

## **Correlates Of Pro-Environmental Behaviour –A Review And Web-Analysis**

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### **ABSTRACT**

Pro-environmental behaviour is a set of behaviours practiced by individuals that seek to take measured actions to promote positive changes in the environment. This type of behaviour can therefore be labelled as goal directed pro-environmental behaviour – behaviour which people adopt with the explicit goal of doing something beneficial for the environment. Pro-environmental behaviour includes recycling, conserving water, saving electricity, reusing, using public transportations or riding bikes or even walking, properly disposing of non-recyclable waste, using less paper when printing, and buying and/or consuming green products. The present study has been carried out with the following objective: to explore the correlates of the pro-environmental behaviour through literature survey. A literature search in different scientific databases was employed to identify studies that examine the link for pro-environmental behaviour, mainly from 2010 to 2021. In the present study different literatures were searched, followed by grouping of the articles of interest and a time scale respective web-analysis was done. The articles were grouped into six groups, and these six groups represent correlates of pro-environmental behaviour, where some of the articles represents more than one groups. The groups were: environmental awareness, beliefs, identity, psychological adaptations, personality and values.

**Keywords:** Environmental awareness, beliefs, identity, psychological adaptations, personality, values.

### **INTRODUCTION**

In the modern world, the global ecological crisis is becoming increasingly serious, and the contradiction between humans and nature is unprecedentedly intensified. Atmospheric warming, rising sea levels, extreme natural disasters, environmental pollution and other environmental problems are devastating human life and affecting economic and social development. Given that almost all environmental issues are caused directly or indirectly by humans, scholars and policymakers urge individuals to take responsibility for environmental protection (Fielding et al., 2008; Urien and Kilbourne, 2011; Vlek and Steg, 2007; Vilella-Vila and Costa-Font, 2008). The Rio Declaration, issued by the United Nations, states that solving environmental problems requires the participation of every member of the public. Therefore, inducing individual pro-environmental behaviors (PEBs) is an important challenge in the path of sustainable development (Gifford, 2011, Williams and Cary, 2002).

As the unprecedented scale and cumulative impact of human actions on the natural environment threatens the balance of the world's ecosystem, the accumulated evidence confirming large-scale environmental problems is undeniable. Since these environmental problems can be traced back to human behaviour, scholars have championed the role of psychological science to help understand and address global environmental change (Oskamp, 2000; Schmuck and Schultz, 2002; Swim et al., 2011; Van Lange et al., 2018). Contributing to this, research in environmental psychology has focused on identifying socio-psychological determinants of pro-environmental attitudes and behaviours (for meta-analytical reviews) (Bamberg and Moser, 2007; Hines et al., 1986, 1987; Klockner, 2013; Milfont et al., 2012).

Human behaviour plays a key role in the rise and severity of environmental problems, and drastic changes in human behaviour are needed to mitigate climate change (Dietz et al., 2009; IPCC, 2018). Pro-environmental behaviour is a set of behaviours practiced by individuals that seek to take measured actions to promote positive changes in the environment and limit the effects of human negligence (Carmi et al., 2015). In promoting pro-environmental behaviour, colleges, universities, and training centres play an essential role, since individual behavioural change can be easily fostered among young generations (Massaro et al., 2018; Ting and Cheng, 2017). Additionally, in the context of education, organizations are interested in having pro-environmental shifts due to their sustainability goals and implications towards student enrolment (Meyer, 2016).

Most research in environmental psychology focuses on studying pro-environmental behaviour, also referred to as environmentally friendly behaviour (Dolnicar and Grün 2009), ecological behaviour, or conservation behaviour (Scherbaum et al., 2008; Schultz et al., 2008). Pro-environmental behaviour has been defined as 'behaviour that consciously seeks to minimize the negative impact of one's actions on the natural and built world' (Kollmuss and Agyeman, 2002). This type of behaviour can therefore be labelled as goal directed pro-environmental behaviour – behaviour which people adopt with the explicit goal of doing something beneficial for the environment.

Pro-environmental behaviour includes recycling (e.g., reusing paper, plastic, glass, containers), conserving water (e.g., limiting the use of water when taking a shower or washing hands), saving electricity (e.g., turning off lights when not needed), reusing (e.g., disposable cups), using public transportations or riding bikes or even walking, properly disposing of non-recyclable waste, using less paper when printing (e.g., double-sided printing), and buying and/or consuming green products (Bissing-Olson et al., 2016). Unfortunately, pro-environmental behaviours can be more expensive, more time-consuming, and less pleasurable than their environmental-harmful alternatives (Steg et al., 2014). Hence, acting pro-environmentally tends to (but does not always) oppose one's self-interest; at least in the short run.

Vicente-Molina et al. (2018) opined, pro-environmental behaviour can be changed by public-sphere behaviour (e.g., public policies). Pro-environmental behaviour can be directly affected by the private and public spheres, with examples including consumption of green products, use of public transportation, and recycling. Individuals' intention to practice responsible environmental behaviour is not only influenced by personal beliefs but by others' behaviours and actions. In the university setting, as Vicente-Molina et al. (2018) presumed, pro-environmental behaviour among students can be promoted by university' plans and actions, such as providing disposable containers or offering environmental-related subjects.

A growing number of studies have employed multilevel designs that allow simultaneous examination of the societal and contextual constraints on people's pro-environmental behaviour (Milfont and Markowitz, 2016). This approach still centres on individual action as the focal driver of environmental protection. Recent study have thus emphasized the importance of collective action in conjunction with individual action to effectively overcome global environmental change (Bamberg et al., 2015; Fritsche et al., 2018). Indeed, the scale and unprecedented nature of global environmental change requires collective efforts that involve people from across national and cultural boundaries.

Environmental psychology largely uses the same quantitative and qualitative methods as other psychological disciplines. However, whereas other psychological disciplines often have one dominant research paradigm, environmental psychology is characterized by the use of a wide diversity of methods. Each research method has its strengths and weaknesses. Choosing a method typically involves a trade-off between internal and external validity. Internal validity reflects the extent to which cause-effect relationships can be established. External validity reflects the extent to which the results of a study can be generalized to other populations or settings. The main research methods used in environmental research include questionnaire studies, laboratory experiments, simulation studies, field studies, and case studies.

The present study has been carried out with the following objective: to explore the correlates of the pro-environmental behaviour through literature survey. In the present study the literature search in different scientific databases was employed to identify studies that examine the link for pro-environmental behaviour.

## **METHOD**

In the present study the different literatures were searched, followed by grouping of the articles of interest and a time scale respective web-analysis was done.

### **A. Literature search:**

A literature search in different scientific databases was employed to identify studies that examine the link for pro-environmental behaviour, mainly from 2010 to 2021. Relevant studies in Science Direct, EBSCOhost, google scholar, Web of Science was systematically searched using keywords: pro-environmental behaviour, environmentally responsible behaviour, environmental psychology. Relevant papers in key journals were also searched such as Journal of Environmental Psychology; Agriculture and Human Values; Resources, Conservation & Recycling; Journal of Cleaner Production; Science of the Total Environment; Ecological Economics; Tourism Management Perspectives; Journal of Business Research; Journal of Ecological Research; and used the Pro-quest database for searching unpublished dissertations and theses. The search for papers was considered complete when various databases provided no more new papers on the topic.

### **B. Inclusion and exclusion criteria:**

The following inclusion and exclusion criteria were included in this web-analysis:

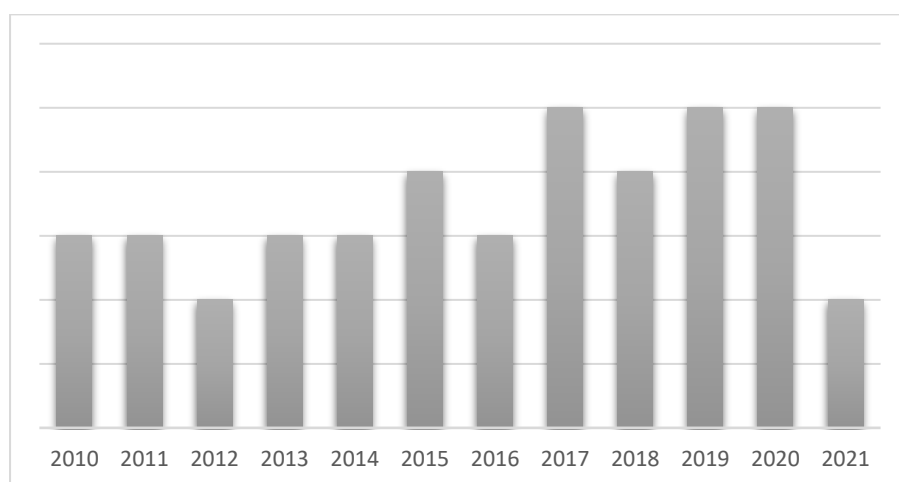
- (1) except for dissertations and theses, these articles had to be published in peer-reviewed international journals,
- (2) the articles were written in English,
- (3) the studies had followed standard statistical analysis (where applicable) of pro-environmental behaviour.

The articles were grouped into six groups, where some of the articles represents more than one groups. The groups were: environmental awareness, beliefs, identity, psychological adaptations, personality and values.

## RESULT AND DISCUSSION

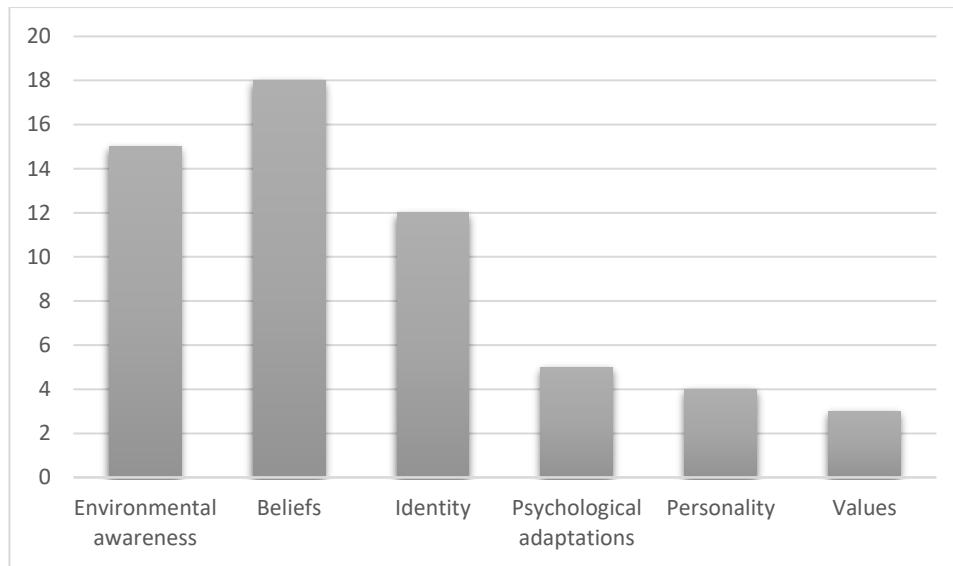
For the literature survey, a time scale analysis of the published articles on environmental psychology from Science direct was done from the year 2010-2021. The search revealed 373 published articles in 2010, 348 articles in 2011, 494 articles in 2012, 551 in 2013, 670 in 2014, 800 in 2015, 815 in 2016, 850 in 2017, 1075 in 2018, 1174 in 2019, 1300 in the year 2020, and 300 in the month of January-February 2021.

Among all the articles, only 1035 literature was found relevant for the objectives of the present study for understanding the correlates of the pro-environmental behaviour. Further, only 42 research articles (articles of interest) matched all the criteria of exclusion and inclusion of the study design. The articles were published mainly in 2020-2021 and majority of studies were published in environmental psychology journals. A time scale analysis of the article of interest was also done from 2010 to 2021 (Fig. 1).



**Fig. 1: Time scale analysis of article of interest from 2010-2021.**

Heuristically, the correlated variables are broadly grouped under six categories- namely: environmental awareness, beliefs, identity, psychological adaptations, personality, values. Among the all 42 articles of interest, some of the article includes more than one groups. The number of articles that met the criteria of these groups were: 15 for environmental awareness, 18 for beliefs, 12 for identity, 5 for psychological adaptations, 4 for personality and 3 for values (Fig. 2).

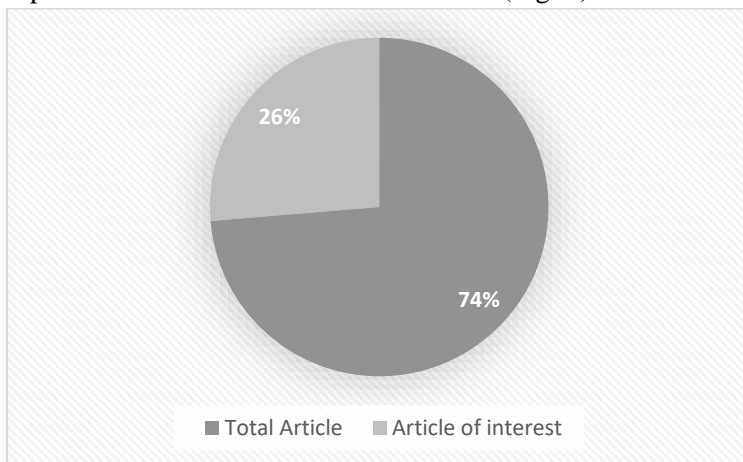


**Fig. 2: Graphical representations of the six groups (Y axis represents number of the articles).**

**Environmental awareness:**

Environmental awareness can be defined as to aware of the natural environment and to make choices that benefit the earth and natural environment, rather than harm it. The ways to practice environmental awareness include using safe and non-toxic building supplies, conserving energy and water, recycling, activism, and others. Pro-environmental behaviour is a set of behaviours practiced by individuals that seek to take measured actions to promote positive changes in the environment and limit the effects of human negligence (Carmi et al., 2015). These behaviour include: water saving, plant conservation, energy condervation, green transport, green buying and waste management.

Among these six groups, 15 articles out of all studied reflects environmental awareness studies, which represents 26% of the total studied article (Fig. 3).



**Fig. 3: Graphical representations of articles on environmental awareness.**

The study by Donmez-Turan and Kılıçlar (2020) was aimed at explaining pro-environmental behaviour based on ecological worldviews of individuals and goals that the individuals desire to achieve with their environmental knowledge. It was also estimated that the individuals who had environmental training

would exhibit voluntary pro-environmental behaviour 4.7 times more than those who did not have any training.

Another study by Tianyu and Meng (2020) was aimed to offer an integrated research between environmental improvements and personal educational attainment. The study was carried out in Chinese populations driving force behind the rapid development lies in the enforcement of relevant education policies. Result clearly revealed that that governmental efforts on public education can contribute to environmental protection by promoting public supports. Increasing the fiscal expenditure on education may have a long-term positive effect on environmental protection (Tianyu and Meng, 2020).

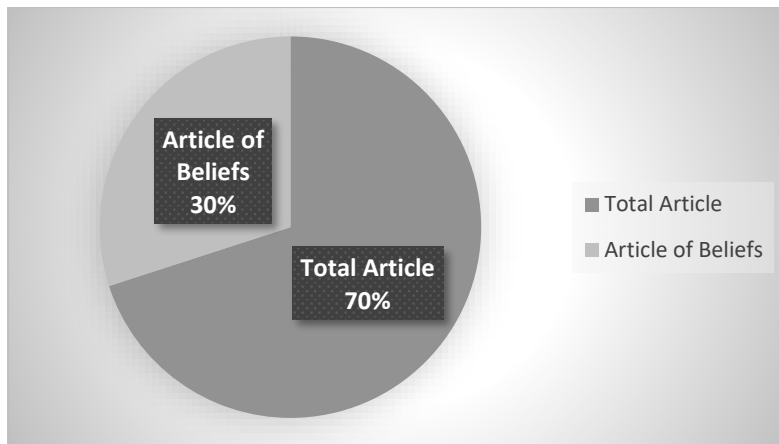
Another empirical study was conducted in the Beijing-Tianjin-Hebei (BTH) region in China by Liping et al. (2019) to reduce the negative effects of the accelerating use of RFT (Road Freight Transportation Industry). Results revealed a high level of perceived policy effectiveness facilitates the transformation of awareness into behavior, bridging the awareness–behavior gap. Study confirmed the importance of environmental awareness and effective incentive policies in encouraging pro-environmental RFT behavior. The conclusions of the study also aid researchers’ understanding of environmental awareness and pro-environmental behavior in China’s RFT, and compel transport policy makers and managers to implement more effective measures that promote environmentally sustainable RFT.

The study of Yusliza et al. (2020) aimed to answer the research question of whether environmental commitment, environmental consciousness, green lifestyle, and green self-efficacy significantly affects the practice of pro-environmental behaviour. This study examined the direct influence of environmental commitment, environmental consciousness, green lifestyle, and green self-efficacy on pro-environmental behaviour (Yusliza et al, 2020).

### **Beliefs:**

A belief is an attitude that something is the case, or that some proposition about the world is true (Primmer, 2018). It is an acceptance that something exists or is true, especially one without proof. Mainstream psychology and related disciplines have traditionally treated belief as if it were the simplest form of mental representation and therefore one of the building blocks of conscious thought. Individual’s behaviour and attitude towards nature majorly influenced by their beliefs (Khare, 2015; Vicente-Molina et al., 2018). Many times without proper knowledge and awareness people do good/bad things towards the environment depending on their beliefs. These type of beliefs can be individual or may be societal or religion dependent, for example food-related environmental beliefs and behaviours.

The major group was studies on beliefs comprising 18 articles and represents 30% of the total studied article (Fig. 4).



**Fig. 4: Graphical representations of articles on beliefs.**

Individuals' intention to being ecologically friendly may be influenced by their beliefs, motives, and commitment to the environment (Khare, 2015). Pro-environmental behaviour may be influenced by various aspects (Vicente-Molina et al., 2018), such as socio-demographics such as gender, age or residence, political perspective, values, and beliefs about life (Panno et al., 2018). The results lend support to the arguments of the TPB model in that students' environmental beliefs and values shape their attitudes that subsequently lead to intended environmental behaviours that further drive them to practice pro-environmental behaviour.

Efficacy beliefs are important drivers of human behavior (Hamann and Reese, 2020). In the sustainability domain, self-, collective, and participatory efficacy tend to predict pro-environmental behavior (PEB). Few studies consider efficacy actors and goals simultaneously, and it is uncertain whether specific efficacy beliefs are more or less predictive of specific PEB types (i.e., private, public, or activist). In the study of Hamann and Reese (2020) the manipulations did not affected goal efficacy beliefs or PEB intentions, goal efficacy beliefs and positive affect predicted PEB intentions, and specific efficacy behavior patterns occurred. Study highlighted the importance of differentiating actors and goals in efficacy research and behavior types in general.

Within this context, several studies have explored students' pro-environmental behaviour, including food-related environmental beliefs and behaviours (Arvai, 2015). The purpose of the study of Arvai (2015) was to document the food-related environmental beliefs and behaviours of undergraduate university students. More specifically, this research was focussed on determining if environmental sustainability is a consideration in students' food choices, identifying the specific choices and behaviours adopted to reduce their food-related environmental footprint, and documenting the role of gender and pro-environmental values in these food-related environmental beliefs and behaviours. Results from focus group discussions revealed a broad array of beliefs and behaviours related to the connection between food, food production and the environment. The survey confirmed these results, but indicated a preference for such actions as recycling and reducing food waste in contrast to such alternatives as reducing meat consumption or avoiding processed foods. These results suggested that educational campaigns could focus on strengthening beliefs about the food-environment connection, as well as help to empower students to take a greater variety of actions to reduce their food-related environmental footprint (Arvai, 2015).

The research of Panno et al. (2018) was aimed at consolidating and expanding previous knowledge by proposing that mindfulness is related to both pro-environmental behavior and belief in global climate

change through social dominance orientation (SDO). Moreover, in the study, a measure of belief in global climate change was adopted as a further outcome. Again, trait mindfulness was related to both pro-environmental outcomes through SDO.

In a study of Sharma and Gupta (2020) the understanding of pro-environmental behaviour (PEB) of tourists visiting protected areas was imperative to mitigate the negative effects of tourism on environment. This study provided empirical support for value-belief-norm (VBN) theory in context of nature based tourists visiting national park in India. The findings indicated that biospheric value has the highest impact on new environmental paradigm, whereas egoistic value negatively influenced new environmental paradigm. Awareness of consequences and ascription of responsibility significantly predict pro-environmental personal norms which statistically predict pro-environmental behaviour of nature based tourists. Specific recommendations for policy makers were suggested to encourage pro-environmental behaviour among tourists (Sharma and Gupta, 2020).

In a previous study of the same author Value Belief Norm theory was tested (Gupta and Sharma, 2019). The aim of the study was to investigate the factors which influence the adventure tourists' intentions to behave pro-environmentally. The results of the study confirmed that value belief norm model predicts adventure tourists' pro-environmental intention. Result found that the biospheric and altruistic value has direct positive relation with new environmental paradigm and indirect positive relation with awareness of consequences, ascription of responsibility, personal norms and pro-environmental behavioural intentions. Further, the result of the study showed that personal norm is the largest predictor of pro-environmental behaviour of adventure tourists (Gupta and Sharma, 2019).

This study of Blok et al. (2015) aimed to identify factors that predict pro-environmental behaviour and it was one of the first studies focussing on pro-environmental behaviour in the workplace. The study revealed that leadership support has a significant positive relation with employee's behaviour and employee's intention to act. In order to enhance more sustainable behaviour in households, a model was tested among employees of a green university in the Netherlands. Based on the results of this study, it was concluded that the theory of planned behaviour can explain pro-environmental behaviour in the workplace. At the same time, the results showed that leadership support and exemplary pro-environmental behaviour are associated with value-belief-norm theory on employee's intention to act pro-environmentally. The findings of this study have various managerial implications for green companies and organizations in general and green universities in particular.

The goal of the study of Bamberg and Möser (2007) was to determinate pro-environmental behavioural intention and the impact of all other psycho-social variables. Results also confirmed that besides attitude and behavioural control personal moral norm is a third predictor of pro-environmental behavioural intention. It also indicated that problem awareness is an important but indirect determinant of pro-environmental intention. Its impact seems to be mediated by moral and social norms, guilt and attribution processes.

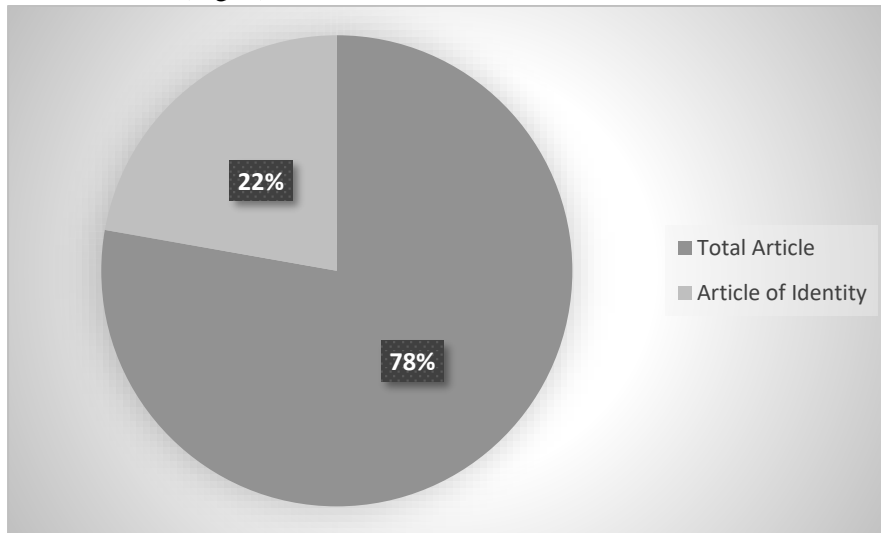
### **Identity:**

Identity can be considered as the set of qualities and beliefs that make one person or group different from others. It can be the distinguishing character or personality of an individual, the relation established by psychological identification, the condition of being the same with something described or asserted, or sameness of essential or generic character in different instances, sameness in all that constitutes the objective reality of a thing. In mother nature each and every organism poses its own identity by their



specific activity towards a particular goal. It can be self-identity or group identity. In environmental behaviour activities, cleanliness, plantation and go-green activities are associated with a persons' identity, and sometimes it is also related with nation identity in wide scale (Milfonta et al., 2020).

Further, 12 articles out of all studied reflects studies on identity, which represents 22% of the total studied article (Fig. 5).



**Fig. 5: Graphical representations of articles on identity.**

The finding by Jans (2021) did not only shed light on the formation of pro- environmental social identities, but also revealed that perceiving a pro-environmental initiative as formed by regular group members themselves enables pro-environmental social identity formation, motivating behaviour accordingly.

The research of Milfonta et al. (2020) examined representations of national identity and, in particular, the extent to which believing that being “clean and green” contributes to a distinct national identity relative to other qualities of being a ‘true’ New Zealander. Most importantly, whether this “clean and green” identity correlates with pro- environmental attitudes and intentions to act on behalf of the environment was investigated by Milfonta et al. (2020). Although being “clean and green” is a core component of New Zealand’s national imagery for many previous research had yet to examine the extent to which viewing environmental protection as central to national identity coincides with other characteristics of the nation and, more importantly, whether this view fosters individual and collective pro-environmental tendencies and actions. Accordingly, previous research has examined the role of national identity in influencing the appraisal of environmental issues and collective environmental actions (Bonaiuto et al., 1996; Schlicht-Schmalzle et al., 2018).

Individuals do not only act in their personal self-interest, as they derive part of their identity – their social identity – from their knowledge of, and emotional attachment to groups (Tajfel and Turner, 1979), such as their nationality or their community. When people define themselves in terms of a particular social identity, they internalize the content of this identity; it’s values, norms, and goals and aim to act in line with these group motivations and advance the interests of the group as a whole (Turner, 1991). Pro-environmental social identities can motivate individual and collective pro-environmental behaviours (Fielding and Hornsey, 2016; Fritsche et al., 2018). The stronger a group’s pro-environmental norms (Nolan et al., 2008), and the more a person identifies with this group (Masson and Fritsche, 2014), the more strongly this group membership can promote pro-environmental behaviour.

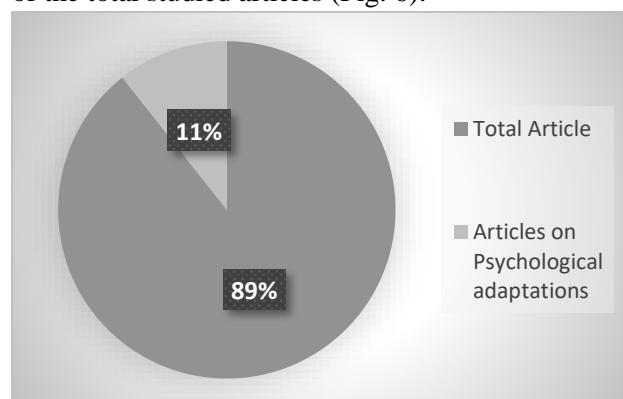
People's desire to maintain a positive and consistent sense of self can help explain the link between environmental self-identity and environmental behaviour. Self-discrepancy theory (Higgins, 1989) suggests that people strive for self-consistency, that is, consistency between their actual self (what they do), the valued self (their values and aspirations), and thought self (perceived norms). People will try to resolve any discrepancy they experience between these different aspects of the self, for instance by changing their behaviour. Similarly self-perception theory (Bem, 1972) suggests that people know who they are by looking at what they do. When people perceive a discrepancy between what they do and what (they say) is important to them, they will experience psychological discomfort: cognitive dissonance (Festinger, 1957), which is a powerful motivator for behaviour or attitude change.

A study tested under which circumstances initial pro-environmental actions can strengthen environmental self-identity and spill-over to other pro-environmental behaviours (Van der Werff et al., 2014). Environmental self-identity was in turn related to pro-environmental product choices. The stronger one's environmental self-identity, the more pro-environmental products participants preferred. Environmental self-identity mediated the relationship between the manipulation of past behaviour (comparing the group reminded of eight different environmental behaviours to the control group). These results show that reminding people of different environmental behaviours can strengthen environmental self-identity, which in turn increases pro-environmental product choices.

### **Psychological adaptations:**

A psychological adaptation is a functional, cognitive or behavioral trait that benefits an organism in its environment. Psychological adaptations fall under the scope of evolved psychological mechanisms (EPMs). Psychological adaptations include only the functional traits that increase the fitness of an organism, while EPMs refer to any psychological mechanism that developed through the processes of evolution. For example, xenophobic attitudes and behaviors, appear to have certain EPM influences relating to disease aversion, in many environments these behaviors will have a detrimental effect on a person's fitness. The principles of psychological adaptation rely on Darwin's theory of evolution and are important to the fields of evolutionary psychology, biology, and cognitive science. Psychological adaptation is highly influential in pro-environmental behaviour studies as it is the adjusting behavior to changing environmental demands, for example, climate change and psychological adaptation (Bradley et al., 2020). Evolution has shaped the brain to successfully deal with the physical and changes in the environment and the actual adaptation of behavior.

For the studies on psychological adaptations, the number of articles were 5 and they represented 11% of the total studied articles (Fig. 6).



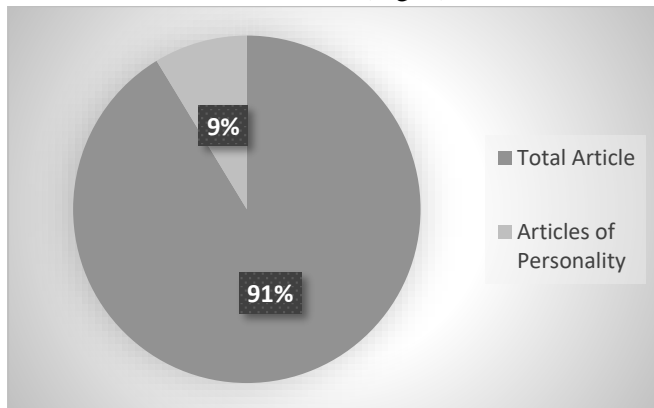
**Fig. 6: Graphical representations of articles on psychological adaptations.**

The research of Bradley et al. (2020) was aimed to develop and test a model of the antecedents of pro-environment behaviors and its (psychological) precursors, and use the information and insights thereby gained to recommend structural, psychological, and behavioral intervention strategies aimed at promoting pro-environmental behavior change. The study provided valuable insights into the processes underlying environmentally-relevant behaviors, strategies were recommended for promoting pro-environmental behavior through the enhancement of a green identity, response efficacy, and psychological adaptation.

**Personality:**

Personality is defined as the characteristic sets of behaviors, cognitions, and emotional patterns that evolve from biological and environmental factors (Corr and Matthews, 2009). Personality refers to individual differences in characteristic patterns of thinking, feeling and behaving. The study of personality focuses on two broad areas: one is understanding individual differences in particular personality characteristics, such as sociability or irritability. Trait-based personality theories, such as those defined by Raymond Cattell, define personality as the traits that predict a person's behavior. On the other hand, more behaviourally-based approaches define personality through learning and habits. Most theories view personality as relatively stable (Corr and Matthews, 2009). The definition of personality, in most theories, focus on motivation and psychological interactions with one's environment (Sadock et al, 2017).

Among these six groups, 4 articles out of all studied reflects studies on personality, which represents 9% of the total studied article (Fig. 7).



**Fig. 7: Graphical representations of articles on personality.**

Pro-environmental behaviour (PEB) is known to reflect people's social preferences, time preferences and risk preferences, and also personality. In a study by Fuhrmann-Riebela et al. (2021) found that social preferences matter mainly for saving-energy behaviour; time, risk and ambiguity preferences matter mainly for the consumption of plastics; and time and ambiguity preferences matter for expenditures on electricity. The insight that particular preferences matter for particular PEBs has important policy implications.

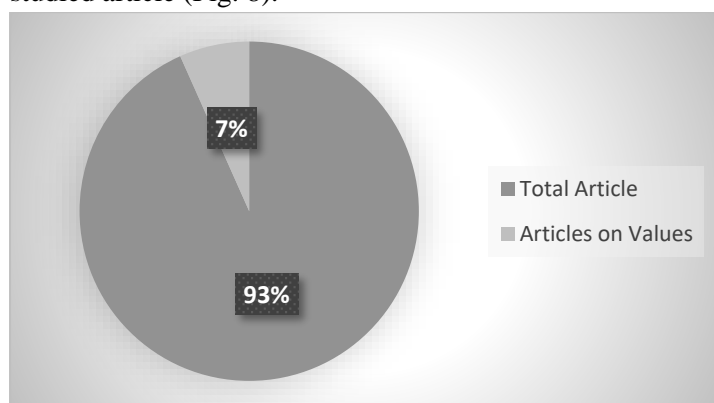
Pro-environmental behaviour may be seen as meaningful behaviour, and thereby feel good to engage in. It has been proposed that engaging in meaningful actions elicits a warm glow feeling (Andreoni,

1990), a positive feeling as a result of helping others. Interestingly, this warm glow feeling may be interpreted quite literally (Taufik et al., 2015).

### **Values:**

Values can be defined as broad preferences concerning appropriate courses of actions or outcomes. Values are the motive behind purposeful action. They are the ends to which individual act and come in many forms. Personal values are personal beliefs about right and wrong and may or may not be considered moral. Cultural values are values accepted by religions or societies and reflect what is important in each context. In ethics, value denotes the degree of importance of some thing or action, with the aim of determining what actions are best to do or what way is best to live (normative ethics). Values tend to influence attitudes and behavior and these types include ethical/moral values, doctrinal/ideological (religious, political) values, social values, and aesthetic values. Further, values influence various specific attitudes and behaviours (Seligman and Katz, 1996), and values provide an economically efficient instrument for describing and explaining similarities and differences between persons, groups, nations, and cultures. According to Steg and Judith (2019), values can be used in environmental behaviour research in a positive direction towards the goal of healthy environment.

For the studies on values 3 articles out of all studied were categorised and represents 7% of the total studied article (Fig. 8).



**Fig. 8: Graphical representations of articles on values.**

Values are ordered in a system of value priorities (i.e. they vary in importance), which implies that when competing values are activated in a situation, choices are based on the value that is considered most important. There are important advantages to using values in environmental behaviour research (Steg and Judith, 2019). First, the total number of values is relatively small compared to the countless behaviour-specific beliefs, attitudes, and norms. Consequently, values provide an economically efficient instrument for describing and explaining similarities and differences between persons, groups, nations, and cultures. Second, the abstractness of values allows for predictions in almost all contexts. Values influence various specific attitudes and behaviours (Seligman and Katz, 1996).

As a consequence, behaviour-specific attitudes and norms are generally better predictors of behaviour than are values (Eagly and Chaiken, 1993). Indeed, various studies showed that values mostly influence behaviour indirectly, via behaviour specific beliefs, attitudes, and norms (De Groot et al., 2016; Thøgersen et al., 2016). The value that is prioritized in a specific situation will be most influential for beliefs, attitudes, and norms (hence, behaviour).

Values are desirable trans-situational goals that vary in importance and serve as guiding principles in the life of a person or other social entities (Schwartz, 1992). This definition includes three key features of values. First, values include beliefs about the desirability or undesirability of certain end-states. Second, values are rather abstract constructs and therefore transcend specific situations. This is the main difference from 'goals'. A goal refers to a target that an individual strives hard to reach in his or her life. It is thus understood that goals remain a target until they are reached or achieved while values are there to be adhered to on a longer term. Third, values serve as guiding principles for the evaluation of people and events and for behaviours (Steg and Judith, 2019).

Environmental psychology is the discipline that studies the interplay between individuals and the built and natural environment. Human behaviour plays a key role in the rise and severity of environmental problems. Pro-environmental behaviour (whether goal-directed or not) differs from the broader term environmental behaviour. Most research in environmental psychology focuses on studying pro-environmental behaviour, also referred to as environmentally friendly behaviour, ecological behaviour, or conservation behaviour. Pro-environmental behaviour has been defined as 'behaviour that consciously seeks to minimize the negative impact of one's actions on the natural and built world'.

Environmental behaviour is often conceptualized as multidimensional. According to unidimensional measure of goal-directed pro-environmental behaviour, all behaviours regarding a specific goal (e.g. environmental conservation) can be ordered on one single dimension from easy to difficult with regards to reaching that goal. Values are desirable trans-situational goals that vary in importance and serve as guiding principles in the life of a person or other social entities. Social norms are 'rules and standards that are understood by members of a group, and that guide and/or constrain human behaviour without the force of laws'. Research shows that the extent to which people believe engaging in behaviour will elicit positive or negative emotions, so-called, anticipated emotions, can be an important predictor of whether they will act accordingly.

Extant research has identified various factors that affect pro-environmental behaviours. One of the factors is place attachment, defined as the cognitive and affective bond that people have with a place (Lewicka, 2011; Scannell and Gifford, 2010). The rationale is that the attachment to a place fosters a sense of belonging, which promotes engagement in civic activities including pro-environmental behaviour (Anton and Lawrence, 2014; Manzo et al., 2006; Uzzell et al., 2002). However, despite the increasing research attention on the link between place attachment and pro-environmental behaviour (Meloni et al., 2019; Song et al., 2019), the variances across individual studies have made it difficult to ascertain the overall impact of place attachment in promoting environmentally friendly behaviours.

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## **REFERENCES**

1. Andreoni J. Impure altruism and donations to public goods: a theory of warm-glow giving. *The Economic Journal* 1990;100(401):464–477.

2. Anton C.E & Lawrence C. Home is where the heart is: The effect of place of residence on place attachment and community participation. *Journal of Environmental Psychology* 2014;40:451–461.
3. Arvai V.C. Food-related environmental beliefs and behaviours among university undergraduates: A mixed-methods study. *Int. J. Sustain. High. Educ.* 2015;16:279–295.
4. Bamberg S., Moser G. Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology* 2007;27(1):14-25.
5. Bamberg S., Rees J., & Seebauer S. Collective climate action: Determinants of participation intention in community-based pro-environmental initiatives. *Journal of Environmental Psychology* 2015;43:155–165.
6. Bem D.J. Self-perception theory. In: *Advances in Experimental Social Psychology* (ed. L. Berkowitz), 1972; 1–62. New York, NY: Academic Press.
7. Bissing-Olson M.J., Fielding K.S. & Iyer, A. Experiences of pride, not guilt, predict pro-environmental behavior when pro-environmental descriptive norms are more positive. *J. Environ. Psychol.* 2016;45:145–153.
8. Blok V., Wesselink R., Studynka O. & Kemp R. Encouraging sustainability in the workplace: a survey on the pro-environmental behaviour of university employees. *Journal of Cleaner Production* 2015;106:55-67.
9. Bonaiuto M., Breakwell G. & Cano I. Identity processes and environmental threat: The effects of nationalism and local identity upon perception of beach pollution. *Journal of Community & Applied Social Psychology* 1996;6:157–175.
10. Bradley G.L., Babutsidze Z., Chai A. & Reser J.P. The role of climate change risk perception, response efficacy, and psychological adaptation in pro-environmental behavior: A two nation study. *Journal of Environmental Psychology* 2020;68:101410
11. Carmi N., Arnon S. & Orion N. Transforming environmental knowledge into behavior: The mediating role of environmental emotions. *J. Environ. Educ.* 2015;46:183–201.
12. Corr P.J., Matthews G. *The Cambridge handbook of personality psychology* (ed.). 2009; Cambridge: Cambridge University Press.
13. De Groot J., Thøgersen J. & Schubert I. Morality and green consumer behaviour: a psychological perspective. In: *Ethics and Morality in Consumption* (ed. D. Shaw, M. Carrington and A. Chatzidakis), 57–74. London, 2016; UK: Routledge.
14. Dietz T., Gardner G. T., Gilligan J., Stern P. C., & Vandenberg, M. P. Household actions can provide a behavioral wedge to rapidly reduce US carbon emissions. *Proceedings of the National Academy of Sciences* 2009;106(44):18452–18456.
15. Dolnicar S. & Grun B. Environmentally friendly behaviour. Can heterogeneity be improved among individuals and contexts/ environments be harvested for improved sustainable management? *Environment and Behavior* 2009;41:693–702.
16. Donmez-Turan A. & Kılıçlar İ.E. The analysis of pro-environmental behaviour based on ecological worldviews, environmental training/ knowledge and goal frames. *Journal of Cleaner Production* 2020;279:123518.
17. Eagly A. & Chaiken S. *The Psychology of Attitudes*. 1993; NY: Harcourt, Brace Jovanovich.
18. Festinger L. *A Theory of Cognitive Dissonance*. 1957; Stanford, CA: Stanford University Press.
19. Fielding K. S. & Hornsey M. J. A social identity analysis of climate change and environmental attitudes and behaviours: Insights and opportunities. *Frontiers in Psychology* 2016;7(121):1–12.
20. Fielding K.S., Terry, D.J., Masser B.M. & Hogg M.A. Integrating social identity theory and the theory of planned behaviour to explain decisions to engage in sustainable agricultural practices. *British Journal of Social Psychology* 2008;47(1):23–48.

21. Fritsche I., Barth M., Jugert P., Masson T. & Reese G. A social identity model of pro-environmental action (SIMPEA). *Psychological Review* 2018;125:245–269.
22. Fuhrmann-Riebela H., D'Exelle B. & Verschoor A. The role of preferences for pro-environmental behaviour among urban middle class households in Peru. *Ecological Economics* 2021;180:106850.
23. Gifford R. The dragons of inaction: psychological barriers that climate change mitigation and adaptation. *Am.Psychol.* 2011;66(4):290.
24. Gupta A. & Sharma R. Pro-environmental behaviour of adventure tourists: an applicability of value belief norm theory. *Tourism: An International Interdisciplinary Journal* 2019;67(3):253-267.
25. Hamann K.R.S. & Reese G. My influence on the world (of Others): Goal efficacy beliefs and efficacy affect predict private, public, and activist pro-environmental behavior. *J. Soc. Issues* 2020;76:35-53.
26. Higgins T. Self-discrepancy theory. What patterns of self beliefs cause people to suffer? *Advances in Experimental Social Psychology* 1989;22:93–136.
27. Hines J. M., Hungerford H. R. & Tomera A.N. Analysis and synthesis of research on responsible environmental behaviour: A meta-analysis. *The Journal of Environmental Education* 1986/1987;18:1–8.
28. Huang H. Media use, environmental beliefs, self-efficacy, and pro-environmental behavior. *J.Bus. Res.* 2016;69:2206–2212.
29. IPCC. Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways. In V. Masson-Delmotte, P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P. R. Shukla, T. Waterfield (Eds.), *The context of strengthening the global response to the threat of climate change*. Intergovernmental Panel on Climate Change. Retrieved from <https://www.ipcc.ch/sr15/>. 2018.
30. Jans L. Changing environmental behaviour from the bottom up: The formation of pro-environmental social identities. *Journal of Environmental Psychology* 2021;73:101531.
31. Khare A. Antecedents to green buying behaviour: A study on consumers in an emerging economy. *Mark. Intell. Plan.* 2015;33:309–329.
32. Klockner C. A. A comprehensive model of the psychology of environmental behaviour – a meta-analysis. *Global Environmental Change* 2013;23:1028–1038.
33. Kollmuss A. & Agyeman J. Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research* 2002;8(3):239–260.
34. Lewicka M. Place attachment: How far have we come in the last 40 years? *Journal of Environmental Psychology* 2011;31(3):207–230.
35. Liping F., Zhaohui S., Zha L., Liu F., He L., Sun X. & Jing X. Environmental Awareness and Pro-environmental Behavior within China's Road Freight Transportation Industry: Moderating Role of Perceived Policy Effectiveness. *Journal of Cleaner Production* 2019;252:11979.
36. Manzo L.C. & Perkins D.D. Finding common ground: The importance of place attachment to community participation and planning. *Journal of Planning Literature* 2006;20(4):335–350.
37. Massaro M., Dumay J., Garlatti A. & DalMas F. Practitioners' views on intellectual capital and sustainability: From a performance-based to a worth-based perspective. *J. Intellect. Cap.* 2018;19:367–386.
38. Masson T. & Fritsche I. Adherence to climate change-related ingroup norms: do dimensions of group identification matter? *European Journal of Social Psychology* 2014;44(5):455–465.
39. Meloni A., Fornara F. & Carrus G. Predicting pro-environmental behaviors in the urban context: The direct or moderated effect of urban stress, city identity, and worldviews. *Cities* 2019;88:83–90.

40. Meyer A. Heterogeneity in the preferences and pro-environmental behavior of college students: The effects of years on campus, demographics, and external factors. *J. Clean. Prod.* 2016;112:3451–3463.
41. Milfont T. L. & Markowitz E. Sustainable consumer behavior: A multilevel perspective. *Current Opinion in Psychology* 2016;10:112–117.
42. Milfont T. L., Wilson J. & Diniz P. K. C. Time perspective and environmental engagement: A meta-analysis. *International Journal of Psychology* 2012;47:325–334.
43. Milfont T.L., Osborne D., Yogeewaran K. & Sibley C.G. The role of national identity in collective pro-environmental action. *Journal of Environmental Psychology* 2020;72:101522.
44. Oskamp S. A sustainable future for humanity? How can psychology help? *American Psychologist* 2000;55:496–508.
45. Panno A., Giacomantonio M., Carrus G., Maricchiolo F., Pirchio S. & Mannetti L. Mindfulness, pro-environmental behavior, and belief in climate change: The mediating role of social dominance. *Environ. Behav.* 2018;50:864–888.
46. Primmer J. Belief. (ed. Primmer), *The Stanford Encyclopedia of Philosophy*, Stanford, 2018; CA: The Metaphysics Research Lab.
47. Sadock B., Sadock V. & Ruiz P. *Kaplan and Sadock's Comprehensive Textbook of Psychiatry.* 2017; Wolters Kluwer.
48. Scannell L. & Gifford R. Defining place attachment: A tripartite organizing framework. *Journal of Environmental Psychology* 2010;30(1):1–10.
49. Scherbaum C.A., Popovich P.M. & Finlinson S. Exploring individual-level factors related to employee energy-conservation behaviors at work. *Journal of Applied Social Psychology* 2008;38(3):818–835.
50. Schlicht-Schmalzle R., Chykina V. & Schmalzle R. An attitude network analysis of post-national citizenship identities. *PloS One* 2018;13:e0208241.
51. Schmuck P. & Schultz P.W. *The psychology of sustainable development.* 2002; Norwell, MA: Kluwer.
52. Schultz P.W., Khazian A.M. & Zaleski A.C. Using normative social influence to promote conservation among hotel guests. *Social Influence* 2008;3:4–23.
53. Schwartz S.H. Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 25, pp. 1–65). 1992; New York: Academic Press.
54. Seligman C. & Katz A.N. The dynamics of value systems. In: *The Psychology of Values: The Ontario Symposium*, vol. 8 (ed. C. Seligman, J.M. Olson and M.P. Zanna), 1996; 53–75. Hillsdale, NJ: Erlbaum.
55. Sharma R. & Gupta A. Pro-environmental behaviour among tourists visiting national parks: application of value-belief-norm theory in an emerging economy context. *Asia Pacific Journal of Tourism Research* 2020;25(8):829-840.
56. Song Z. & Soopramanien D. Types of place attachment and pro-environmental behaviors of urban residents in Beijing. *Cities* 2019;84:112–120.
57. Steg L. & de Groot J. I. M. *Environmental Psychology: An Introduction*, 2019; Second Edition, John Wiley & Sons Ltd.
58. Steg L., Bolderdijk J.W., Keizer K. & Perlaviciute G. An integrated framework for encouraging pro-environmental behaviour: The role of values, situational factors and goals. *Journal of Environmental Psychology* 2014;38:104–115.
59. Swim J.K., Stern P.C., Doherty T., Clayton S., Reser J.P., Weber E. U., et al. Psychology's contributions to understanding and addressing global climate change mitigation and adaptation. *American Psychologist* 2011;66:241–250.



60. Tajfel H. & Turner J. An integrative theory of intergroup conflict. In W. G. Austin, & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33–47). 1979; Monterey, CA: Brooks/Cole.
61. Taufik D., Bolderdijk J.W. & Steg L. Acting green elicits a literal 'warm-glow'. *Nature Climate Change* 2015;5:37–40.
62. Thøgersen J., Zhou Y. & Huang G. How stable is the value basis for organic food consumption in China? *Journal of Cleaner Production* 2016;134:214–224.
63. Tianyu J. & Meng L. Does Education Increase Pro-Environmental Willingness to Pay? Evidence from Chinese Household Survey. *Journal of Cleaner Production* 2020;275: 122713.
64. Ting D.H. & Cheng C.F.C. Measuring the marginal effect of pro-environmental behaviour: Guided learning and behavioural enhancement. *J. Hosp. Leis. Sport Tour. Educ.* 2017;20:16–26.
65. Turner J. C. *Social influence*. 1991; Belmont, CA: Thomson Brooks/Cole.
66. Urien B. & Kilbourne W. Generativity and self-enhancement values in eco-friendly behavioural intentions and environmentally responsible consumption behavior. *Psychol. Market.* 2011;28(1):69–90.
67. Uzzell D., Pol E. & Badenas D. Place identification, social cohesion, and environmental sustainability. *Environment and Behavior* 2002;34:26–53.
68. Van der Werff E., Steg L. & Keizer K. I am what I am, by looking past the present the influence of biospheric values and past behavior on environmental self-identity. *Environment and Behavior* 2014;46(5):626–657.
69. Van L.P.A.M., Joireman J. & Milinski M. Climate change: What psychology can offer in terms of insights and solutions. *Current Directions in Psychological Science* 2018;27:269–274.
70. Vicente-Molina M.A., Fernández-Sainz A. & Izagirre-Olaizola J. Does gender make a difference in pro-environmental behavior? The case of the Basque Country University students. *J. Clean. Prod.* 2018;176:89–98.
71. Vilella-Vila M. & Costa-Font J. Press media reporting effects on risk perceptions and attitudes towards genetically modified (GM) food. *J. Socio. Econ.* 2008;37(5):2095–2106.
72. Vlek C. & Steg L. Human behavior and environmental sustainability: problems, driving forces, and research topics. *J. Soc. Issu.* 2007;63(1):1–19.
73. Williams K.J. & Cary J. Landscape preferences, ecological quality, and biodiversity protection. *Environ. Behav.* 2002;34(2):257–274.
74. Yusliza M.Y., Amirudin A., Rahadi R.A., et al. An Investigation of Pro-Environmental Behaviour and Sustainable Development in Malaysia. *Sustainability* 2020;12:1-21.