour is stronger in participants who perceive pro-environmental social norms as disapproved of by significant others (i.e., injunctive social norm), is the finding that the negative indirect effect of egoistic value orientations on pro-environmental behaviour through environmental beliefs is only statistically significant when pro-environmental social norms are perceived as somewhat approved by significant others (i.e., at the mean), $Effect = 0.017$, $BootSE = 0.011$, $BootCI$ [0.000, 0.044] (see Table 26). Neither the indirect effects between egoistic value orientations and pro-environmental behaviour through personal norms nor both environmental beliefs and personal norms were moderated by injunctive social norms (see Table 26).

Table 26

The moderating function of injunctive pro-environmental social norms on the direct and indirect relationships between egoistic value orientations and pro-environmental behaviour (Model 3), Study 3

Direct and interaction effects of egoistic value orientations on pro-environmental behaviour						
	Beta	*BootSE*	*t*	*p*	*Boot LLCI*	*Boot ULCI*
Constant	3.166	0.217	14.53	< .001	2.737	3.595
Egoistic value orientation	0.150	0.039	3.77	< .001	0.071	0.228
Environmental beliefs	0.860	0.081	10.61	< .001	0.701	0.228
Personal norm	0.165	0.050	3.26	< .01	0.065	1.020
Injunctive pro-environmental social norms	-0.046	0.043	-1.05	.291	-0.132	0.265
Egoistic value orientation * injunctive pro-environmental social norms	-0.074	0.027	-2.66	< .01	-0.129	-0.039
Environmental beliefs* injunctive pro-environmental social norms	-0.010	0.048	-0.20	.837	-0.105	-0.019
Person norms* injunctive pro-environmental social norms	0.002	0.039	0.06	.947	-0.075	0.081
Biospheric value orientation	0.021	0.042	0.50	.610	-0.061	0.104
Altruistic value orientation	0.161	0.041	3.91	< .001	0.080	0.242

Conditional direct effect of egoistic value orientation on pro-environmental behaviour upon

injunctive pro-environmental social norms

	Beta	BootSE	t	p	Boot LLCI	Boot ULCI
1 SD below the mean	0.266	0.071	3.72	< .001	0.125	0.407
At the mean	0.154	0.040	3.80	< .001	0.074	0.234
1SD above the mean	0.031	0.043	0.71	.472	-0.054	0.116

Conditional indirect effect of egoistic value orientation on pro-environmental behaviour

through environmental beliefs upon injunctive pro-environmental social norms

	Effect	BootSE	BootLLCI	BootULCI
1SD below the Mean	0.005	0.042	-0.083	0.084
At the Mean	-0.030	0.025	-0.083	0.016
1SD abobe the Mean	-0.069	0.030	-0.136	-0.014

Conditional indirect effect of egoistic value orientation on pro-environmental behaviour

through personal norms upon injunctive pro-environmental social norms

	Effect	BootSE	BootLLCI	BootULCI
1SD below the Mean	0.041	0.029	-0.004	0.107
At the Mean	0.017	0.011	0.000	0.044
1SD abobe the Mean	-0.010	0.011	-0.038	0.004

Conditional indirect effect of egoistic value orientation on pro-environmental behaviour

through both environmental beliefs and personal norms upon injunctive pro-environmental

social norms

	Effect	BootSE	BootLLCI	BootULCI
1SD below the Mean	0.000	0.002	-0.004	0.006
At the Mean	-0.000	0.001	-0.004	0.000
1SD abobe the Mean	-0.002	0.002	-0.008	0.000

In sum, injunctive pro-environmental social norms significantly moderated the direct relationships between value orientations and pro-environmental behaviour – although in some cases differently as expected. For instance, it was hypothesized that the positive effect of biospheric value orientations is relatively stronger in participants who perceive pro-environmental social norms as approved of by significant others (i.e., injunctive social norms). However, our results imply that the positive direct and indirect effects of biospheric value orientations on pro-environmental behaviour are strongest in participants who perceive pro-environmental social norms as not approved of by significant others (i.e., 1 SD below the mean).

It was further hypothesized that the negative effect of egoistic value orientation on pro-environmental behaviour is relatively stronger in participants who perceive pro-environmental social norms as disapproved of by significant others (i.e., injunctive social norms). Although the finding concerning the direct effect of egoistic value orientations was in line with Hypothesis 11, the finding concerning the indirect effect of egoistic value orientations was not as it was significant and positive in participants who perceive pro-environmental social norms as somewhat approved (i.e., at the mean).

Nevertheless, in line with Hypothesis 11 is the finding that the direct positive effect of altruistic value orientation on pro-environmental behaviour is indeed stronger when pro-environmental social norms are perceived to be approved of by significant others. Likewise, the indirect effect of altruistic value orientations on pro-environmental behaviour through environmental beliefs was significant and positive in participants who perceived that pro-environmental social norms are approved by significant others (i.e., injunctive social norms), which supports the assumption stipulated in Hypothesis 11.

Discussion

In Study 3, we re-tested the assumptions of the value-belief-norm theory in explaining pro-environmental behaviour. We further explored whether social class, as well as descriptive and injunctive pro-environmental social norms, contribute to explaining pro-environmental behaviour, as well as analyzed the conditionality of the relationships between the constructs of the value-belief-norm theory (i.e., value orientations, environmental beliefs, and personal norms) and pro-environmental behaviour upon social class and social norms.

Overall and different from the previous two studies, the results of Study 3 supported the entire top-down effects from values to behaviour through beliefs and norms as stipulated by the value-belief-norm theory. For instance, both biospheric and altruistic value orientations were indeed positively related to pro-environmental behaviour through environmental beliefs and personal norms implying that sharing biospheric and/or altruistic value orientations increases the likelihood to hold environmental beliefs which makes pro-environmental behaviour likely because of moral obligations. Likewise, Study 3 also provided evidence that egoistic value orientations reduce the likelihood of pro-environmental action because of the lack of environmental beliefs and thus the lack of moral obligations to act pro-environmentally.

Replicating the findings of Study 1 and Study 2, biospheric value orientation persistently showed a direct positive association with pro-environmental behaviour, indicating that people who value other species are likely to show a propensity to pro-environmental actions. Also replicating the findings of Study 2, egoistic value orientation was negatively directly related to pro-environmental behaviour implying that individuals who share egoistic values are less involved in the protection of the environment (e.g., Ibtissem, 2010; Hornsey et al., 2016). These results support Stern's (2000, p. 412) proposal that environmental values and beliefs create a general predisposition that influences pro-environmental intent.

The results of Study 3 supported also the assumption that the interplay between values, beliefs, norms and pro-environmental behaviour is conditional upon social contexts such as social class and social norms. For instance, the indirect effects of biospheric and altruistic value orientation on pro-environmental behaviour through environmental beliefs were stronger in upper than in low social class participants, which – however – contradicted Hypothesis 3. Moreover, the differences between upper and low social class participants did not reach statistical significance in these indirect effects, respectively, which makes our result rather ambiguous. Nevertheless, even these non-conforming and ambiguous results support the notion that upper and lower social class individuals differ in terms of psychological tendencies (e.g. Eom et al., 2018; Easterbrook et al., 2019; Farinha et al. 2019). For instance, Eom et al. (2018, p. 61) underlined that greater social and economic resources of upper social class individuals offer increased opportunities. Viewed from this perspective, one might speculate that upper social class students in the Ethiopian context are more likely to be exposed to public discourses related to the environment and climate change through social media (as it would require access to mobile devices and the internet). It is also interesting to note that while in Study 2 social class moderated the indirect effect between values and pro-environmental behaviour through personal norms, in Study 3 social class moderated the indirect effect between values and pro-environmental behaviour through environmental beliefs. These findings imply that other factors besides social class might be at play in determining when the effects of value orientations on pro-environmental behaviour are mediated through environmental beliefs or personal norms.

Study 3 found also that the direct and indirect effects of value orientations on pro-environmental behaviour are conditional upon descriptive and injunctive pro-environmental social norms. For instance, the positive direct effect of biospheric value orientations on pro-environmental behaviour was only significant when participants perceived descriptive pro-

environmental social norms as somewhat or not shared at all. These effects became, however, insignificant in participants who perceive pro-environmental social norms as shared and practised by most members of their group (i.e, above the mean). In addition, the positive indirect effect of biospheric value orientations on pro-environmental behaviour through environmental beliefs was only found in participants who perceived pro-environmental social norms perceived as not shared by relevant others (i.e., 1 SD below the mean). In a similar trend, the − expected negative - direct effect of egoistic value orientation on pro-environmental behaviour was, in fact, *positive* in participants who perceived pro-environmental social norms as not shared (i.e., below the mean); and only negative in participants who perceive pro-environmental social norms as disapproved by others (i.e., 1 SD below the mean) or somehow common (i.e., at the mean). Overall, these results imply that the interplay between values, beliefs, and personal norms elicits pro-environmental behaviour when pro-environmental social norms are either absent (i.e., not salient) or internalized. More explicitly, people tend to perform pro-environmental behaviour (e.g., saving electricity and disposing of solid waste) not because they observe what significant others do or expect them to do, but because these beliefs and personal norms are internalized (e.g., personal norms). Thus, the drivers of environmental behaviour might be an inner conviction, which can, for instance, be expressed in the form of statements like "I should use as little as possible electricity" or "I am not the kind of person who litters". Consistent with the proposed explanation, previous studies found that people show desirable behaviour not only because of social pressure or fear of social sanctions (e.g., Cialdini & Jacobson, 2021; Kinzig, Ehrlich, Alston, Arrow, Barrett, Buchman, & Saari, 2013) but rather because of personal norms and beliefs, which induce self-sanctioning or rewarding (i.e., feelings of guilt or pleasure, respectively), irrespective of what others do or expect one should do.

Taken together, Study 3 provided empirical evidence that social factors such as social class as well as social norms influence people's pro-environmental behaviour not only directly but also indirectly. Furthermore, Study 3 revealed unexpected results indicating that pro-environmental behaviour is significant in the absence or non-salience of social norms. This observation can be explained in terms of the fact that non-salience of social norms does not necessarily indicate an inability to perform pro-environmentally, instead it shows that social norms can be internalized and demonstrate themselves in terms of personal norms and beliefs.

GENERAL DISCUSSION

The overall aim of the present research was to explore in three separate studies the psychological and social factors that underpin the propensity to pro-environmental behaviour of university students in Ethiopia. More specifically, we proposed the extension of the value-belief-norm theory, which assumes that pro-environmental behaviour is informed by the interplay between value orientations, environmental beliefs, and personal norms (Studies 1 – 3), by considering the influence of social class (Studies 2 – 3), cultural orientations (Study 2) and social norms (Study 3). The proposed extension of the value-belief-norm theory, which was informed by theoretical considerations and empirical findings of previous research, built the basis from which the eleven hypotheses of the present research were derived and systematically tested. Moreover, the conceptualization of pro-environmental behaviour was informed by the societal context of the present research and, therefore, considered practices related to electricity saving and disposal of solid waste materials. In addition, the present research assessed the relationships between environmental information (Study 1), age (Study 1 and 2), gender (Study 1 and 2), geographic origin of the participants (Study 1), and pro-environmental behaviour.

Overall the results of the present research provide further evidence about the role of both self-transcendence and self-enhancement values in explaining pro-environmental behaviour (Stern et al., 1999). For instance, it was found in all three studies that biospheric value orientations were directly positively associated with pro-environmental behaviour. Thus, the concern about non-human species (i.e., biospheric values) is an important psychological driver to act pro-environmentally. Moreover, our results provided evidence that altruistic value orientations are positively related to pro-environmental behaviour (Study 2 and 3) and egoistic value orientations are negatively related to pro-environmental behaviour (Studies 2 and 3). These results support the reasoning of Stern (2000, p. 413) that depending on what values are

mostly affected by environmental challenges, people respond with pro-environmental behaviour. Given the present results that showed biospheric values influencing pro-environmental behaviour across the three studies, one could speculate that university students in Ethiopia internalize the environmental challenges of Ethiopia which might not come as a surprise as the agricultural sector does not only employ the majority of the labour force in Ethiopia (over 80%) but also constitutes the major commodities for the exports and thus the largest foreign exchange-earners. Thus, higher education institutions in Ethiopia might make use of this reality as a foundation for fostering pro-environmental behaviour among their students by envisioning their contribution to environmental protection at the national level.

The present results provide also further evidence that value orientations are not only directly but also indirectly associated with pro-environmental behaviour (Armitage & Conner, 2001; Bamberg & Möser, 2007). For instance, our results imply that individuals who share altruistic value orientations are more likely to feel moral obligations (i.e., personal norms) to act pro-environmentally (Study 2) as well as endorse environmental beliefs and therefore feel morally obliged to act pro-environmentally (Study 3). Likewise, shared biospheric value orientations are associated with the endorsement of environmental beliefs which makes people feel to be morally obliged to act pro-environmentally (Study 3). On the other hand, the sharing of egoistic value orientations reduces the moral obligations to act pro-environmentally (Study 2) as well as reduces both the endorsement of environmental beliefs and the moral obligations to act pro-environmentally (Study 3). These results support the reasoning of the value-belief-norm theory (Stern, 2000) that the salience of self-transcendence and self-enhancement values due to environmental challenges influence the relevance of value-congruent information (i.e., environmental beliefs) and moral obligations (i.e., personal norms) to act pro-environmentally. Thus, our results do not only support our hypothesis that biospheric and altruistic value orientations are directly and indirectly positively and egoistic value orientations are directly

and indirectly negatively related to pro-environmental behaviour through environmental beliefs and personal norms (Hypothesis 1) but also replicate previous findings supporting the interrelatedness between value orientations and pro-environmental behaviour through environmental beliefs and personal norms (De Groot & Steg, 2010; Stern et al., 1999; Steg & Vlek, 2009).

Extending previous research, our findings imply also that the interplay between value orientations and pro-environmental behaviour through environmental beliefs and personal norms is conditional upon social factors such as social class, cultural orientations, and social norms. More specifically, the present research does not only provide evidence that social class and cultural orientations (Study 2) as well as descriptive and injunctive pro-environmental social norms (Study 3) explain pro-environmental behaviour directly but also that these social factors determine the effects of value orientations on pro-environmental behaviour through environmental beliefs and personal norms. For instance, social class and cultural orientations (Study 2) and social norms (Study 3) significantly contributed to explaining additional variance in pro-environmental behaviour. These results supported Hypothesis 2, Hypothesis 4, and Hypothesis 10 which proposed that the consideration of social class, cultural orientation, and social norms improve the predictive power of the value-belief-norm model in explaining pro-environmental behaviour, respectively.

More importantly, the present results revealed also that some of the interplays between value orientations and pro-environmental behaviour through environmental beliefs and personal norms are indeed conditional upon social class (Studies 2 and 3) and cultural orientations (Study 2) as well as descriptive and injunctive pro-environmental social norms (Study 3). For instance, our findings suggest that the effect of *biospheric value orientation* on pro-environmental behaviour through environmental beliefs is conditional upon social class in that this effect was found in upper social class individuals but not in low social class individuals

(Study 3). Likewise, the effect of biospheric value orientation on pro-environmental behaviour through environmental beliefs was also conditional upon both descriptive and injunctive pro-environmental social norms, in that this effect was only found to be significant in participants who perceive pro-environmental social norms as less commonly shared and practised by relevant others (descriptive social norms), and that this effect was only found to be significant in participants who perceive pro-environmental social norms as disapproved by relevant others (injunctive social norms) (Study 3).

Furthermore, the present findings imply that the effect of *altruistic* value orientation on pro-environmental behaviour *through personal norms* is conditional upon social class (Study 2) and cultural orientation (Study 2) and the effect of altruistic value orientation on pro-environmental behaviour *through environmental beliefs* is conditional upon social class (Study 3), as well as descriptive and injunctive pro-environmental social norms (Study 3). More specifically, it was found that the effect of altruistic value orientation on pro-environmental behaviour through personal norms was only significant in low social class participants and participants with average harmony-cultural orientations (Study 2). In Study 3, the effect of altruistic value orientation on pro-environmental behaviour through environmental beliefs was conditional upon social class as well as descriptive and injunctive pro-environmental social norms in that the effect was significantly stronger in upper social class participants and *only significant* in participants who perceive pro-environmental social norms on average shared and practised by relevant others (i.e., medium) and in participants who perceive pro-environmental social norms as strongly approved by relevant others (Study 3).

Likewise, the effect of egoistic value orientation on pro-environmental behaviour through personal norms was conditional upon social class (Study 2) in that the effect was only negatively statistically significant in participants from low social class. The effect of egoistic value orientation on pro-environmental behaviour through personal norms was also conditional

upon cultural orientations in that the negative effect was increasing in participants who shared medium and strong harmony-cultural orientations (Study 2). We further found moderation effects of social class and social norms on the effect of egoistic value orientation and pro-environmental behaviour through environmental beliefs (Study 3). More specifically, the *negative* indirect effect of egoistic value orientation was found in upper social class participants, in participants who perceive pro-environmental social norms on average and rather commonly shared and practised by relevant others, and in participants who perceive pro-environmental social norms as strongly approved by relevant others (Study 3).

Although Study 2 and Study 3 provided empirical evidence that social class, cultural orientations, and social norms are important social factors that influence the interplay between value orientations, beliefs, personal norms, and pro-environmental behaviour, the present findings are at best described as ambiguous concerning the assumptions proposed in Hypotheses 3, 5 and 11. For instance, concerning social class, it was hypothesized that direct and indirect effects of biospheric, altruistic, and egoistic value orientations on pro-environmental behaviour through environmental belief and personal norms are conditional upon social class in that the *positive* direct and indirect effects of altruistic and biospheric value orientations on pro-environmental behaviour should be stronger in low than in upper social class individuals, whereas the *negative* direct and indirect effect of egoistic value orientation should be stronger in upper than in low social class individuals (Hypothesis 3). Our results revealed that neither in Study 2 nor Study 3 any of the direct effects of value orientations on pro-environmental behaviour was conditional upon social class. The only finding supporting Hypothesis 3 was that social class influenced the indirect effect of *altruistic value orientation* on pro-environmental behaviour through personal norms in that the positive effect was only found in low social class but not in upper social class individuals (Study 2). However, most other findings contradicted the assumptions in Hypothesis 3. For instance, the positive indirect

effect of *altruistic value orientation* on pro-environmental behaviour through environmental beliefs was significantly stronger in participants from upper social class than low social class. Likewise, the positive indirect effect of *biospheric value orientation* on pro-environmental behaviour through environmental beliefs was found in upper social class individuals but not in low social class individuals (Study 3). Also, the negative indirect effect of *egoistic value orientation* on pro-environmental behaviour through personal norms was only found in participants from low social class than in participants from upper social class (Study 2) – which contradicted our prediction. These contradictory results might result from the fact that the indicators used to assess objective social class (i.e., income) might not be viable in the context of university students as some of the participants do not have a permanent source of income, which, is worth considering in future research endeavours.

Our results concerning *social class* have three main implications. Firstly, they imply that upper and low social class individuals differ indeed in terms of psychological tendencies. Secondly, our results suggest that the endorsement of environmental beliefs elicited by self-transcendence values assumes accessibility to discourses that shape environmental beliefs – which, in a societal context like the University of Addis Ababa (where inequality of access to material resources is a reality for students), might be reserved for students with better social and economic opportunities (i.e., upper social class). Thirdly, in the absence of discourses that shape environmental beliefs, moral obligations (i.e., personal norms) to act pro-environmentally might be even more sensitive to values.

Concerning cultural orientation, it was hypothesized that the *positive* direct and indirect effects of altruistic and biospheric value orientations on pro-environmental behaviour should be stronger in individuals with harmony-cultural orientation, whereas the negative direct and indirect effect of egoistic value orientation should be stronger in individuals with mastery-cultural orientation (Hypothesis 4). Although we found moderation effects of cultural

orientations – our findings contradicted the hypothesis. For instance, the positive indirect effect of *altruistic* value orientation through personal norm reached only significance in participants sharing average harmony-cultural orientation but not in participants who share less nor strong harmony-cultural orientation. Likewise, egoistic value orientations were indirectly related to pro-environmental behaviour through personal norms in participants who share medium to strong harmony-cultural orientations (Study 2). Our results concerning the role of cultural orientation should, however, be treated with caution because of possible measurement issues given that the used scale did not adequately distinguish between harmony-cultural and mastery-cultural orientations.

Concerning social norms, it was hypothesized that the *positive* direct and indirect effects of biospheric and altruistic value orientations are stronger in participants who perceive pro-environmental social norms as common (i.e., descriptive) and approved of (i.e., injunctive) in their groups than in participants who perceive pro-environmental social norms as less common and disapproved of, whereas the *negative* direct and indirect effects of egoistic value orientation on pro-environmental behaviour is stronger in participants who perceive pro-environmental social norms as uncommon (i.e., descriptive) and disapproved of (i.e., injunctive) than in participants who perceive them as common and approved of (Hypothesis 11). Our findings did not support our reasonings of Hypothesis 11. However, they revealed interesting trends as they point towards distinct implications. For instance, it was found that the *positive* effect of biospheric value orientation was only significant in participants who perceive pro-environmental social norms as less commonly shared and practised by relevant others and who perceive pro-environmental social norms as disapproved by relevant others; whereas the *positive* effect of altruistic value orientations was only significant in participants who perceive pro-environmental social norms on average shared and practised by relevant others (i.e., medium) and in participants who perceive pro-environmental social norms as strongly

approved by relevant others. On the other hand, the *negative* effect of egoistic value orientation was found in participants who perceive pro-environmental social norms on average and rather commonly shared and practised by relevant others and who perceive pro-environmental social norms as strongly approved by relevant others (Study 3). The implications resulting from these findings are the following: firstly, in the absence of descriptive and injunctive pro-environmental social norms, biospheric value orientations play an important role in influencing pro-environmental behaviour either directly or indirectly through environmental beliefs. Secondly, the presence of descriptive and injunctive pro-environmental social norms seemingly elicits either that individuals conform with these social norms (e.g., through altruistic values) or show some reactance towards these social norms (e.g., through egoistic values).

We assessed in the present research, furthermore, the role of environmental information, age, gender, and geographic origin of the participants. It was found that environmental information from family/community is positively related to pro-environmental behaviour (Study 1), which supports previous research showing that information from credible sources plays a pivotal role in fostering pro-environmental behaviour (Steg & Vlek, 2009; Zorić & Hrovatin, 2012). We further found a rather weak and negative age effect (Study 2), a gender effect (Study 2) but no effect of geographic origin (Study 1). The gender effect implies that females reported more propensity to pro-environmental behaviour than males, which was in line with Hypothesis 8. Additional analyses also revealed the interplay between environmental information and gender. More specifically, we found that the relationship between biospheric value orientation and pro-environmental behaviour was conditional on the level of environmental information from family/community as a source for females but not males. These results imply that the more female participants are exposed to environmental information at the family/community level, the stronger the effect of biospheric values on pro-

environmental behaviour – which highlights the importance of environmental information in boosting people's awareness about environmental issues (e.g., Abrahamse et al., 2005).

Overall the findings of the present research contribute to existing research and extend our understanding of pro-environmental behaviour. Firstly, the findings of the three studies provided evidence for the relevance of the value-belief-norm theory in explaining pro-environmental behaviour. For instance, the psychological constructs of the value-belief-norm theory jointly explained a significant proportion of variance in pro-environmental behaviour across the three studies (ranging from 26% to 56%). These findings are consistent with previous studies, which assessed the effects of value orientations, environmental beliefs, and personal moral norms on pro-environmental behaviour (e.g Stern et al. 1999; Bamberg & Möser, 2007). Furthermore, the present multi-study design in testing the value-belief-norm theory also revealed that the contributions of the different psychological factors (i.e., values, beliefs, and social norms), as well as their interrelatedness, varied across the three studies. These findings imply and support our reasoning that values, beliefs, and personal norms do not exist in a social vacuum (Tajfel, 1972). Or to put it differently, as Stern (2000, p. 413) argued although different environmental challenges determine different psychological states such as values, one could equally argue that the resulting psychological processes such as the endorsement of environmental beliefs and/or the elicitation of moral obligations to act pro-environmentally are determined by social factors such as social class, cultural orientations, and social norms. Given that the value-belief-norm theory has been criticized for consisting only of intra-individual psychological variables, the current research addressed this limitation (Stern, 2000, p. 418) by systematically assessing the effects of social context. The social context was conceptualized as social class, cultural orientation, and social norms - by which we aimed to capture its complexity.

Consequently, the second contribution of the present research is to provide first evidence about the role of social class in explaining pro-environmental behaviour from the perspective of the value-belief-norm theory. Researchers increasingly agree that social class shapes people's social cognitions, emotions, and behaviours (Kraus et.al., 2012; Manstead, 2018; Easterbrook et al., 2019). For instance, Kraus, Côté, & Keltner (2010) showed that although lower social class individuals have fewer resources, are more exposed to threats such as uncertainty in employment, housing, safety, and health, and face a reduced sense of control, they appear to be more concerned with the needs of others. Our findings that the positive indirect effect of *altruistic value orientation* on pro-environmental behaviour through personal norms was found in low social class individuals (Study 2), whereas the positive indirect effect of *altruistic value orientation* on pro-environmental behaviour through environmental beliefs was found in upper social class individuals but not in lower social class individuals. These results correspond with the findings of Kraus et al. (2012) in that considering the needs of others (i.e., altruistic value orientation) leads to pro-environmental behaviour in low social class individuals because they feel morally obliged. In contrast, upper social class individuals act pro-environmentally due to their consideration of the need of others (i.e., altruistic value orientation) because of their beliefs about the environment. While low social class individuals rely on moral considerations, upper social class individuals rely on their beliefs about the environment to act pro-environmentally. The latter might be more resource-intensive than the former. Although lower social class individuals are more concerned about the needs of others than upper social class individuals (Kraus et al., 2012), our results also imply that self-enhancing values might prevent this trend. Our results imply that even though social class might determine whether participants act pro-environmentally, it determines - all the more *why* individuals act pro-environmentally. The latter is important for any intervention which should be informed by the different motivations that drive upper and lower social class individuals.

A third contribution of the present research refers to the role of cultural orientations in explaining pro-environmental behaviour from the perspective of the value-belief-norm theory. For instance, the inclusion of cultural orientation into value-belief- norm theory improved the predictive power of the model by explaining more variance of pro-environmental behaviour. This result is consistent with the previous research that investigated the influence of cultural dimensions on pro-environmental behaviour (e.g., Schwartz, 2006; Stern, 2011). More specifically, previous research reported that people's cultural values help frame environmental beliefs/attitudes and predict tendencies for environmentally responsible behaviour (Hofstede, 2001). However, the results concerning the question of *how* the harmony-mastery value dimension (Schwartz, 2006), influences the relationships between values, environmental beliefs, personal norms, and pro-environmental behaviour were rather ambiguous. This ambiguity can be attributed to the fact that participants in the present study expressed rather harmony-cultural orientations rather than mastery-cultural orientations. This finding implies that cultural orientations are sensitive to the social and cultural context in which they are assessed. Thus, future research that aims at assessing the role of cultural orientations in explaining pro-environmental behaviour might benefit to apply different concepts and assessment tools – particularly in non-WEIRD contexts such as Ethiopia where previous research on cultural orientations as related to environmental problems is limited (or not existing). Pertinent to this point, Schwartz (2006) argues that national culture influences socio-economic, political, and demographic factors and that reciprocally it is influenced by these factors. Likewise, Luria et al. (2016, p. 1051) outlined the strong impact of national culture on social norms, power distance, uncertainty acceptance, and interpersonal communication. Thus, cross-cultural differences when studying the impacts of cultural orientation on pro-environmental behaviour are necessary and important to be considered in future research.

A fourth contribution of the present research is to provide further evidence about the important role of social norms in explaining pro-environmental behaviour. Previous studies reported that social norms are important social factors that influence a wider spectrum of human attitudes and behaviour including pro-environmental behaviour (e.g., Cialdini & Jacobson, 2021; Nigbur et al., 2010). Although the importance of descriptive and injunctive social norms concerning pro-environmental behaviour has been studied extensively in the context of developed countries, little is known in the context of developing countries (Farrow et al., 2019). In response to this gap, the current research explored whether and how descriptive and injunctive social norms influence the interplay between values, beliefs, and personal moral norms in explaining pro-environmental behaviour (Study 3). The results of the present research suggest that in the *absence* of social norms, people's pro-environmental behaviour is strongly influenced by their value orientations, whereas in the presence of social norms, the shared values seemingly determine whether people *conform* with or *respond with reactance* to these social norms. One could speculate that whether people conform might be influenced by whether personal values are in line with these social norms. In line with this explanation, one could further argue that whether social norms or personal values dominate depends on the degree to which people identify with the social groups and, therefore, with their social norms (Fritsche et al., 2018). It is, however, also important to keep in mind that social norms are constantly re-constructed and deeply rooted in the social context. Or to cite Rabinovich et al. (2012, p. 552), "what is normative for *us* depends on who *they* are". Future research should consider different intergroup contexts as the current study did not capture the context of Ethiopia as a nation, which is highly diverse concerning language, culture and norms. It is this diversity of Ethiopians that determines their lived experience. Our proposal resonates with the reasoning of Fritsche et al. (2018, p. 246) that people's environmental appraisals and responses are largely shaped by their social identity (e.g. religious, ethnic or other local community

groups) and when employed as a basis for framing environmental goals (e.g., green and clean village) should increase people's willingness to protect collectively the environment.

Fifthly, although limited in the context of higher education institutions, the present research contributes to research on pro-environmental behaviour in Ethiopia. As mentioned elsewhere, the majority of environmental research in Ethiopia addresses biophysical, socio-economic, and infrastructure aspects, whereby little or no attention has been given to the psychological dimensions such as attitudes, values, beliefs, norms and contextual dimensions influencing the propensity of environmental protection among Ethiopians. In line with this observation, Dibie (2001, p. 12), who examined the environmental policies of Ethiopia and Botswana, concluded that these policies were unsuccessful in both countries because of, among other reasons, the failure of the national governments to consider the human-environment interaction as well as to actively include indigenous people to participate in environmental protection programs. Thus, the findings of the present study provide some directions to policymakers in adapting environmental policies that strategize behavioural change. Moreover, the findings of the present study might provide also some insights on designing pro-environmental communication strategies by stressing both descriptive and injunctive social norms to induce behavioural change. Various researchers underlined that behavioural change is more likely to occur when descriptive and injunctive norms are congruent (e.g., Crowy et al., 2010; Culiberg et al. 2015; Smith et al., 2012). For example, a widespread injunctive norm of waste disposal practices in a given community may co-occur with a descriptive norm in favour of littering behaviour in the same community. Household surveys could identify these contradicting norms and inform the use of normative communication strategies to foster pro-environmental behaviour.

Furthermore, the present research provides information that might be useful for higher education institutions to design pro-environmental interventions focusing on the improvement

of energy conservation and waste management on campus. For instance, the University of Addis Ababa might develop communication strategies to make injunctive and descriptive pro-environmental norms more salient among students, which might eventually become part of being a student of this (or another) university. Towards this end, the university may intentionally instil energy-saving behaviour among its students through messages stating, for instance, that students *should* switch off the light before going to bed as a symbol of responsible citizens or the messages could state that the majority of students of the University of Addis Ababa switch off their lights before going to bed. Likewise, the messages could also state that students *should* not litter as responsible citizens or that the majority of students of Addis Ababa do not litter. Likewise, the university could strengthen self-transcendent values among its students through appropriate communication campaigns and provide a conducive environment of discourses on pro-environmental behaviour through seminars, workshops or other academic activities (e.g student groups) which would provide a context that supports the endorsement of environmental beliefs. For instance, the University of Addis Ababa could establish environmental clubs with the main purpose of designing and coordinating specific activities that help foster biospheric and altruistic values among students. Such initiatives and interventions do not only offer various opportunities for learning about climate change and related mitigation and adaptation strategies within higher education institutions but also for developing competencies and skills which are essential to enable active, reflective and cooperative participation toward sustainable development (Barth et al., 2015; Wang et al., 2013). The need for preparing university students to positively impact the larger society after graduation was indicated by Adomßent and Michelsen (2006, p. 87), who stated that "if our graduates are to cope creatively and successfully with society's most difficult problems, *such as environmental issues*, they must be exposed as students to those problems, and higher education needs to find innovative ways to develop students' capabilities". In a similar vein,

Rowe (2007) argues that universities should empower students to act in complex situations, which may require enabling them to reflect on their actions by taking into account current and future social and environmental effects.

Finally, the present research contributes to the body of research on pro-environmental behaviour that originates outside of WEIRD (i.e., western, educated, industrialized, rich, and democratic) nations, and thus contributes to developing the knowledge about pro-environmental behaviour in developing countries. More specifically, research on environmental and climate change issues originates mainly from the context of developed countries as indicated in many previous studies (e.g. Vicente-Molina et al., 2013; Cotton et al., 2016), while little is known about the determinates of environmental behaviour within the contexts of developing countries. Towards addressing this gap, the findings of the current research provided important inputs on psychological and social factors pertinent to pro-environmental behaviour. Increasing our knowledge about pro-environmental behaviour in developing countries will not only be of benefit locally but also globally as climate change is a large-scale crisis (i.e., a global risk) which is the result of collective behaviour and, therefore, requires to be solved *collectively* (Fritsche et al., 2018). Knowing the factors that foster pro-environmental behaviour in different socio-economic and cultural contexts, might allow acting in unity to address global problems such as climate change and environmental issues (e.g., Barth et al., 2015) by not only mobilizing resources but also acting collectively to achieve common goals for the well-being of humanity.

As with all research, the present research has various limitations. First and foremost, the present study included only students as participants which limits the external validity of the present research. Different from WEIRD countries where the proportion of students relative to the population ranges between 25 to 35 per cent, the proportion of students relative to the population in Ethiopia reaches not even 5 per cent. Even if the focus would be on the University

of Addis Ababa, another limitation would be that neither faculty members, university leaders nor support personnel were considered – even though they play important roles in the process of developing pro-environmental behaviour in higher education institutions.

Secondly, the study employed self-reported measurements to assess the principal constructs (e.g., values, beliefs, personal norms, social norms, and pro-environmental behaviour) which carries inherent limitations. For instance, previous research has indicated that self-reported measurements can significantly differ from direct observation methods (e.g. Chao & Lam, 2011). Armitage and Conner (2001) propose that self-reported measures vary as much as 14% from actual behaviour. Therefore, the deviation of self-reported from actual behaviour needs consideration not only when interpreting the results but also when deriving implications. Moreover, participants tend to respond inaccurately to the items due to social desirability (Bernardi, 2006) or they interpret the items differently (i.e., reference bias). The reference bias might be even stronger when participants are asked to respond to items that are not presented in their mother tongue. Related to the measurement limitations, is the limitation that we used self-reported behavioural intentions rather than self-reported behaviour. The former is only a proximation of participants' true intentions and consequent behaviour.

Likewise, some measurements did not correspond with the reality of the participants. For instance, students at the university might not have a permanent income which might have affected the relevance of the income variables for social class. In the same way, the used indicators of the housing condition (i.e., congested, decent versus luxury) were not defined which might have distorted the responses.

Thirdly, given that all three studies were conducted as cross-sectional surveys, we had to apply the *measurement of mediation design* (Pirlott & McKinnon, 2016) to analyze the data, which does not account for the causal chain between the values, beliefs, and personal norms. Consequently, although the value-belief-norm theory proposes a chain of effects, the results of

the present research cannot support this assumption. Thus, the internal validity is limited in the present research as causality cannot be confirmed but only excluded due to the lack of correlative relationships. Future research should therefore apply the experimental design and opt for the *manipulation of mediation design* (Pirlott & McKinnon, 2016). Alternatively, future research could apply a longitudinal design and use cross-lagged panel analysis to test for mediation effects. The application of experimental and longitudinal designs in future research would not only guarantee internal validity but also improve the quality of data that are anyway rare in non-WEIRD contexts such as Ethiopia.

Fourthly, the procedure to assess the moderator variables (i.e., social class, cultural orientations, and social norms) had also its limitations in the present study. For instance, cultural orientations and social norms were not assessed before the principal variables were measured. Thus, we cannot exclude the possibility that the assessment of previous measures did influence the responses to the moderator variables.

Lastly, the present research is limited as certain psychological constructs were not assessed which might have contributed to extending our understanding of *why* and *when* people act pro-environmentally. For instance, our conclusions about the role of social norms are limited as we did not control for the groups our participants had in mind when answering the social norm measures and the degree to which they identified with these groups. It would also have been interesting to include in the analysis information about participants' attitudes and their behavioural control. The latter is particularly important as social control concerning pro-environmental behaviour is context-dependent. For instance, deciding to get involved in environmental protection movements requires that such movements exist and are accessible. Likewise, we did not consider in the present research the construct of self-efficacy and collective efficacy beliefs which are strong predictors of pro-environmental mobility and general pro-environmental intentions (e.g., Jugert et al., 2016).

Irrespective of these limitations, the findings of the present research have various theoretical, policy, and practical implications for our current understanding of pro-environmental behaviour. Firstly, the present research has theoretical implications. By demonstrating that extending a psychological approach like the value-belief-norm theory by factors describing the social context in which people live (such as dormitory in university settings), extends our understanding of the complexity and dynamics related to pro-environmental behaviour. This approach is in line with the assertion of Stern (2000, p. 421) who stated that "environmentally significant behaviour is dauntingly complex, both in its variety and in the causal influences on it". Thus, providing valid and sufficient information about *why* and *when* people act pro-environmentally requires a systematic multi-dimensional and interdisciplinary research approach by amalgamating theoretical frameworks from different fields. This call for interdisciplinary research on environmental problems was already emphasized by Schoot Uitenkamp and Vlek (2007, p. 194) who argued that isolated disciplinary approaches or non-integrating approaches from separate fields are insufficient for an adequate understanding of rather complex problems such as climate change and for identifying adequate and effective solutions to mitigate and adapt to climate change.

Policy and practical implications result from our findings of the role of values, beliefs, and personal and social norms in influencing whether people act pro-environmentally as they imply that any regulation to change people's environment-related behaviours needs to consider both individual and collective needs. At the university level, conducive environmental contexts can be developed and maintained that allow students to initiate and engage in public discourses with the ultimate goal of building values, beliefs, and norms to care for the various environmental facets. For instance, the university could motivate each student to join environmental clubs during enrolment to contribute toward creating a green and clean campus. The environmental clubs should intentionally prepare a detailed plan whereby each student

acquires environmental protection knowledge and skills by participating in cleaning roads, participating in environmental awareness campaigns and getting involved in public discourse on environmental issues through, for instance, social media. Previous research indicated that engaging and enabling learners to enact principles, values and goals of environmental protection and sustainability will ensure ultimately societal transformation (e.g., Sipos, Battisti, & Grimm, 2008). Toward this end, the assessment tools used in the present research might also be adapted to conduct rapid assessments and identify barriers to fostering pro-environmental behaviour in one's university and define tailored strategies to overcome those barriers to pro-environmental behaviour.

Moreover, our findings present also possible inputs to design and enforce environmental policies and programs at a broader societal level. As Ethiopia has been facing different types of environmental challenges (e.g., deforestation, water, and electric energy conservation, waste disposal practices, etc.), the main impetus of environmental policy and programs, however, is geared toward biophysical and infrastructure aspects (e.g., afforestation, soil conservation, terracing construction, electrification, etc.), with no or little attention on psychological and behavioural dimensions (César & Ekbom, 2013; Colby Environmental Policy Group. 2011; World Bank Group, 2020). Therefore, the findings of the present research might at least contribute to sensitizing different actors to consider the human-environment interactions in the households, community, and institutional settings in their regulations. For instance, policies and regulations could enforce information initiatives through radio and TV to enhance people's knowledge of environmental issues, increase the awareness of the climate crisis, and promote alternative strategies and support to improve energy savings and reduce the use of firewood as a source of energy.

In conclusion, the present research underlines the relevance of the value-belief-norm theory in explaining pro-environmental behaviour in the context of developing countries like

Ethiopia. It also provides evidence that the social context of individuals matters *when* they appraise environmental challenges like climate change, which values are activated, whether environmental beliefs are endorsed, and whether they feel morally obliged to protect the environment. Furthermore, the present research showed that an integrated model to explain pro-environmental behaviour, which considers the fact that pro-environmental behaviour is influenced by a range of psychological and social factors as well as demographics, is superior to theories that focus on specific factors. Although psychological insights are important to understand and change peoples' environmental behaviours to mitigate and adapt to climate change, its entire impact will be only achieved if it is applied in concert with innovations in technology, governance, and politics that are globally shared and locally implemented.

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