

Values, Pro-Environmental Behaviour and Stress Appraisals of Anthropogenic Environmental Degradation

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Abstract

Anthropogenic environmental degradation is a major global threat to both natural and human systems. There is an emerging literature that suggests related psychological distress may lead to significant mental health outcomes. Using the cognitive theory of stress, pro-environmental behaviour can be proposed as a coping response to stress appraisals around anthropogenic environmental degradation. Pro-environmental behaviour may be motivated by many personal and social factors. In particular, value orientations (egoistic, altruistic and biospheric) may be a key factor in influencing pro-environmental behaviour. To date, there is a lack of knowledge regarding the relationships between these variables. This current study aimed to determine how values orientations, pro-environmental behaviour and stress appraisals of anthropogenic environmental degradation are related, in a sample of adults in New Zealand. Using a quantitative, survey study design, data was gathered from 205 participants. Analyses found that demographic factors such as age and gender influenced pro-environmental behaviour and certain components of stress appraisal. Biospheric value orientation, egoistic value orientation and centrality appraisals of anthropogenic environmental degradation emerged as significant predictors of pro-environmental behaviour, highlighting the importance of value orientation and aspects of primary appraisal in influencing pro-environmental behaviour. It was also found that values in general, have little influence over stress appraisal processes around anthropogenic environmental degradation, though they still may have a small influence on certain aspects of primary appraisal. The findings suggest that though values may have an important influence on pro-environmental behaviours, they may not necessarily have an important impact on the perceptions of stress around anthropogenic environmental degradation. Limitations and suggested future directions for research are discussed.

Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the referencing), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

A handwritten signature in black ink that reads "Dana Ashwell". The signature is written in a cursive style with a horizontal line underlining the name.

Dana Ashwell

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Chapter 1: Introduction

This research study formed part of the requirements for a Master's degree in psychology (counselling psychology pathway). The research aimed to uncover the associations between values, pro-environmental behaviour and stress appraisals of anthropogenic environmental degradation in adults in New Zealand. This chapter will discuss the context in which this research is positioned, the rationale for this study and the relevant background literature.

1.1 Anthropogenic Environmental Degradation

Anthropogenic environmental degradation can be defined as *the changes made to biophysical environments that are caused directly or indirectly by humans* (Wuebbles et al., 2017). This is a major global challenge that continues to threaten both natural and human systems. Internationally it has been recognised that the consequences of anthropogenic changes to the natural environment affect human safety, infrastructure, agriculture, economic systems, water supplies and natural ecosystems (IPCC, 2014). Much of the literature focuses on *climate change* (or global warming), which is the most alarming aspect of anthropogenic environmental degradation. There is a broad consensus that if the Earth's system is pushed further towards continued warming, there will be a higher risk of unforeseen consequences, some of which may be substantial and irreversible (USGCRP, 2017). Without additional efforts to mitigate anthropogenic environmental degradation, there will be high risk of severe, widespread and irreversible impacts by the end of the 21st century (IPCC, 2014). Drastic changes need to be made to human lifestyles and behaviours to avoid ecological disaster and for the earth to be habitable for future generations (Oskamp, 2000).

In 2015, The Paris Agreement was adopted by parties under the United Nations Framework Convention on Climate Change (UNFCCC). This commitment is to ensure that all ratifying parties aim to keep the global average temperature below 2° C above pre-industrial levels, to strengthen the ability to deal with climate change impacts and allow financial support to develop climate-resilient economies (Ministry for the Environment, 2018). New Zealand deposited its instrument of ratification on the 4th of October 2016, and therefore committing to the terms of the agreement. On the 4th of

November 2016, The Paris Agreement came into effect, with 55 parties ratifying parties, accounting for at least an estimated 55% of the world's greenhouse gas emissions. To this date, 185 parties have ratified the convention (MFTE, 2018; UNFCC, 2019).

In recent months, concern around anthropogenic environmental degradation has been prominent both in New Zealand and across the globe. In March, tens of thousands of school students protested across New Zealand, calling for government action to reduce global warming before its catastrophic consequences. It was the largest student strike of its kind in New Zealand history (Lee, 2019). Following this, on the 11th of June 2019, the Auckland Council unanimously voted to declare a climate emergency, publicly recognising the urgent need for action (Auckland Council, 2019). On the 1st of May 2019, the United Kingdom declared a climate emergency after extensive protests in April and the preceding declaration of climate emergency in several U.K. cities (Gunia, 2019). The severity of anthropogenic environmental degradation and its consequences have elicited significant response from both public and governing bodies. It is imperative that anthropogenic environmental degradation be addressed by our global society.

1.2 Psychology's Role in Anthropogenic Environmental Degradation

The natural sciences have traditionally engaged in the study of environmental systems, including the physical and chemical processes. However, for over quarter of a century, a second science has been developing to explore the "human dimensions" of anthropogenic environmental degradation, such as climate change (Swim, Stern, Doherty, Clayton, Reser, Weber, Gifford & Howard, 2011). This science includes the psychological aspects, seeking to understand the human activities that cause anthropogenic environmental degradation, the subsequent consequences that affect people, the human responses to anthropogenic environmental degradation and the ways which may help people to respond effectively (Swim et al., 2011).

The effects of anthropogenic environmental degradation, and climate change in particular, have significant consequences for mental health and wellbeing, and a large body of research suggests that there are psychological implications (Berry, Bowen &

Kjellstrom, 2010; Doherty & Clayton, 2011; Fritze, Blashki, Burke & Wiseman, 2008; Gifford & Gifford; 2016). These implications result from emotional, behavioural and physiological (fight or flight) responses to environmental threats that can be directly or indirectly caused by environmental degradation. Accumulating evidence for the magnitude of climate change and its psychological impact have implications for psychological interventions, policies and research. This may threaten individual and community health, and it has been noted by psychologists that it is essential to explore individual adaptation as well as mitigation activities to consider the functional applications (Doherty & Clayton, 2011).

Addressing anthropogenic environmental change is critical for psychologists. There is much that psychologists can do to support pro-environmental action at many different levels. Environmental issues can be conceptualised as socio-behavioural problems and engaging in empirical research may make significant contributions (Schmuck & Vlek, 2003). Counselling psychology places focus on the relational ways of understanding people and their contexts, including their context within the environment. The skills of counselling psychologists may also be useful in environmental research to explore the relationships individuals may have with the natural environment and the related consequences (Milton, 2010). Psychologists are also committed to promoting the wellbeing of society. With the increasing awareness that wellbeing is influenced by the natural world and the interactions between people and their environments, there is also an ethical responsibility to address these “bigger-than-self” issues (Abraham, Feather & Harré, 2016).

1.3 Rationale

This current research study set out to build upon the findings of the researcher’s honours’ dissertation “Young Adults in New Zealand: The Experiences of Pro-Environmental Behaviour in Relation to Mental Health and Wellbeing” (Ashwell, 2018). The study was a small qualitative exploratory investigation into the experiences of pro-environmental behaviour in relation to mental health and wellbeing in young adults in New Zealand. From this study, two important findings were uncovered, which are described below.

Firstly, participants expressed that their pro-environmental behaviours were guided by their personal values, which generally placed importance on the environment. These values were biospheric (based on moral principles concerning the natural environment) or altruistic (aiming to protect other human beings) in nature (Stern, Dietz & Kalof, 1993). Values can provide a sense of purpose and can help create a life worth living, despite inevitable emotional suffering (Harris, 2007). Participants felt positive emotions from pro-environmental behaviour, even when previously expressing that they felt negative emotions from perceived environmental threat. This suggests that pro-environmental behaviour could be a form of value-guided action, providing a buffer against emotional suffering from environmental threat (Ashwell, 2018).

Secondly, participants' pro-environmental behaviours were also described as attempts to be pro-active about their pessimism, worries and fears for the future due to environmental degradation, and they expressed that these behaviours reduced their anxiety about environmental threats (Ashwell, 2018). This was interpreted as a form of problem-focused coping, which involves strategies to modify or change a stressful situation and can lead to positive reappraisals of those situations (Folkman, Lazarus, Dunkel-Schetter, DeLongis & Gruen, 1986). This may suggest that pro-environmental behaviour could be a form of problem-focused coping, potentially influencing mental wellbeing (Ashwell, 2018).

Ashwell's (2018) study suggests that young adults in New Zealand may have negative psychological experiences associated with perceived environmental threats and anthropogenic environmental degradation. It also hypothesises that the degree to which they experience these negative emotions may be influenced by their pro-environmental behaviour as a form of value-guided action and problem-focused coping. This current study intends determine these relationships between psychological distress related to environmental degradation, pro-environmental behaviour and values by using a quantitative approach.

1.4 Psychological Impact of Environmental Degradation

The psychological impact of environmental degradation (in particular, climate change) has been widely acknowledged in the literature (Berry et al., 2010; Doherty &

Clayton, 2011; Fritze et al., 2008; Gifford & Gifford; 2016). These psychological responses can be directly or indirectly caused by the consequences of environmental degradation. The cognitive theory of stress may provide an explanation of how situations (such as global anthropogenic environmental degradation) may be appraised by individuals (Folkman, 1984).

1.4.1 Direct psychological impact

The direct impact of climate change, such as extreme weather events and environmental stressors, has immediate effects on the mental health of individuals in affected communities. There is extensive evidence for extreme weather events leading to mental health outcomes associated with loss, disruption and displacement, as well as the impact of repeated exposure to natural disasters (Doherty & Clayton, 2011; Fritze et al., 2008). Acute weather events such as floods, fires and hurricanes can contribute to the development of post-traumatic stress disorder by exposing people to precursors such as danger, injury, death and harm to significant others (Berry et al., 2010; Doherty & Clayton, 2011).

Direct effects of climate change also bring disruptions to the social, economic and environmental determinants of mental health among vulnerable communities (Doherty & Clayton, 2011). Impacts on economic systems, cost of living and the unequal distribution of these impacts may negatively affect mental health and wellbeing (Fritze et al., 2008). Communities may be vulnerable due to location or adaptive capacity (e.g. poverty or reliance on climate-sensitive systems). Communities that are vulnerable in both these aspects are those which will be most affected by socio-economic impacts and related mental health impacts (Fritze et al., 2008). In New Zealand, many Māori communities have strong ties to the natural environment through socio-economic and cultural systems. In addition to the socio-economic differences between Māori and non-Māori, it can be predicted that these communities will experience significant impacts from climate change (Manning, Lawrence, King & Chapman. 2015).

1.4.2 Indirect psychological impact

Indirect psychological impacts of climate change include emotional distress and anxiety over the state of the environment (Doherty & Clayton, 2011; Fritze et al., 2008). These indirect impacts on mental health stem from the awareness of climate change as a global environmental threat rather than a direct experience (Fritze et al., 2008). Mental health consequences can come from viewing images of environmental degradation and related human suffering or questioning lifestyle or purchasing decisions (Doherty & Clayton, 2011).

Distress related to environmental degradation can include a range of emotional and affective responses. This can include anxiety and worry about environmental threats. Cognitive processes, experiences of stress and selection of coping strategies can all contribute to how anthropogenic environmental degradation can impact on an individual's psyche (Doherty & Clayton, 2011; Stokols, Misra, Runnerstrom & Hipp, 2009). Terms such as *eco-anxiety* and *habitual ecological worrying* have emerged increasingly in the literature (Gifford & Gifford, 2016). Eco-anxiety can be described as a debilitating and severe worry about the environment which can elicit intense reactions such as panic attacks, sleeplessness and loss of appetite. Habitual ecological worrying is described as an adaptive response to climate change that may be associated with pro-environmental behaviour and attitudes (Gifford & Gifford, 2016). Individuals may also experience depressive emotions such as guilt, despair and grief related to climate change. Discussion about the consequences of climate change can give rise to questions about the long-term sustainability of both the environment and human life and can elicit feelings of environmental loss and uncertainty (Doherty & Clayton, 2011). Doherty and Clayton (2011) have proposed a theoretical framework which suggests that psychological responses to climate change may potentially even lead to functional impairments and psychopathology, depending on the nature (adaptive or maladaptive) of those responses. This suggests that the impact of environmental degradation could have significant consequences for mental health.

1.4.3 Indirect psychological distress online and in media

In addition to the current peer-reviewed literature, a growing number of articles, blog posts and essays have been published in the last few years regarding eco-anxiety, climate grief, guilt and depression (Table 1). The indirect psychological effects of

environmental degradation are now acknowledged not only by researchers, but also globally across the general population.

Table 1

Online articles and essays relating to climate change and indirect impact on mental health

<i>Category</i>	<i>Article/Essay</i>
Eco-anxiety	<ul style="list-style-type: none"> - Budner's (2018) "Is the Changing Climate Giving You Anxiety? You're Not Alone." - Grant's (2019) "I Worked on David Attenborough's Documentary. The Grim Reality Gave Me Climate Anxiety." - McDonough's (2019) "Talking About Our Eco-Anxiety is Good. But How Do We Do It?" - Nickerson's (2019) "Climate Change is Causing Us 'Eco-Anxiety'." - Watson's (2019) "Climate Concern Fuels the Rise of 'Eco-Anxiety'."
Climate Grief	<ul style="list-style-type: none"> - Atkinson's (2018) "Addressing Climate Grief Makes You a Badass, Not a Snowflake." - Garcia's (2018) "If Climate Change is Causing You Anxiety or Even Grief, Experts Say You Are Not Alone." - Payne's (2018) "'Ecological Grief' Among Mental Health Effects of Climate Change in Canada: Report." - Cook's (2019) "Coastal Loss, Climate Grief."
Climate Depression	<ul style="list-style-type: none"> - Shalant's (2017) "Banishing the Climate Blues." - Hayat's (2019) "Is Climate Change Depressing you Too?"
Climate Guilt	<ul style="list-style-type: none"> - Adam's (2019) "The Climate Crisis Has Arrived- So Stop Feeling Guilty and Start Imagining Your Future." - Frank's (2019) "It's Time to Acknowledge Collective Guilt for the Coming Climate Genocide."

1.4.4 Stress appraisals and coping

Stress appraisals

The emotional and physical symptoms of distress elicited by the indirect effects of environmental degradation suggest that the state of current global environmental issues is perceived by some as stressful. Cognition, information processing, stress and coping are important factors which impinge on the psyche of individuals and their behaviour, in response to anthropogenic environmental degradation (Stokols et al., 2009). The cognitive theory of stress suggests that stress is a relational process between an individual and the event (or situation) that is appraised by the individual as threatening or taxing (Folkman, 1984). When an individual encounters an event, they may engage in cognitive appraisal processes which shapes the meaning of the

encounter. The cognitive appraisal process involves a *primary appraisal*, where the individual evaluates the encounter in terms of how threatening or challenging it may be. This can be influenced by a range of personal and situational factors (e.g. beliefs, commitments, nature of the stressor, expectancy etc.) which allows the individual to form a judgement regarding the potential impact on their wellbeing. A *secondary appraisal* is also involved, and the individual assesses their available resources and options in response to the event. It also involves an individual's perception of control. It allows individuals to ask, "What can I do?" and generate coping strategies which can include the use of physical, social, psychological and material resources (Folkman, 1984). Intuitively, the cognitive theory of stress suggests that increased perceptions of threat are often associated with decreased perceived control. Therefore, when individuals feel they are unable or do not have the ability to manage or cope with an event, threat perceptions increase (Bandura, 1997; Lazarus & Folkman, 1984; Jerusalem & Schwarzer, 1992).

Though perceptions of threat are associated with decreased perceived control, one context in which a positive relationship is observed is anthropogenic environmental degradation (such as climate change) (Davydova, Pearson, Ballew & Schuldt, 2018; Hornsey, Fielding, McStay, Reser, Bradley & Greenaway, 2015). Hornsey et al. (2015) found that threat perceptions around climate change positively influenced collective control beliefs. Personal control beliefs however, were not influenced by threat perceptions. Davydova et al. (2018) also found that perceiving greater threat from climate change positively influenced collective control beliefs around mitigating the threat. Furthermore, attributions of responsibility (to government entities) for causing or mitigating climate change bolstered perceived collective control.

Chang (1998) conducted a survey study around optimism, stress appraisal, coping and adjustment, in a sample of students (using an exam as the stressor). The study found that while optimists and pessimists did not differ in primary appraisal, optimists differed significantly from pessimists in secondary appraisal. This suggests that though stressors may be appraised as highly threatening by both optimists and pessimists, only optimistic individuals may consider coping options and resources. Their study also found that both primary and secondary appraisal predicted a range of coping response, suggesting that stress appraisal processes lead to coping behaviours.

Measuring stress appraisal

Peacock and Wong (1990) developed a multi-dimensional measure of stress appraisal called the Stress Appraisal Measure (SAM). It aims to capture important aspects of both primary and secondary appraisal processes, based on the cognitive theory of stress. The dimensions of stress appraisals included in this measure are designed to measure anticipatory stress and therefore, the SAM is used to measure stress appraisals of future events or situations. Three scales are included to measure primary appraisal dimensions, and these are identified as threat, centrality and challenge appraisals. Threat appraisals include the perception of potential harm or loss, challenge appraisals involve the anticipation of growth or gain, and centrality appraisals reflect the perceived importance of the event for an individual's wellbeing. Three secondary appraisal scales are also included and are focused around perceptions of control and controllability. These include the degree to which a situation is controllable-by-self, controllable-by-others and uncontrollable-by-anyone. The SAM includes an overall perceived stressfulness scale however, it was found that over half the variance in this scale was predicted by the threat and centrality scales (Peacock & Wong, 1990). Peacock and Wong (1990) also provides correlational data to show the relationship between the SAM scales and measures of locus of control, psychological symptomology and dysphoric mood.

Past studies which examine stress appraisal or stress around anthropogenic environmental degradation have been inconsistent in the measures used. Homburg and Stolberg (2007) used measures of health-threat and health-harm to represent primary appraisal, and measures of self-efficacy and collective-efficacy to represent secondary appraisal. Other studies have used a more general measure of perceived ecological stress or perceived ecological threat (Helm, Pollitt, Barnett, Curran & Craig, 2018; Schmitt, Aknin, Axsen, Shwom, 2018). It appears that there is no established, validated measure of stress appraisal around anthropogenic environmental degradation, making it difficult to make conclusions when comparing findings between studies. Homburg, Stolberg and Wagner (2007) developed the first scales which measure coping in regard to global environmental problems. Coping strategies are responses to perceived stress which come after cognitive appraisal processes (Lazarus & Folkman, 1984) and so

while the coping measure presented by Homburg et al. (2007) may be related to stress appraisal, it is not an equivalent measure. Emotional responses to anthropogenic environmental degradation are also not limited to perceptions of stress and there is a wide range of affective responses (Doherty & Clayton, 2011). Though stress and coping are related to an individual's psychological response to anthropogenic climate degradation (Stokol et al., 2009), there may be a need for a measure that captures a wider range of emotional responses.

Coping

Coping strategies are responses to perceived stress after the cognitive appraisal process and are effortful or purposeful thoughts and actions aimed to overcome or manage stressful situations (Lazarus & Folkman, 1984). Coping responses are often categorised as either emotion-focused or problem-focused. Emotion-focused coping involves strategies that attempt to manage the emotional distress that is associated with the situation (Lazarus & Folkman, 1984). The range of strategies used can be broad, including denial, venting, positive reinterpretations and seeking out social support (Carver, Scheier & Weintraub, 1989). Problem-focused coping strategies are strategies that aim to modify the problem at hand, evaluate pros and cons and implement steps to solve the problem (Lazarus & Folkman, 1984). Problem-focused coping is most effective when stressful situations are perceived as changeable and may lead to positive reappraisals of stressful situations (Folkman et al., 1986). When individuals have high levels of emotional awareness, problem-focused coping can be especially useful. Problem-focused coping is associated with higher positive affect when individuals have adequate information about their goals and can effectively make decisions to solve their problems (Baker & Berenbaum, 2007). Emotion-focused coping is traditionally seen as maladaptive, as some strategies can encourage avoidance. Emotion-focused coping, however, can benefit individuals who do not actively identify, process and express their emotions (Baker & Berenbaum, 2007).

1.4.5 Summary

In summary, the psychological impact of anthropogenic environmental degradation has become increasingly documented in peer reviewed literature, as well as

across media and social media outlets. The psychological effects from anthropogenic environmental degradation can be categorised as direct or indirect. The indirect effects of climate change can manifest in variety of different emotional responses such as anxiety or worry and depressive emotions such as guilt, despair or grief (Doherty & Clayton, 2011).

Distress around anthropogenic climate change can also be explained through the cognitive theory of stress. Stress is a relational process between an individual and an event (in this case, anthropogenic environmental degradation) that is appraised by the individual as threatening or taxing (Folkman, 1984). Stress appraisals can include a primary appraisal process and a secondary appraisal process, which both combine to determine how stressful a situation is perceived by an individual (Folkman, 1984). Stress appraisals of anthropogenic environmental degradation have been quantified using a range of measures in past research (Helm et al., 2018; Homburg & Stolberg, 2006; Schmitt et al., 2018) and there is no validated measure of psychological distress around climate change. The stress appraisal measure appears to be a validated measure of stress appraisal; however, it may not capture the entire range of emotional responses to anthropogenic environmental degradation.

Different coping strategies may be responses to perceived stress, after the cognitive appraisal process. Coping strategies are effortful or purposeful thoughts and actions aimed to overcome or manage stressful situations (Lazarus & Folkman, 1984). Pro-environmental behaviour may present as coping response to anthropogenic environmental degradation (Doherty & Clayton, 2011; Maiteny, 2002) and this will be discussed further in the following section.

1.4 Pro-Environmental Behaviour

The definition of *pro-environmental behaviour* used in this study is taken from Kollmuss and Agyeman (2002), in which pro-environmental behaviour is defined as ‘*behaviour that consciously seeks to minimize the negative impact of one’s actions on the natural and built world*’ (p. 240). Pro-environmental behaviour can include many types of behaviours and activities. Ashwell (2018) found that young adults in New Zealand engaged in a variety of behaviours present in many aspects of their lives,

ranging from dietary changes, choice of transport and everyday habits. Pro-environmental behaviour can be an adaptive behavioural response to environmental threat or anxiety (Doherty & Clayton, 2011; Maiteny, 2002) and engagement can be dictated by many personal and social factors (Table 2) (Gifford & Nilsson, 2014).

Hines, Hungerford and Tomera (1987) conducted a meta-analysis using 128 studies that had assessed the psychosocial determinants associated with pro-environmental behaviours. Knowledge of issues, knowledge of action strategies, locus of control, attitudes, verbal commitment and individuals' sense of responsibility were found to be variables that were associated with pro-environmental behaviour. Bamberg and Moser (2007) replicated and extended these findings, testing the structural relationship between pro-environmental behaviour and the psychosocial determinants uncovered in their own meta-analysis. Eight psychosocial determinants of pro-environmental behaviour were found: problem awareness, internal attributions, social norms, moral norms, feelings of guilt, attitudes, intentions and perceived behavioural control. The analysis also found several relationships between the variables that influence pro-environmental behaviour. Intention of pro-environmental behaviour was found to mediate the impact of all other psychosocial variables on pro-environmental behaviour. Pro-environmental behaviour was shown as a product of self-interest combined with pro-social motives. Perceived behavioural control, attitude and moral norms were all significant predictors of pro-environmental behaviour. Furthermore, feelings of guilt, social norms and internal attribution and problem awareness were all significant predictors of the moral norms construct.

Past studies have also found that environmental knowledge is an important factor in predicting personal efficacy or sense of control (through environmental concern) and pro-environmental behaviour (Levine & Strube, 2012; Milfont, 2012). Increasing environmental knowledge around positive environmental actions has also been suggested as a way to increase saliency values, potentially affecting the way people prioritise their values in certain situations (De Groot & Steg, 2009).

Table 2
Personal and social factors that influence pro-environmental concern and behaviour (Gifford & Nilsson, 2014).

<i>Factors</i>	<i>Description</i>
Childhood experience	Children with greater outdoor experiences, talk about the environment at home, watch nature films and read about the environment are more likely to be concerned.
Knowledge and education	Environmental knowledge is a strong predictor of environmentally responsible behaviour.
Personality and self-construal	Personality traits such as openness, agreeableness and conscientiousness are strongly linked to environmental engagement.
Sense of control	Those with an internal locus of control attribute control over life events to themselves and are more likely to actively seek out and make use of information around environmental problems.
Values, political views and worldviews	Individuals with values that are orientated towards others and nonmaterialistic are more likely to act pro-environmentally. Those with more liberal political views are also more likely to be pro-environmental.
Goals	Depending on the mindset, having goals may influence engagement in pro-environmental behaviour.
Felt responsibility	Felt responsibility largely stems from guilt and influences environmental concern.
Cognitive biases	Cognitive biases may play a role in environmental choices.
Place attachment	Those with strong attachment to a place may be more likely to protect it.
Age	Younger people report more environmental concern but older adults report more environmental behaviour.
Gender	Women tend to report stronger environmental attitudes, concern and behaviours than men.
Choice of activities	Those who engage in consumptive outdoor activities (fishing and hunting) less likely to be environmentally concerned than those who engage in non-consumptive outdoor activities (hiking and photography).
Religion	Western Judaeo-Christian religious tradition thought to cause environmental problems due to dualism of humanity and nature.
Urban vs rural residence	Those who grow up in urban environments may report more environmental concern but research from numerous countries has yielded conflicting results.
Norms	Norm activation theory means that pro-environmental behaviour is more likely if it is perceived to be the 'usual thing to do'.
Social class	Environmentalists tend to be from middle or upper-middle class.
Proximity to problem sites	People who live closer to a problem site tend to be more concerned about that environmental problem.
Cultural and ethnic variations	Cultures vary in their level of concern, but also in the structure of their thinking about concern

1.4.1 Pro-environmental behaviour as problem-focused coping

It is suggested that people respond to distress over ecological and social problems in three main ways. Firstly, individuals may experience an unconscious reaction of denial and seek gratification through continued or increased acquisition and consumption of material goods. Secondly, individuals may have a 'green' consumer response, in which they seek to consume what they perceive as more ethical. The third type of response is characterised by feelings of connection with broader social and ecological contexts, and individuals may respond by changing themselves and their lifestyles (Maiteny, 2002). Ashwell (2018) observed similar occurrences in young adults in New Zealand where pro-environmental behaviour was described as a problem-focused coping response to negative affect regarding environmental problems.

The cognitive theory of stress may be used to explain pro-environmental behaviour. Primary and secondary appraisals have been found to predict a range of coping responses (to a stressor), including coping behaviours such as problem-solving (Chang, 1998). Homburg and Stolberg (2006) found that pro-environmental behaviour was a direct result of individual coping attempts (problem-focused coping), which was determined by perceptions of health threat and health harm (as a measure of primary appraisal), and individual or collective efficacy (as a measure of secondary appraisal). Problem-focused coping was shown to represent an important link between appraisal processes and pro-environmental behaviour. Ojala (2013) also found supporting evidence for pro-environmental behaviour as a problem-focused coping response in Swedish adolescents. Meaning-focused coping and problem-focused coping were both found to be independent, positive predictors of pro-environmental behaviour. Interestingly, the more problem-focused coping an individual used, the more likely they were to worry about climate change.

Hartmann, Apaolaza, D'Souza, Barrutia & Echebarria (2015) found that threat appraisals impact behaviour intentions and coping behaviour (pro-environmental behaviour), through the increase of the emotional fear response. Fear responses were shown to play a crucial role in motivating coping behaviours and significantly explained the intention to engage in pro-environmental behaviours. Schmitt et al (2018) conducted

a study using adult populations from Canada and the United States, examining the relationships between pro-environmental behaviour, life satisfaction and perceived ecological threat. Perceived ecological threat was found to negatively predict life satisfaction and positively predict pro-environmental behaviour. The study also found that pro-environmental behaviour was shown to mediate the negative relationship between perceived ecological threat and life satisfaction, reducing the overall negative effect on wellbeing.

1.4.2 Values orientations and pro-environmental behaviour

An individual's personal values may influence their engagement in pro-environmental behaviour. Values are psychological constructs that can influence the motivation of behaviour and personal wellbeing (Brown & Kasser, 2005). According to acceptance and commitment therapy (ACT), values are reflections of what is most important to a person, what kind of person they want to be and what is most significant and meaningful to them (Harris, 2007). Value orientations have been classified in different ways in the literature and are associated with various pro-environmental outcomes.

The development of Schwartz's theory of values

Schwartz and Bilsky (1987) constructed a theory of universal value types, viewing values as cognitive representations of three basic, universal requirements: 1) biological needs, 2) interactional requirements for interpersonal coordination and 3) societal demands for survival and group welfare. From populations in Israel (n=455) and Germany (n=331), they derived eight value domains: enjoyment, security, social power, achievement, self-direction, pro-social, restrictive conformity and maturity. This theory was further expanded into 10 value types, grouping these into 4 value clusters. These value clusters include: conservation (tradition, conformity and security value types), openness to change (self-direction, stimulation and hedonistic value types), self-transcendence (universalism and benevolence value types) and self-enhancement (power, achievement and in some cultures, hedonistic value types) (Schwartz, 1992, 1994).

Schwartz (1992) developed the first instrument to measure these value clusters—the 56 item Schwartz Values Survey. This was then adapted by Stern, Dietz and Guagnano (1998) into a brief values inventory measuring the four main value clusters: conservatism (changed due to the double meaning of term “conservation” in terms of environmental research), openness to change, self-transcendence, and self-enhancement (or egoistic, as referred to in this study). The self-transcendence value cluster can further be broken down into biospheric and altruistic value clusters. Altruistic values relate to social justice, world peace and equality. Biospheric values specifically concern the environment, protecting and respecting the earth, nature and other species. Stern et al. (1998) recommends making this distinction between biospheric and altruistic values, especially in terms of environmental research. It should be acknowledged that what Schwartz (1992,1994) refers as “value cluster” is often referred to as a “value orientation” in the literature (Stern, Dietz & Kalof, 1993; Stern, Dietz, Kalof & Guagnano, 1995) and these terms are used inter-changeably in this study.

Values orientations in explaining pro-environmental concern and behaviour

Before Schwartz developed the Schwartz values survey, Schwartz developed a model of norm-activation theory (Schwartz, 1968a, 1968b, 1970, 1977) which suggested that pro-environmental behaviour was a form of altruism. The model assumed that if individuals had a general value orientation towards the welfare of others, they could be motivated to act in a way that prevents harm to others. The Schwartz model implied that under the appropriate conditions, pro-environmental behaviour could be activated from an altruistic value orientation. When considering environmentalism, there was some debate in the 1970’s as to whether environmental actions were an extension of valuing other people (as suggested by the Schwartz model) or valuing non-human species and the biosphere (Herberlein, 1972, 1977; Dunlap & Van Liere, 1977a; 1977b). Dunlap and Van Liere (1978) went on to develop the New Environmental Paradigm scale, measuring individuals’ underlying worldviews around ecology and the environment, incorporating items relating to biospheric values. Under Schwartz’s (1992, 1994) value clusters, values that align with protecting the environment fall under the self-transcendence value cluster and specifically under the universalism value-type. This is defined as *understanding, appreciation, tolerance, and protection for the welfare of all people and for nature* (Schwartz, 1994, p. 22).

Schwartz's self-transcendence cluster appears to incorporate both altruistic and biospheric components. Stern et al. (1998) also distinguished the two value types, suggesting the separation the self-transcendence value cluster into altruistic and biospheric value clusters in environmental research.

Stern, Dietz and Kalof (1993) conducted a quantitative survey study which set out to examine whether pro-environmental behaviour could be derived from concern stemming from three value orientations: *egoistic*, *altruistic* or *biospheric*. Egoistic environmental concern suggests that pro-environmental behaviour occurs when it aligns with self-interest and when expected benefits outweigh the costs. Altruistic environmental concern may influence an individual to engage in pro-environmental behaviour, only when the aim is to protect other human beings. Environmental concern based on a biospheric value orientation would cause individuals to act environmentally when species or habitat destruction is at stake. Stern et al. (1993) further hypothesised that egoistic, altruistic and biospheric value concerns towards the environment were not incompatible and that for most individuals, a mix of all three orientations influences environmental attitudes and behaviours. Their study found that egoistic, altruistic and biospheric environmental concerns each predicted an individual's willingness to take political action (for the sake of the environment). However, in terms of individual's willingness to pay through taxes, only egoistic environmental concern was a significant predictor (Stern et al., 1993). Stern and Dietz (1994) formed a value-basis theory for environmental attitudes following on from previous studies such as Stern et al. (1993). Attitudes around concern for the environment were suggested to be derived from a person's general value orientation, extending on Schwartz's (1977) norm-activation theory. Instead of pro-environmental behaviour being activated following an altruistic value orientation, pro-environmental behaviour was suggested to be activated under three value orientations (egoistic, altruistic, biospheric). Stern and Dietz (1994) also found little or no effect from Schwartz's conservative or openness to change value orientations on behavioural indicators of environmentalism, suggesting that only egoistic, altruistic and biospheric values are relevant regarding environmentalism.

Stern, Dietz, Kalof and Guagnano (1995) examined Stern et al's (1993) value-basis for environmental attitudes, using Schwartz's value clusters to measure individual value orientation through telephone interviews. In relation to Schwartz's egoistic,

altruistic and biospheric value clusters, Stern et al. (1995) found a two-factor structure from factor analysis, with egoistic values comprising the first factor and both biospheric and altruistic values comprising the second factor. They concluded that in terms of environmentalism, the biospheric value orientation could not be differentiated from a more general “self-transcendence” value cluster (originally proposed by Schwartz (1992, 1994)). Willingness to engage in pro-environmental action was suggested to be a function of both values and environmental concern (sometimes also referred to as environmental ‘beliefs’). Stern et al. (1995) found that the biospheric-altruistic (or self-transcendence) value cluster positively predicted an individual’s willingness to act environmentally, as well as positively predicting biospheric and altruistic environmental concerns. The study also showed that egoistic environmental concern was related to a general biospheric-altruistic value orientation and unrelated to the egoistic value orientation. This suggests that even though egoistic environmental concern can result in pro-environmental action, the biospheric-altruistic value orientation (rather than egoistic value orientation) explains this form of environmental concern.

In a series of three survey studies, Schultz (2001) found that concerns for environmental issues formed a three-factor structure, providing evidence for the distinction between egoistic, altruistic and biospheric environmental concerns. Additionally, Schultz (2001) found that egoistic environmental concerns positively correlated with Schwartz’s self-enhancement (egoistic) value cluster and negatively correlated with the self-transcendence value cluster. In contrast, biospheric environmental concerns positively correlated with the self-transcendence value cluster and negatively correlated with the self-enhancement value cluster. Egoistic, altruistic and biospheric environmental concerns were found to be unrelated to Schwartz’s openness to change and conservative value clusters. Schultz, Gouveia, Cameron, Tankha, Schmuck and Franek (2005) found further evidence that environmental concerns were comprised of a three-factor structure corresponding to egoistic, altruistic and biospheric values (using environmental values and attitude data from six countries, including New Zealand). They also found that self-transcendence value orientation positively correlated with biospheric environmental concerns and correlated negatively with egoistic environmental concerns. Self-enhancement value orientation correlated positively with egoistic environmental concerns and negatively with biospheric environmental concerns, supporting Schultz’s (2001) findings. Their analyses also

examined Schwartz's universalism value type, creating separate scales for universalism with or without environment related items. It was found that both measures of universalism uniquely predicted biospheric and egoistic environmental concerns, however, universalism (including the environment-related items) was the strongest predictor of environmental concern. Schultz et al. (2005) further suggested that values and environmental concerns only explained a small amount of variance in environmental behaviours. Analyses of self-transcendence values however showed that self-transcendence value orientation positively predicted environmental behaviour when activated by the seriousness of global environmental problems. Self-enhancement value orientation however, did not predict pro-environmental environmental behaviour when activated.

Gatersleben, Murtagh and Abrahamse (2014) examined how values and identities explained individual pro-environmental behaviour using a survey study conducted in the United Kingdom. It was found that out of egoistic, altruistic and biospheric values, only a biospheric value orientation predicted pro-environmental behaviour. They also found that environmental identity mediated the relationship between both environmental and biospheric values, and pro-environmental behaviour. Environmental values were measured using The New Ecological Paradigm (NEP), measuring the extent to which an individual has an anthropocentric worldview versus an ecocentric worldview (Dunlap, VanLiere, Mertig & Jones, 2000). The NEP is negatively correlated with egoistic value orientation and positively with biospheric value orientation (De Groot & Steg, 2008). It should be noted that values have been suggested to be an integral, core part of personal identity (Hitlin, 2003) which may explain the mediation effect.

It is now established that values are suggested to influence pro-environmental behaviour through specific beliefs (egoistic, biospheric, altruistic environmental concerns), norms and intentions (Stern, 2000; De Groot & Steg, 2009). Values influence behavioural beliefs which, in turn, influence intentions and behaviours (Figure 1). Changes in the priority of one's values may result in changes in behaviour-specific beliefs, intentions and pro-environmental behaviours and therefore are of key importance when explaining pro-environmental behaviour. Biospheric, altruistic and egoistic values are important in explaining pro-environmental behaviour, though De

Groot and Steg (2009) argue that though egoistic values may influence pro-environmental behaviour, they should always be supported by altruistic and biospheric values to promote stable pro-environmental behaviour. When pro-environmental behaviour depends on solely egoistic concerns, individuals no longer engage in the behaviour as soon as the individual benefits decrease or when individual costs become too high. It was suggested that one way to increase pro-environmental behaviour is to make biospheric and altruistic values more salient and cognitively accessible, affecting the way individuals prioritise their values in specific situations. This consequently impacts on the extent to which values influence beliefs, intentions and behaviours in a given situation (De Groot & Steg, 2009).

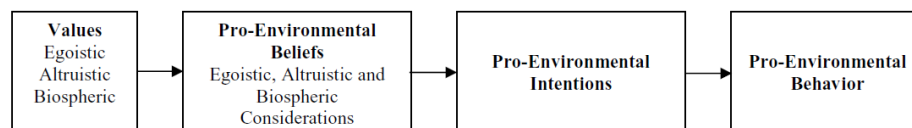


Figure 1. *Model of the influence of egoistic, altruistic and biospheric values on pro-environmental beliefs, intentions and behaviour* (De Groot & Steg, 2009)

Steg, Bolderdijk, Keizer and Perlaviciute (2014) proposed a framework for encouraging pro-environmental behaviour which included the role of values, situational factors and goals. Based on goal framing theory, they proposed that hedonic goals (involving seeking direct pleasure), gain goals (involving personal resources) and normative goals (involving the consideration of the appropriateness of behaviour), all govern pro-environmental behaviour in a given situation. The goal that is strongest in a given situation will be the strongest influencer of cognitive processes and decision making. Barriers to pro-environmental action often due to the conflict between normative goals on one side, and hedonic and gain goals, on the other side. For example, pro-environmental behaviour may be the most appropriate thing to do in a certain situation however, it may be considered less profitable or less pleasurable. To promote pro-environmental behaviour, Steg et al. (2014) suggests that one way may be in reducing the conflict between goals by reducing the (hedonic and gain) costs. Steg et al. (2014) also suggests that strengthening normative goals may be another way in which pro-environmental behaviour can be promoted. Strengthening normative goals may involve values and the situational factors may influence the accessibility of these values. Values influence the extent to which (hedonic, gain or normative) goals are

accessible and salient, and therefore determining which goal become the focal point in a given situation. Similar to De Groot and Steg's (2009) conclusion that promoting biospheric and altruistic values may increase pro-environmental behaviour by influencing beliefs and intentions, it can be implied that increasing environmental values may work to promote pro-environmental behaviour through increasing the saliency of normative goals.

Values, pro-environmental behaviour and the psychological impact

Pro-environmental behaviour as value-oriented action has also been suggested to have a psychological impact. Value orientations seem to impact the usefulness of pro-environmental behaviour as a coping strategy. Helm, Pollitt, Barnett, Curran and Craig (2018) carried out a survey study addressing differentiating environmental concern in the context of psychological adaption to climate change. They found that biospheric environmental concern was a positive predictor of perceived ecological stress and ecological coping strategies (Helm et al., 2018). Social-altruistic environmental concern did not predict perceived ecological stress but predicted ecological coping. Biospheric and altruistic environmental concerns, however, partially accounted for the positive association between ecological coping and pro-environmental behaviour. Those who had egoistic environmental concern did not experience ecological stress or participate in ecological coping. Ecological stress was positively predicted depressive symptoms (but did not significantly predict pro-environmental behaviour), suggesting that people with high biospheric concern are more vulnerable to negative mental health outcomes (Helm et al., 2018). Ecological coping was found to be negatively associated with depressive symptoms and positively predicted pro-environmental behaviour, suggesting that ecological coping strategies may help overcome feelings of helplessness and despair in individuals with biospheric environmental concerns (Helm et al., 2018).

From a clinical theory and practice perspective, within the framework of acceptance and commitment therapy, awareness of values and value-oriented action (or committed action guided by values) are widely known as two of the six core processes in creating psychological flexibility. Psychological flexibility is the ability to contact the present moment and to change or persist with behaviour in accordance with values, facilitating wellbeing and resilience (Harris, 2006; Harris, 2007; Hayes, Luoma, Bond,

Masuda & Lillis, 2006). Values can provide a sense of purpose, helping to create a life worth living despite life's inevitable emotional suffering (Harris, 2007). Committed action that is aligned with one's values allows individuals to achieve meaningful goals, shifting focus away from emotional suffering and, consequently reducing its impact (Harris, 2006). Ashwell's (2018) qualitative study found evidence in support of pro-environmental behaviour as value-oriented or value-guided action. Participants expressed that they engaged in pro-environmental behaviour due to their values around protecting others and the environment. They described positive emotions from engaging in pro-environmental behaviour and negative emotions (such as guilt or disappointment) when they failed to commit to their pro-environmental behaviour (Ashwell, 2018). According to acceptance and commitment therapy, when behaviour is detached from one's values, individuals lose contact with what they want from life and relief from emotional pain (Hayes et al., 2006).

Kasser and Ryan (1996) suggest that values can be classified as *intrinsic* (relating to personal growth, relationships and community involvement) or *extrinsic* (focusing on financial success, popularity and image). Intrinsic values could be viewed as aligned with altruistic or biospheric values, while extrinsic values align with egoistic values. Studies by Kasser and Ryan (1996) show that individuals with intrinsic values are more likely to report higher personal wellbeing whereas extrinsic values were associated with lower wellbeing. It is suggested that intrinsic values reflect inner psychological needs and when those needs are satisfied, this may facilitate higher wellbeing. Brown and Kasser (2005) found that subjective wellbeing was associated with pro-environmental behaviour and both subjective wellbeing and pro-environmental behaviour was positively correlated with intrinsic value orientations and dispositional mindfulness. As intrinsic values do not rely on material possessions, intrinsic pursuits may mean less energy is dedicated to consumption-based activities. Intrinsic values involve community pursuits and may lead individuals to decrease their environmentally unfriendly behaviour to benefit the future of humanity (Brown & Kasser, 2005). In summary, values appear to play an important role in influencing pro-environmental behaviour and there is also evidence that values may be linked to positive psychological outcomes. However, values are not the only important variable linked to pro-environmental behaviour and there is evidence suggesting the influence of certain demographic variables. These will be discussed below.

1.4.3 Demographic variables and pro-environmental behaviour

There is some evidence that demographic variables such as age, ethnicity or gender, may influence pro-environmental behaviour or value orientation. Early studies (Hines et al., 1987; Roberts, 1993) on adults found that older adults reported more engagement in pro-environmental behaviour than younger adults. Gilg, Barr and Ford (2005) conducted a survey study which identified different aspects of sustainable consumption in adults. Their analysis found that older age had a positive impact on green consumption behaviours. Swarmi, Chamorro-Premuzic, Snelgar and Furnham's (2011) survey study on personality and socio-demographic factors contributing to waste management behaviours found that older adults engaged more in waste management activities, though younger adults were more likely to reuse waste. McDougle, Greenspan and Handy's (2011) survey of environmental attitudes of behaviours suggested that pro-environmental behaviour in young adults does not depend on value orientation and that drivers such as normative influences have more impact on young adults' pro-environmental initiatives. Interestingly, their study did not investigate pro-environmental behaviour in its entirety, but specifically environmental volunteerism. A meta-analysis of age and environmental sustainability found that older adults were more likely to engage in pro-environmental behaviour, but overall age had negligible relationships with pro-environmental behaviour (Wiernik, Ones & Dilchert, 2013).

A meta review by Hines et al (1987) found conflicting evidence for the role of gender in environmental attitudes and behaviour. Later studies such as Hunter, Hatch and Johnson's (2004) cross-national study (which included New Zealand) found that women were more likely to engage in environmental concern and adjustment of behaviour. Glig et al. (2005) also found that men were more likely to be "non-environmentalists", engaging in lower amounts of green consumption behaviour. Milfont and Sibley's (2016) analysis of New Zealand data found that women tended to have stronger environmental values than men due to higher empathy and lower social dominance orientation. This trend may be explained by the differences in gender roles and socialisation, and in particular, the tendency for higher other-focused, empathic concern in women (Milfont & Sibley, 2016).

Milfont, Duckitt and Cameron (2006) conducted cross-cultural research in New Zealand, investigating differences between environmental motives and their implications for pro-environmental behaviour. European New Zealanders had higher scores on biospheric environmental concern and Asian New Zealanders scored significantly higher on egoistic environmental concerns. Biospheric concern was positively predicted pro-environmental behaviour in Europeans, and biospheric and altruistic concern predicted pro-environmental behaviour in Asians. Egoistic concern negatively predicted pro-environmental behaviour in Europeans but not in Asians. Biospheric concern is suggested to influence pro-environmental behaviour regardless of cultural tradition, but the role of altruistic and egoistic concern may differ across cultures (Milfont et al., 2006).

1.4.4 Summary

Overall, there are a number of personal and social factors that impact on pro-environmental behaviour. Distress around anthropogenic environmental degradation can promote pro-environmental behaviour as a problem-focused coping response. Homburg and Stolberg (2006) explain this coping response using the cognitive theory of stress and found that stress appraisals of environmental problems predict pro-environmental behaviour through problem-focused coping.

Values can also influence pro-environmental behaviour and the value orientations that most concern pro-environmental behaviour include egoistic, altruistic and biospheric values (Stern & Dietz, 1994; Stern et al., 1995; Schultz, 2001; Schultz et al., 2005). General value orientation has been measured in the past using Schwartz's (1994) values survey, or the adapted brief values inventory by Stern et al. (1998). Values impact pro-environmental behaviour through pro-environmental beliefs (concerns) and intentions (De Groot & Steg, 2009). Values also influence the extent to which (hedonic, gain or normative) goals are cognitively accessible, and therefore determining which goal become the focal point in a given situation. As pro-environmental behaviour can be affected by the conflict between goals, increasing the saliency of certain goals may lead to pro-environmental behaviour (Steg et al., 2014). Pro-environmental behaviour as committed action in accordance to values has been suggested as a way to improve wellbeing through psychological flexibility in

acceptance and commitment therapy (Harris, 2006; Harris, 2007; Hayes, Luoma, Bond, Masuda & Lillis, 2006). Brown and Kasser's (2005) study also found evidence to suggest that engagement in pro-environmental behaviour may influence subjective wellbeing, suggesting an overlap in improving both environmental and individual wellbeing.

Finally, demographic factors may also impact pro-environmental behaviour with a number of studies suggesting that older age may predict higher pro-environmental engagement (Gilg et al., 2005; Hines et al. 1987; Roberts, 1993; Swami et al., 2011; Wiernik et al., 2013). Past literature has also suggested variances among gender and ethnicity in relation to pro-environmental values, concern and behaviour (Gilg et al., 2005; Hines et al. 1987; Hunter et al., 2004; Milfont et al., 2006; Milfont & Sibley, 2016).

1.4 Current Study

The current study builds upon the findings of Ashwell's small scale qualitative study (2018) by conducting a more in-depth quantitative study using a larger sample size and, expanding the sample of young adults (aged 18-30) to adults (aged 18+). This study utilised quantitative measures to determine the relationships suggested from the findings of the previous study. The current study had the overarching aim to examine how value orientation, stress appraisals of anthropogenic environmental degradation and pro-environmental behaviour are related, in adults in New Zealand. This was further broken down into the following research questions:

Question 1: *Is there a significant relationship (or significant difference) among value orientations, pro-environmental behaviour and stress appraisals of anthropogenic environmental degradation, and (or between) demographic variables (or groups)?* Past literature has generally suggested that older adults are more likely to engage in pro-environmental behaviour (McDougle et al., 2011; Swami et al., 2011; Wiernik et al., 2013). Younger adults are more likely to perceive higher levels of environmental concern and threat (Baldassare & Katz, 1992; Gifford & Nilsson, 2016). Milfont et al. (2006) suggested that ethnicity had some influence on the relationship between environmental motives and pro-environmental behaviour. Gender has also been found

to influence environmental values and behaviour (Hunter et al., 2004; Milfont & Sibley, 2016).

Question 2: *What is the relationship between value orientations, pro-environmental behaviour and stress appraisals of anthropogenic environmental degradation?* The findings of Stern et al. (1995) and Schultz et al. (2005) suggests that pro-environmental behaviour positively correlates with biospheric-altruistic (or self-transcendence) value clusters and negatively with egoistic (or self-enhancement) value clusters. Ashwell's (2018) qualitative study found that young adults who actively engaged in pro-environmental behaviour tended to disclose values that were biospherically or altruistically oriented. Helm et al. (2018) found that only environmental concern rooted in biospheric values was positively associated with perceived ecological stress and ecological coping (ecological coping was related to pro-environmental behaviour).

Question 3: *How well do value orientations and stress appraisals of anthropogenic environmental degradation predict pro-environmental behaviour?* Previous studies have found evidence to suggest that biospheric values positively predict pro-environmental behaviour (Gatersleben et al., 2014; Helm et al., 2018). Health threat and health harm appraisals, and perceived ecological threat are also suggested to predict pro-environmental behaviour (Homburg & Stolberg, 2006; Schmitt et al., 2018), though Helm et al. (2018) found that perceived ecological stress did not significantly predict pro-environmental behaviour.

Question 4: *How well do value orientations predict stress appraisals of anthropogenic environmental degradation?* To date, only one known study (Helm et al., 2018) has examined the role of value orientation (underlying environmental concern) and perceived ecological stress. It was found that only biospheric environmental concern positively predicted perceived ecological stress.

Chapter 2: Method

This research study had the overarching aim to examine how value orientation, stress appraisals of anthropogenic environmental degradation and pro-environmental behaviour are related. The study utilised a quantitative, cross-sectional survey design using a sample of adults from New Zealand (N= 205). Procedures, instruments used, participants, data collection processes and data analysis processes will be further discussed in this section.

2.1 Procedure

The recruitment process was conducted during June – July 2019. Advertisements, which included a URL link to an online survey, were placed on social media sites. Advertisements on Facebook were placed on community group pages (e.g. ‘Zero-Waste New Zealand’, ‘Auckland Vegans’ or university group pages). The advertisements were also voluntarily shared by some participants on their own personal social media. Participants were invited to click the link to the online survey if they were interested in participating in the research. After using the URL link, the participants were presented with an information sheet which allowed them to indicate their informed consent to participate in the study. Participants were then asked to fill out and submit the online survey. No identifying information was collected and participants had full anonymity when completing the survey.

2.2 Instruments

This research study utilised an online, self-report survey that was made available through Qualtrics software (2019, Qualtrics) (Appendix A). Some of the terms used in the information sheet differed from the terms presented in this study (e.g. “pro-environmental behaviour” and “anthropogenic environmental degradation” was changed to “environmentally-friendly behaviour” and “human-caused environmental destruction”). This was to avoid using academic jargon with participants and helped to make the research study understandable to lay-persons. The survey consisted of

predominantly closed questions and measured the study variables using the following quantitative instruments.

Demographic information: A series of questions were used to obtain demographic information about the participants. Information regarding the age, gender identity and ethnicity of participants was collected.

Value orientation: Value orientation was measured using a brief inventory of values (Stern et al., 1998) which measured Schwartz's (1994) four value clusters of self-transcendence, self-enhancement (or egoistic), conservatism (or conservative) and openness to change. As the items in the self-transcendence cluster is weighted towards environmental content, Stern et al. (1998) separates these into biospheric (environmental) and altruistic (non-environmental) clusters. The use of five value clusters is recommended for environmental research where identifying biospheric values may be more appropriate (Stern et al., 1998). Five value subscales were therefore used to measure five value clusters using the 15-item inventory: altruistic (a world at peace, social justice and equality), biospheric (protecting the environment, unity with nature and respecting the earth), egoistic (authority, influence and wealth), conservative (honouring elders, family security and self-discipline) and openness to change (a varied life, an exciting life and curiosity). Each of these subscales consisted of 3 items and participants rated items "as a guiding principle in my life" on a nine-point importance scale from -1 (opposed to my values) to 0 (not important) to 7 (of supreme importance). Scores for each of the value clusters were calculated (the average of all 3 items from each cluster). Differences in response style were controlled for by calculating centred values scores, which was done by subtracting the mean value score (average of all 15 value items) from each of the scores of the five values clusters (Schwartz, 2005).

Reliability alpha scores from Stern et al. (1998) were sufficient, ranging from 0.85 – 0.62 (Table 3). Stern et al. (1998) note that the development of the brief scales sacrificed some reliability but did not result in any noticeable sacrifice of the predictive value. There was adequate validity for four value clusters: self-transcendence, conservative, self-enhancement and openness to change. The Self-transcendence is suggested to be broken into to two sub-scales, biospheric and altruistic, when research is interested in environmental attitudes and behaviours (Stern et al., 1998).

Table 3
Alpha reliability coefficients for value cluster subscales (Stern et al., 1998)

<i>Subscale</i>	<i>Study 1</i>	<i>Study 2</i>
Altruistic	.72	.65
Biospheric	.84	.84
Conservative	.64	.65
Egoistic (self-enhancement)	.70	.67
Openness to change	.77	.62

Pro-environmental behaviour: Participants were presented with a list of 14 pro-environmental behaviours or activities identified in the previous qualitative study by Ashwell (2018). The definition used to identify pro-environmental behaviours was: ‘behaviour that consciously seeks to minimize the negative impact of one’s actions on the natural and built world’ (Kollmuss & Agyeman, 2002, p. 240). Participants were asked to rate how often they had engaged in these behaviours in the past year, on a five-point Likert scale from 1 (never or almost never) to 5 (always or almost always). A total average score was generated by calculating the mean of all items.

Stress appraisal of anthropogenic environmental degradation: The stress appraisal measure (SAM) was used to measure the stress appraisals of anthropogenic environmental degradation. Because there is yet to be a validated, reliable measure of psychological distress related to anthropogenic environmental degradation, the SAM was used, as it is an established measure of stress appraisal dimensions regarding a chosen situation. The SAM is a 28-item scale used to measure an individual’s appraisal of a specific stressful situation across three primary appraisal dimensions (threat, challenge, centrality) and three secondary appraisal dimensions (controllable-by-self, controllable-by-others, uncontrollable-by-anyone). An overall perceived stressfulness subscale is also included (Peacock & Wong, 1990). Participants rated their responses to questions regarding their thoughts about various aspects of *the global situation regarding human-caused environmental destruction* (e.g. “is this a totally hopeless situation?”) on a five-point Likert scale from 1 (not at all) to 5 (extremely). There is support for the psychometric properties of the scale with satisfactory internal consistency across the SAM scales (Table 4). Two factor analyses showed that the six appraisal dimensions were relatively independent and multiple regression analyses

found that “threat” and “centrality” were significant predictors of overall stressfulness (Peacock & Wong, 1990). Mean scores were generated for each of the seven subscales.

Table 4
Alpha reliability coefficients for subscales measuring appraisal dimension of the SAM (Peacock & Wong, 1990)

<i>Subscale</i>	<i>Study 1</i>	<i>Study 2</i>	<i>Study 3</i>
<i>Primary appraisal</i>			
Threat	.75	.73	.65
Challenge	.74	.79	.66
Centrality	.90	.85	.84
<i>Secondary appraisal</i>			
Controllable by self	.87	.86	.84
Controllable by others	.84	.84	.85
Uncontrollable by anyone	.51	.82	.57
Overall perceived stressfulness	.81	.75	.79

Two open-ended questions were also included in the online survey and will be used to explore the possible psychological and functional impacts of anthropogenic environmental degradation in adults in New Zealand. The qualitative data collected from these questions will be analysed in a separate study to build upon the findings of this current quantitative study as part of a broader research project.

2.3 Participants

A total of 246 participants volunteered to complete the survey. The inclusion criteria required participants to be 18 years old or over and a New Zealand resident. Of the 246 participants, 205 completed the entire survey and provided sufficient information to be used in the current study. The 41 surveys that had missing data were discarded. 180 participants identified as female, 23 as male and 2 participants identified as non-binary or gender fluid. Ages ranged from 18 to 75 and the mean age of the participants was 36 years (SD= 12.4). The distribution of age was moderately skewed with a skewness of .781 (SE= .17) and kurtosis of .338 (SE= .34). Participants came from a diverse range of ethnic backgrounds, including Māori, Pasika and Asian. However, most of the participants (74.1%) identified as being New Zealand European (Pākehā).

Table 5
Demographic information of sample (n=205)

<i>Category</i>	<i>n (%)</i>
<i>Gender</i>	
Male	23 (11.2)
Female	180 (87.8)
Non-binary/gender fluid	2 (.9)
<i>Ethnicity</i>	
NZ European/ Pākehā	152 (74.1)
Māori	14 (6.8)
Pacific Islander/ Pasifika	4 (2.0)
Asian	21 (10.2)
Other	14 (6.8)

2.4 Data Analysis

The Statistical Package for the Social Sciences (SPSS v.25) was used to analyse the data. Data was exported from Qualtrics and imported into SPSS. 246 responses were imported, 205 responses had completed the survey with sufficient data for analysis. The other 41 responses with missing data were discarded. Scale scores were calculated for each of the variables and data was analysed. The first analyses consisted of computing the descriptive statistics for the sample. Reliability analyses were conducted, and Cronbach's alpha coefficients and item-total correlations were generated for the scales and subscales used in the study. Cronbach's alpha were considered acceptable if they were greater than .70. Considering that Cronbach's alpha may not be ideal for scales that consist of less than 10 items, mean inter-item correlations were checked if alpha coefficients were below .70. Briggs and Cheek (1986) recommend an optimal inter-item correlation range between .2 to .3. Item-total correlations were considered acceptable if they were over .30 (showing that items measure the same underlying construct) and under .80 (indicating the scale is not experiencing multicollinearity) (Pallant, 2016). Pearson's product moment correlations were used to examine the correlations amongst variables (value orientations, pro-environmental behaviour and SAM subscales) with age and gender. A series of one-way analyses of variance between groups were conducted for each of the variables between ethnic groups to examine variances between mean scores. Pearson's product moment correlations and partial correlations (controlling for age and gender) were then used to examine correlations amongst variables. Pearson's product moment correlation coefficients between the variables were also compared between demographic groups (gender and ethnicity). The statistical significance of the difference between correlation coefficients was tested using an

online calculator (<http://vassarstats.net/rdiff.html>), as per the recommendation of Pallant (2016). Finally, multiple regression analyses were utilised to test the extent to which variables predicted pro-environmental behaviour and the extent to which value orientations predicted SAM measures.

2.5 Ethical Considerations

Ethics approval (Appendix B) was obtained by the Auckland University of Technology Ethics Committee (AUTEK) to come into effect on the 5th of June 2019 for three years until the 5th of June 2022. The research proposal was approved on the 6th of May 2019 by the Postgraduate Research Committee (Appendix C).

The current study ensured informed consent was obtained by including an information sheet at the beginning of the online survey. Participants were able to remain fully anonymous and no personal identifying information was collected. Traditional ‘positivist’ quantitative methods consider the researcher in an ‘expert’ position which may be incongruent with the principles of the Treaty of Waitangi (partnership, participation and protection). Therefore, adaptations were made to the terminology used in the advertisement and online survey to avoid using academic jargon and language that may not be understood by laypersons. This was to ensure that the research remained as collaborative as possible and avoid patronising participants. This may help reduce the perception of the researcher holding an ‘expert’ position.

Chapter 3: Results

3.1 Preliminary Analyses

3.1.1 Normality

Normality of the distribution of scores was determined for each of the brief values inventory and stress appraisal measure subscales as well as the total pro-environmental behaviour scores. A Kolmogorov-Smirnov test indicated that generally scores did not follow a normal distribution (Sig.<0.05), except those from the conservative, egoistic and openness subscales of the brief values inventory. This is common in large samples (Pallant, 2016). Histograms generated however, appeared to be reasonably normally distributed and normal Q-Q plots generated showed scores plotted in a relatively straight line, also indicating normality. Considering the large sample size (N= 205), the histograms and normal Q-Q plot scores, the distribution of scores appeared to be reasonably normal and parametric statistics were used.

3.1.2 Reliability analysis

Reliability analyses and internal consistency reliability estimates were generated for each of the scales used to measure the variables in the study. Table 6 presents the information regarding the scales and summated subscales. The biospheric, threat, controllable-by-self, uncontrollable-by-anyone and overall stressfulness subscales had Cronbach's alpha above .70, indicating sufficient internal consistency for each of these subscales. The centrality, controllable-by-others subscales and the scale measuring pro-environmental behaviour all had Cronbach's alpha coefficients above .80, indicating excellent internal consistency. The Cronbach's alpha coefficient for altruistic, conservative, egoistic, openness to change and challenge subscales were all below .70. Cronbach's alpha values are sensitive to the number of items in the scale and with short scales (items fewer than 10), it is common to find low Cronbach's alpha values (Pallant, 2016). In these cases, it may be appropriate to look at inter-item correlation for items. Considering this, the conservative, egoistic, openness to change and challenge subscales all presented with inter-item correlation means between .2 and .4, within the optimal

range indicating these items are measuring the same underlying construct. The altruistic subscale displayed a Cronbach's alpha of .69 and inter-item correlation mean of .43, this places the altruistic subscale slightly outside the ranges indicating sufficient internal consistency.

Table 6
Number of participants (*n*), number of items, mean (*M*), standard deviation (*SD*), Cronbach's alpha (*a_c*) and inter-item correlation mean for scales and subscales

<i>Scale</i>	<i>n</i>	<i>Number of Items</i>	<i>M</i>	<i>SD</i>	<i>a_c</i>	<i>Inter-Item Correlation Mean</i>
<i>Brief Inventory of Values</i>						
Altruistic	205	3	17.56	3.10	.69	.43
Biospheric	205	3	17.32	3.40	.80	.59
Conservative	205	3	14.70	3.49	.54	.30
Egoistic (Self-Enhancement)	205	3	8.16	3.83	.64	.37
Openness to change	205	3	14.63	3.22	.59	.32
<i>Stress Appraisal Measure</i>						
Threat	205	4	14.28	3.17	.71	.39
Centrality	205	4	15.71	3.43	.90	.68
Challenge	205	4	12.75	2.65	.47	.19
Controllable-by-self	205	4	10.95	2.94	.78	.48
Controllable-by-others	205	4	9.96	3.04	.83	.55
Uncontrollable-by-anyone	205	4	9.21	3.42	.79	.48
Overall stressfulness	205	4	12.54	3.17	.75	.43
<i>Pro-Environmental Behaviour</i>	205	14	51.50	8.09	.84	.30

The majority of the items in each of the subscales of the brief inventory of values appeared to correlate well with the total score with no indication of multicollinearity (Table 7). The item 'Curiosity, interest in everything, exploring' in the openness to change subscale displayed an item-total statistic of .29. Values lower than .3 indicate that the item is likely to be measuring something different to the scale as a whole. As the overall inter-item correlation mean was within the optimal range (.2 to .4), the item was retained in the analysis. When comparing the Cronbach's alpha coefficient with the final values obtained in Table 6, most of the values exceeded the final alpha value, indicating that these items should be retained for analysis. The exception is the item 'curiosity, interest in everything, exploring' in the openness to change subscale. As the brief inventory of values is an already established measure, the removal of items would mean that results would not be comparable to other studies and

again, this item was retained for analysis. Overall, the results indicate that each of the subscales within the brief inventory of values was unidimensional, with most items measuring the same underlying construct.

Table 7

Means (M), standard deviations (SD), item-total correlations and Cronbach's alpha if deleted for items within the subscales of the brief inventory of values

<i>Item</i>	<i>M</i>	<i>SD</i>	<i>Item-Total Correlation</i>	<i>Cronbach's Alpha if Item Deleted</i>
<i>Altruistic subscale</i>				
Social justice	5.68	1.46	.51	.59
Equality, equal opportunity for all	5.85	1.27	.57	.51
A world at peace, free of war and conflict	6.03	1.21	.44	.67
<i>Biospheric subscale</i>				
Protecting the environment, preserving nature	6.20	1.06	.64	.75
Unity with nature, fitting into nature	5.18	1.60	.66	.74
Respecting the earth, harmony with other species	5.95	1.32	.69	.68
<i>Conservative subscale</i>				
Honouring parents and elders, showing respect	4.85	1.71	.45	.27
Family security, safety for loved ones	6.15	1.14	.34	.49
Self-discipline, self-restraint, resistance to temptation	3.70	1.88	.31	.54
<i>Egoistic (self-enhancement) subscale</i>				
Wealth, material possessions, money	2.69	1.46	.33	.68
Authority, the right to lead or command	2.09	1.68	.56	.37
Influence, having an impact on people and events	3.38	1.86	.47	.51
<i>Openness to change subscale</i>				
Curiosity, interest in everything, exploring	5.33	1.35	.29	.63
An exciting life, stimulating experiences	4.68	1.48	.44	.42
A varied life, filled with challenge, novelty and change	4.62	1.52	.47	.37

Table 8 displays the reliability analysis for the items in the scale used to measure pro-environmental behaviour. Most item-total correlations appear to be over .30, indicating that the items are measuring the same underlying construct. All item-total correlation statistics are below .80, providing no evidence of multicollinearity. The item 'used alternative or public transport' had an item-total correlation of .261, suggesting that the item may be measuring something different from the overall scale. As this is close to the cut-off criterion, the item remained in the analysis. If each item was deleted, the Cronbach's alpha for the scale would all be above .70 and there the deletion would not make a significant impact on the internal consistency of the scale (Table 6). Items were therefore all retained in the analysis.

Table 8
Means (M), standard deviations (SD), item-total correlations and Cronbach's Alpha if Item Deleted for the items in the pro-environmental behaviour measure

<i>Item</i>	<i>M</i>	<i>SD</i>	<i>Item-Total Correlation</i>	<i>Cronbach's Alpha if Item Deleted</i>
Made specific dietary choices or changes	3.79	1.21	.36	.84
Used alternative or public transport	3.13	1.21	.26	.85
Consciously reduced waste	4.17	.81	.65	.82
Consciously reduced material purchases	3.89	.97	.70	.82
Consciously avoided plastic or packaging	3.95	.80	.60	.83
Purchased second hand or re-purposed goods	3.62	1.02	.41	.84
Purchased eco-products	3.84	.86	.62	.82
Recycled	4.71	.60	.42	.84
Purchased organic goods	2.96	.89	.38	.84
Conserved water usage	3.37	1.02	.52	.83
Conserved power or energy usage	3.53	.98	.48	.83
Composed food scraps	3.91	1.41	.50	.83
Engaged in environmental activism or advocacy	2.85	1.23	.50	.83
Talked to friends or family about environmental issues	3.80	.87	.56	.83

Reliability analysis indicated that items in each of the subscales of the Stress Appraisal Measure also appeared to correlate well with the total test score (Table 9). Item-total correlation statistics were above .30 and below .80; items appeared to be measuring the same construct within each subscale and show no indication of multicollinearity. The exception to this is the item 'Is this going to have a positive impact on me?' from the challenge subscale, which had an item-total correlation of .05. As the stress appraisal measure is an established scale, the item was left for the analysis. Cronbach's alpha if item deleted values were greater than the final alpha values displayed in Table 6. Again, this was except for the item 'Is this going to have a positive impact on me?'. The challenge subscale would have a Cronbach's alpha of .62 if this item was deleted. As the brief inventory of values is already an established scale, excluding items for analysis would impact on the ability to compare the results with other studies, therefore this item was retained for analysis.

Table 9
Means (M), standard deviations (SD), item-total correlations and Cronbach's Alpha if Item Deleted for the items in the subscales of the Stress Appraisal Measure

<i>Item</i>	<i>M</i>	<i>SD</i>	<i>Item-Total Correlation</i>	<i>Cronbach's Alpha if Item Deleted</i>
<i>Threat</i>				
Does this situation make me feel anxious?	3.17	1.08	.41	.70
Will the outcome of this situation be negative?	3.43	1.23	.48	.65
How threatening is this situation?	4.30	.89	.55	.62

Table 9 (continued)

Is this going to have a negative impact on me?	3.39	1.10	.56	.60
<i>Centrality</i>				
Does this situation have important consequences for me?	3.96	1.00	.76	.87
How much will I be affected by the outcome of this situation?	4.02	.91	.77	.86
Does this situation have serious implications for me?	3.72	1.08	.79	.86
Does this situation have long-term consequences for me?	4.01	.947	.75	.87
<i>Challenge</i>				
Is this going to have a positive impact on me?	1.90	1.17	.05	.62
How eager am I to tackle this problem?	3.99	.92	.40	.29
To what extent can I become a stronger person because of this problem?	3.14	1.08	.44	.22
To what extent am I excited thinking about the outcome of this situation?	3.72	1.08	.26	.41
<i>Controllable-by-self</i>				
Do I have the ability to do well in this situation?	2.88	.98	.58	.74
Do I have what it takes to do well in this situation?	2.99	.90	.66	.69
Will I be able to overcome the problem?	2.46	.96	.56	.74
Do I have the skills necessary to achieve a successful outcome to this situation?	2.62	.93	.56	.75
<i>Controllable-by-others</i>				
Is there someone or some agency I can turn to for help if I need it?	2.39	1.00	.59	.81
Is there help available to me for dealing this problem?	2.61	.91	.75	.74
Are there sufficient resources available to help me in dealing with this situation?	2.44	.88	.60	.81
Is there anyone who can help me manage this problem?	2.52	.95	.68	.77
<i>Uncontrollable-by-anyone</i>				
Is this a totally hopeless situation?	2.92	1.08	.48	.79
Is the outcome of this situation uncontrollable-by-anyone?	2.34	1.14	.62	.72
Is it beyond anyone's power to do anything about this situation?	1.95	1.10	.66	.71
Is the problem unresolvable by anyone?	2.00	1.06	.64	.71
<i>Overall stressfulness</i>				
Does this situation create tension for me?	3.44	1.01	.62	.65
Does this situation tax or exceed my coping resources?	2.52	1.05	.46	.74
To what extent do I perceive this situation as stressful?	3.35	1.15	.70	.60
To what extent does this situation require coping efforts on my part?	3.22	.97	.43	.75

3.1.3 Demographic variables

The reseearch question: ‘*Is there a significant relationship (or significant difference) among value orientations, pro-environmental behaviour and stress appraisals of anthropogenic environmental degradation, and (or between) demographic variables (or groups)?*’ was addressed using correlation analyses and analyses of variance.

Pearson’s correlations were generated among each of the variables with age and gender. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. Correlation coefficients were interpreted using guidelines in Cohen (1988, pp. 79-81). As Pearson’s correlation analysis may only be used with continuous variables and dichotomous variables, correlation analyses with gender excluded the two participants who indicated they were non-binary/ gender-fluid. There were weak, negative correlations between age and openness to change value orientation, $r = -.22$, $n = 205$, $p = .002$, threat appraisals, $r = -.23$, $n = 205$, $p < .001$, centrality appraisals, $r = -.23$, $n = 205$, $p < .04$, controllable-by-self appraisals, $r = -.15$, $n = 205$, $p < .05$, and overall perceived stressfulness, $r = -.15$, $n = 205$, $p < .05$. There was also a weak, positive correlation between age and pro-environmental behaviour, $r = .28$, $n = 205$, $p < .001$, and no significant correlations between age and any other variables. No significant correlations were found between any of the variables and gender (all $p > .05$). Pearson’s correlations between each of the variables were conducted and the strength of each of the correlation coefficients were compared between male and female groups. Differences between correlation coefficients for male and female were also found to be not significantly different between each of the variables (all $p > .05$).

A series of analyses of variance (ANOVA) between groups were then conducted on the study variables to determine if they varied as a function of ethnicity as the independent variable. Ethnicity did not have a significant effect on altruistic value orientation, $F(4, 200) = 1.74$, $p = .14$, biospheric value orientation, $F(4, 200) = 1.27$, $p = .28$, conservative value orientation, $F(4, 200) = 1.94$, $p = .11$, egoistic value orientation, $F(4, 200) = 1.96$, $p = .10$, openness to change value orientation, $F(4, 200) = .73$, $p = .57$, amount of pro-environmental behaviour, $F(4, 200) = 2.32$, $p = .06$, threat appraisals, $F(4, 200) = .605$, $p = .66$, challenge appraisals, $F(4, 200) = 1.03$, $p = .39$, centrality appraisals,

$F(4, 200) = 1.87, p = .12$, controllable-by-self appraisals, $F(4, 200) = .663, p = .618$, controllable-by-others appraisals $F(4, 200) = .93, p > .45$, uncontrollable-by-anyone appraisals, $F(4, 200) = .94, p = .44$, and overall perceived stressfulness, $F(4, 200) = 1.25, p = .29$. Thus, all variables did not differ significantly between ethnic groups. Pearson's correlations between each of the study variables were determined and the strengths of each of the correlation coefficients were compared between ethnic groups. Differences between correlation coefficients for all ethnic groups were found to be not significantly different between each of the variables (all $p > .05$).

Overall, age had significant correlations with some variables while gender and ethnicity had no significant correlations with any of the variables in this study. As there is some evidence that pro-environmental behaviour and value-orientation may be influenced age or gender (McDougle et al., 2011; Milfont & Sibley, 2016; Swarmi et al., 2011), these factors were controlled for during correlational and multiple regression analyses.

3.2 Correlational Analyses

Correlational analyses were conducted to answer the research question: '*What is the relationship between value orientations, pro-environmental behaviour and stress appraisals of anthropogenic environmental degradation?*'. The relationships between each of the variables was analysed using Pearson product-moment correlations and partial correlations controlling for age and gender (Table 10). Preliminary analyses ensured no violation of the assumptions of normality, linearity and homoscedasticity. Partial correlation coefficients appeared to be similar to the zero-order coefficients.

3.2.1 Correlations within scales

Among the subscales of the brief inventory of values, moderate, negative correlations were found between egoistic and altruistic value orientations, and egoistic and biospheric value orientations. There were also moderate, negative correlations between biospheric and conservative value orientations, and between altruistic and conservative value orientations.

Table 10 also displays the many significant relationships between the dimensions of stress appraisal and overall perceived stressfulness. Notably, threat and centrality appraisals were the most strongly correlated with overall perceived stressfulness. There were also strong, positive correlations between challenge and controllable-by-self appraisals, and controllable-by-others and controllable-by-self appraisals.

3.2.2 Value orientations and pro-environmental behaviour

When controlling for age and gender, a strong, positive relationship was found between biospheric value orientation and pro-environmental behaviour, $r = .56$, $n = 203$, $p < .001$. There was also a moderate, negative relationship observed between egoistic value orientation and pro-environmental behaviour, $r = -.42$, $n = 203$, $p < .001$.

3.2.3 Dimensions of stress appraisal and pro-environmental behaviour

Across the dimensions of stress appraisal, moderate, positive relationships were observed with pro-environmental behaviour for challenge, $r = .39$, $n = 203$, $p < .001$, centrality, $r = .48$, $n = 203$, $p < .001$ and controllable-by-self appraisals, $r = .38$, $n = 203$, $p < .001$ (Table 10). Challenge, centrality and controllable-by-self appraisals (of global anthropogenic environmental degradation) were therefore, moderately correlated with an increased amount of pro-environmental behaviour. There was also a moderate, positive relationship between pro-environmental behaviour and overall perceived stress, $r = .43$, $n = 203$, $p < .001$. Small, positive correlations were found between pro-environmental behaviour and threat, $r = .27$, $n = 203$, $p < .001$, and between pro-environmental behaviour and controllable-by-others appraisals, $r = .16$, $n = 203$, $p = .03$. The remaining stress appraisal dimension, 'uncontrollable-by-anyone' showed no significant relationship with pro-environmental.

3.2.4 Value orientations and dimensions of stress appraisals

Partial correlations controlling for age and gender (Table 10) showed that biospheric value orientation was correlated with all stress appraisal dimensions. Biospheric value orientation had moderate, positive correlations with challenge, $r = .31$,

$n= 203, p < .001$, centrality, $r = .41, n= 203, p < .001$, and overall perceived stressfulness, $r = .39, n= 203, p < .001$. Weak, positive correlations were found between the other dimensions of stress appraisal (threat, controllable-by-others, controllable-by-self and uncontrollable-by-anyone).

Weak to moderate, negative relationships were found with egoistic value orientation for threat, $r = -.28, n= 203, p < .001$, centrality, $r = -.29, n= 203, p < .001$, and overall perceived stressfulness, $r = -.26, n= 203, p < .001$. Conservative value orientation had a weak, positive relationship with uncontrollable-by-anyone appraisals, $r = .18, n= 203, p = .01$, and a weak, negative relationship with overall perceived stressfulness, $r = -.19, n= 203, p = .004$. No other significant relationships were observed across dimensions of stress appraisal and value orientations.

Table 10
 Pearson's correlations between variables with partial correlations controlling for age and gender^a to the right of the major diagonal.

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Altruistic	-	.06	-.10	-.46***	-.33***	.10	.06	-.09	.08	.03	-.04	-.14	.12
2. Biospheric	.06	-	-.41***	-.48***	-.16*	.56***	.28***	.31***	.41***	.29***	.15*	-.14*	.39***
3. Conservative	-.10	-.39***	-	-.10	-.32***	-.12	-.08	-.03	-.16*	-.03	.03	.18**	-.19**
4. Egoistic	-.45***	-.48***	-.10	-	-.18*	-.42***	-.28***	-.10	-.29**	-.13	-.02	.06	-.26***
5. Openness to change	-.34***	-.17*	-.33***	-.17*	-	-.07	.07	-.11	-.02	-.16	-.12	.03	-.03
6. Pro-environmental behaviour	.12	.56***	-.10	-.40***	-.13	-	.27***	.39***	.48***	.38***	.16*	-.04	.43***
7. Threat	.05	.24***	-.10	-.27***	.11	-.19**	-	-.06	.63***	.06	-.23**	.22**	.70***
8. Challenge	-.08	.30***	-.03	-.09	-.11	.38***	-.06	-	.28***	.62***	.41***	.17*	.30***
9. Centrality	.06	.38***	-.16*	-.28***	.03	.37***	.64***	.26***	-	.26***	-.07	-.01	.62***
10. Controllable-by-self	.02	.28***	-.04	-.13	-.12	.32***	.09	.61***	.28***	-	.54***	-.14	.38***
11. Controllable-by-others	-.05	.15*	.03	-.02	-.12	.16*	-.23**	.41***	-.07	.53***	-	-.18**	.02
12. Uncontrollable-by-anyone	-.13	-.12	.19**	.06	.00	-.01	.18**	-.17*	-.04	-.15*	-.18**	-	.21**
13. Overall stressfulness	.12	.36***	-.20**	-.25***	.01	.37**	.71***	.30***	.62***	.39***	.02	.18**	-

Note. Zero order correlations $N= 205$; Partial correlations $N= 203$

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

^a Male= 1 Female= 2

3.3 Multiple Regression Analyses

Multiple regression analyses were utilised to address the research questions: ‘*How well do value orientations and dimensions of stress appraisal predict pro-environmental behaviour?*’ and ‘*How well do value orientations predict the dimensions of stress appraisal (regarding anthropogenic environmental degradation)?*’.

Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity.

3.3.1 Predicting pro-environmental behaviour

Hierarchical multiple regression was used to assess how well value orientation (altruistic, biospheric, egoistic) and the dimensions of stress appraisal (threat, challenge, centrality, controllable-by-self, controllable-by-others, uncontrollable-by-anyone, overall perceived stressfulness) as independent variables, predicted pro-environmental behaviour as the dependent variable, after controlling for the influence of age and gender (Table 11). Conservative and openness to change value orientations were not included in the regression model as they were not found to be significant predictors. Though altruistic value orientation was also not found to be a significant predictor it was included in the model as previous research has suggested its importance in explaining pro-environmental behaviour (De Groot & Steg, 2009; Helm et al., 2018; Schultz et al., 2005; Stern et al., 1995).

Age and gender were entered at Step 1, explaining 8% of the variance in pro-environmental behaviour. After entry of altruistic, biospheric and egoistic value orientation in Step 2, the total variance explained by the model as a whole was 40%, $F(5, 197) = 26.50, p < .001$. The addition of the value orientations explained an additional 32% of the variance in pro-environmental behaviour when controlling for age and gender. When the measures of stress appraisal were entered in Step 3, the total variance in pro-environmental behaviour explained by the model was 51%, $F(12, 190) = 16.40, p < .001$. The dimensions of stress appraisals further contributed an added 11% to the variance in pro-environmental behaviour.

Within the regression model depicted in Step 3 age, gender, biospheric value orientation, egoistic value orientation and centrality appraisals significantly predict pro-environmental behaviour. Age was shown to have the greatest predictive power, $\beta = .30$, $p < .001$, followed by biospheric value orientation, $\beta = .29$, $p < .001$, centrality appraisals, $\beta = .24$, $p = .002$, egoistic value orientation, $\beta = -.19$, $p = .006$, and finally gender, $\beta = .13$, $p = .02$.

Table 11
Hierarchical multiple regression model predicting pro-environmental behaviour from value orientations and dimensions of stress appraisals

<i>Step and variable</i>	<i>R²</i>	<i>ΔR²</i>	<i>ΔF</i>	<i>B</i>	<i>β</i>	<i>T</i>
<i>Step 1</i>	.08	.08	9.04***			
Age				.01	.27	4.04***
Gender				.15	.08	1.20
<i>Step 2</i>	.40	.32	35.07***			
Age				.01	.23	4.07***
Gender				.23	.12	2.24*
Altruistic				-.02	-.02	-.34
Biospheric				.27	.45	6.94***
Egoistic				-.11	-.20	-2.76**
<i>Step 3</i>	.51	.11	5.89***			
Age				.01	.30	5.33***
Gender				.24	.13	2.43*
Altruistic				-.01	-.02	-.31
Biospheric				.18	.29	4.36***
Egoistic				-.10	-.19	-2.76**
Threat				-.07	-.10	-1.05
Challenge				.09	.10	1.42
Centrality				.16	.24	3.11**
Controllable-by-self				.09	.11	1.37
Controllable-by-others				.01	.01	.17
Uncontrollable-by-anyone				.03	.05	.81
Overall perceived stressfulness				.07	.09	1.00

Note. $N = 203$.

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

3.3.2 Predicting the dimensions of stress appraisal

Hierarchical multiple regression was used to explore how well value orientation (altruistic, biospheric, egoistic) as independent variables, predicted each of the measures of stress appraisal of anthropogenic environmental degradation as dependent variables, after controlling for age, gender and pro-environmental behaviour. The value orientations that were not found to be significant predictors of the stress appraisal measures were not included in the regression models. Though biospheric, altruistic and egoistic did not always significantly predict stress appraisal measures, they were included in the regression models due to previous research suggesting their relationship

with perceived environmental stress (Helm et al., 2018). Of all the models generated, only those with significant predictors are presented below.

Table 12
Hierarchical multiple regression model predicting threat appraisals from value orientations.

<i>Step and variable</i>	<i>R²</i>	<i>ΔR²</i>	<i>ΔF</i>	<i>B</i>	<i>β</i>	<i>T</i>
<i>Step 1</i>	.12	.12	8.97***			
Age				-.02	-.30	-4.32*
Gender				.08	.03	.50
Pro-environmental behaviour				.37	.27	3.88***
<i>Step 2</i>	.16	.04	3.42*			
Age				-.02	-.27	-3.94***
Gender				.17	.07	1.02
Pro-environmental behaviour				.17	.13	1.49
Altruistic				-.05	-.05	-.70
Biospheric				.09	.11	1.30
Egoistic				-.15	-.19	-2.21*

Note. N= 203.

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

Table 12 presents the hierarchical regression model predicting threat appraisals of anthropogenic environmental degradation. Age, gender and pro-environmental behaviour were included in Step 1 and accounted for 12% of the variance in threat appraisals. Altruistic, biospheric and egoistic orientation was entered in Step 2 and explained 16% $F(6, 196) = 6.36, p < .001$, of the variance in threat appraisals. The value orientations explained only an additional 4%, $F(3, 196) = 3.42, p = .02$ Egoistic value orientation, $\beta = -.19, p = .03$, and age, $\beta = -.27, p < .001$, were the only significant predictors in this model.

Table 13
Hierarchical multiple regression model predicting centrality appraisals from value orientations.

<i>Step and variable</i>	<i>R²</i>	<i>ΔR²</i>	<i>ΔF</i>	<i>B</i>	<i>β</i>	<i>T</i>
<i>Step 1</i>	.28	.28	25.30***			
Age				-.03	-.36	-5.73***
Gender				-.37	-.14	-2.27*
Pro-environmental behaviour				.72	.48	7.66***
<i>Step 2</i>	.31	.03	2.82*			
Age				-.02	-.35	-5.51***
Gender				-.31	-.11	-1.86
Pro-environmental behaviour				.52	.35	4.57***
Altruistic				.02	.02	.24
Biospheric				.17	.19	2.44*
Egoistic				-.03	-.04	-.49

Note. N= 203.

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

The hierarchical multiple regression model predicting challenge appraisals is presented (Table 13). After controlling for age, gender and pro-environmental behaviour, the model in Step 1 accounted for 28% of the variance in centrality appraisals. Altruistic, biospheric and egoistic value orientations were entered in Step 2 and the variance explained by the model was 31%, $F(6, 196)= 14.41, p< .001$. The value orientation explained only an additional 3% of the variance in centrality appraisals controlling for age, gender and pro-environmental behaviour, R squared change= .03, F change (3, 196)= 2.82, $p= .04$. In the model depicted in Step 2, pro-environmental behaviour, $\beta= .35, p< .00$, and age, $\beta= .35, p< .001$, had the strongest predictive power followed by biospheric value orientation $\beta= .19, p= .02$.

Table 14
Hierarchical multiple regression model predicting overall perceived stressfulness appraisals from value orientations.

<i>Step and variable</i>	<i>R²</i>	<i>ΔR²</i>	<i>ΔF</i>	<i>B</i>	<i>β</i>	<i>T</i>
<i>Step 1</i>	.20	.20	17.03***			
Age				-.02	-.28	-4.18***
Gender				.09	.04	.56
Pro-environmental behaviour				.60	.44	6.63***
<i>Step 2</i>	.24	.04	3.12*			
Age				-.02	-.27	-4.05***
Gender				.13	.05	.85
Pro-environmental behaviour				.42	.31	3.81***
Altruistic				.08	.08	1.11
Biospheric				.18	.21	2.63**
Egoistic				.00	.01	.07

Note. $N= 203$.

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

Table 14 presented the hierarchical regression model predicting overall perceived stressfulness. Step 1 controlled for age, gender and pro-environmental behaviour and the model predicted 20% of the variance in overall perceived stressfulness. After the value orientations were entered, the model predicted an additional 4%, R squared change= .04, F change (3, 196)= 3.12, $p= .03$. The model depicted in Step 2 in total, predicted 24%, $F(6, 196)= 10.352, p< .001$, of the variance in overall perceived stressfulness. Pro-environmental behaviour had the highest predictive power, $\beta= .31, p< .001$, followed by age, $\beta= -.27, p< .001$, and biospheric value orientation, $\beta= .21, p= .01$.

Chapter 4: Discussion

The current study had the overarching aim to examine how value orientation, stress appraisals of anthropogenic environmental degradation and pro-environmental behaviour are related, in adults in New Zealand. To address this, the study set out to answer four research questions: 1) *‘Is there a significant relationship (or significant difference) among value orientations, pro-environmental behaviour and stress appraisals of anthropogenic environmental degradation, and (or between) demographic variables (or groups)?’*, 2) *‘What is the relationship between value orientations, pro-environmental behaviour and stress appraisals of anthropogenic environmental degradation?’*, 3) *‘How well do value orientations and stress appraisals of anthropogenic environmental degradation predict pro-environmental behaviour?’*, and 4) *‘How well do value orientations predict stress appraisals of anthropogenic environmental degradation?’* The current study’s findings are presented below and are discussed in relation to the previous literature.

4.1 Demographic Variances in Value Orientation, Pro-Environmental Behaviour and Stress Appraisals of Anthropogenic Environmental Degradation

To address the first research question: *‘Is there a significant relationship (or significant difference) among value orientations, pro-environmental behaviour and stress appraisals of anthropogenic environmental degradation, and (or between) demographic variables (or groups)?’*, a series of correlational analyses and analyses of variances were used.

4.1.1 Age

Analyses found a weak, negative relationship between age and openness to change, suggesting that older adults are associated with a lower openness to change value orientation. No other significant correlations between age and value orientations were observed in the current study. These results differed slightly to those of Helm et al. (2018), who found that age had a small, negative correlation with egoistic environmental concern, but also found that age did not correlate with biospheric and

altruistic values (though Helm et al. (2018) measured values underlying environmental concern rather than general value orientation). Among the stress appraisal measures the variables of threat, centrality, controllable-by-self and overall perceived stressfulness appraisals had weak, negative relationships with age. This suggests that older adults are associated with the reduced appraisal of threat, centrality, controllable-by-self and overall perceived stressfulness around anthropogenic environmental degradation. Helm et al. (2018) found no correlation between age and perceived ecological stress, however, their study uses a general measure of perceived ecological stress, rather than a measure of the component of stress appraisal. As this measure differs from the stress appraisal measure used in this study, findings are difficult to compare. Age had a weak, positive relationship with pro-environmental behaviour. Older adults are associated with higher engagement in pro-environmental behaviour. This was consistent with the findings of Swami et al. (2011) and Helm et al. (2018), who also found positive correlations between pro-environmental behaviour and age. However, results differed from Schmitt et al. (2018) who found no correlation between age and pro-environmental behaviour.

Overall, correlational analysis found that age had weak relationships with some of the variables in the study (openness to change, threat, centrality, controllable-by-self, overall perceived stressfulness and pro-environmental behaviour) which is consistent with some of the findings from past literature. The findings suggest that age may be weakly associated with pro-environmental behaviour and certain components of stress appraisal. Out of all value orientations, only openness to change had a weak relationship with age, suggesting that for the most part, age may not be associated with the value orientations of individuals. Despite this study's correlational findings, later regression analyses found that age was a significant predictor of pro-environmental behaviour, threat appraisal, centrality appraisal and overall perceived stressfulness. The implications of these findings are addressed in the discussion of the results of the regression analyses.

4.1.2 Gender and ethnicity

No significant correlations were found between gender and any of the variables in the study, suggesting that there is no relationship between gender and value orientations, pro-environmental behaviour and stress appraisals of anthropogenic

environmental degradation. Correlation coefficients between the study variables were also compared between the male and female groups and no significant differences were found. These findings are consistent with those of Stern et al. (1993), who found that strengths of value orientations did not differ between males and females. However, the study found that females had stronger environmental concerns for self, others and the biosphere. Correlational analyses in Schmitt et al. (2018) found there were weak relationships between gender and ecological threat and pro-environmental behaviour, and being female correlated with higher perceived ecological threat and engagement in pro-environmental behaviour. Previous studies (Hunter et al., 2004; Milfont & Sibley, 2016) have also found that females are more likely to hold environmental values and engage in environmental concern and behaviour. Milfont and Sibley (2016) suggests that this may be due to the tendency for females to display higher levels of empathy and lower social dominance orientation. It could be of note that there was a significantly lower number of males compared with females in the sample size (190 females and 23 males) and this may impact on the results. Regression analysis in this study also found gender to be a small but significant predictor of pro-environmental behaviour, consistent with the findings of Hunter et al. (2004) and this will be elaborated upon in the discussion of the results of the regression analyses.

A series of ANOVA found that value orientation, pro-environmental behaviour and stress appraisals of anthropogenic environmental degradation were not significantly different between ethnic groups. Pearson's correlation coefficients between the study variables were compared between the ethnic groups and no significant differences were found. The findings differ to those of Milfont et al. (2006) who found differences between ethnicity in regard to environmental concern and its implications on pro-environmental behaviour. European New Zealanders had higher mean scores for biospheric environmental concern than Asian New Zealanders. Asian New Zealanders had significantly higher scores on egoistic environmental concern than European New Zealanders. Biospheric concern positively predicted pro-environmental behaviour in Europeans and biospheric and altruistic concern positively predicted pro-environmental behaviour in Asians. Egoistic concern predicted lower pro-environmental behaviour in Europeans but not in Asians. This current study measured general value orientation rather than values forming environmental concern, which may explain why the findings differ from those of Milfont et al. (2006). The current study also had a sample which

predominantly consisted of New Zealand Europeans (74%), which may also be reflected in the findings.

In summary, gender had no significant relationship with the variables in this study and variables in this study did not significantly differ between ethnic groups. The relationships between the variables in this study were also not significantly different between gender and ethnic groups. These findings deviate from most of the previous research. To an extent, this could be influenced by the disproportionate number of females (88%) and New Zealand Europeans (74%) in the sample. Later analyses found that gender emerged as a significant predictor of pro-environmental behaviour, which is consistent with the current literature and will be addressed with the findings of the regression analyses.

4.2 Correlational Relationships Among Variables

Pearson's product-moment correlations and partial correlations (controlling for age and gender) were used to determine the correlations between variables and answer the research question: *'What is the relationship between value orientations, pro-environmental behaviour and stress appraisals of anthropogenic environmental degradation?'*

4.2.1 Value orientation and pro-environmental behaviour

The current study found that pro-environmental behaviour had a strong relationship with biospheric values. This suggests that stronger values around protecting/ respecting the environment and other species, are associated with higher engagement in pro-environmental behaviour. Egoistic value orientation was found to have a moderate, negative relationship with pro-environmental and indicates that greater values around self-enhancement and power, are associated with lower engagement in pro-environmental behaviour. This is consistent with the findings of Stern et al. (1995) and Schultz et al. (2005) which showed that pro-environmental behaviour positively correlated with biospheric-altruistic (or self-transcendence) value clusters and negatively with egoistic (or self-enhancement) value clusters. The current study measured altruistic value orientation as a separate construct (separating the self-

transcendence value cluster in the brief inventory of values) and found no significant relationship between pro-environmental behaviour and altruistic value orientation. Altruistic values concern the welfare of society and this suggests that pro-environmental behaviour may not be associated with this aspect of self-transcendence values. It could be suggested that pro-environmental behaviour is associated with only the biospheric (welfare of the environment) component of biospheric-altruistic (or self-transcendence) value orientations. Helm et al. (2018) found that biospheric environmental concern correlated with pro-environmental behaviour and social-altruistic environmental concern also correlated with pro-environmental behaviour. It should be noted that the study explored values underlying environmental concern while the current study concerned individual's general value orientation. Past studies (Schultz, 2001; Schultz et al., 2005; Stern et al., 1995) has found conflicting evidence regarding how environmental concern is related to general value orientation. It is unclear how egoistic, altruistic and biospheric value orientations influence egoistic, altruistic and biospheric environmental concerns.

The findings of this study suggest that overall, biospheric values have a strong, positive relationship with pro-environmental behaviour, while egoistic values have a moderate, negative relationship with pro-environmental behaviour. Despite the fact that the present study found no relationship between altruistic value orientation and pro-environmental behaviour, altruistic value orientation may still be associated with pro-environmental behaviour should they underly environmental concern (Helm et al., 2018).

4.2.2 Stress appraisals of anthropogenic environmental degradation and pro-environmental behaviour

Across the measures of stress appraisal, challenge, centrality, controllable-by-self appraisals and overall perceived stressfulness had a moderate, positive relationships with pro-environmental behaviour. These findings suggest that individuals who appraised anthropogenic environmental degradation as a challenge, important to wellbeing, controllable by one's self and perceived the situation as stressful overall, may be more likely to engage in pro-environmental behaviour. Threat and controllable-by-others appraisals had a weak, positive relationships with pro-environmental

behaviour, suggesting that individuals who appraise anthropogenic environmental degradation as a threat or controllable by other, may also be likely to engage in pro-environmental behaviour. Uncontrollable-by-anyone appraisals were not correlated with pro-environmental behaviour, indicating that the perception that anthropogenic environmental degradation is uncontrollable is not associated with pro-environmental engagement.

The findings are somewhat consistent with those presented in Homburg and Stolberg (2006) who found health threat and health harm appraisals (of environmental problems) had small correlations with pro-environmental behaviour. Homburg and Stolberg's measure of secondary appraisal using self-efficacy was found to have no correlation with pro-environmental behaviour. Using collective-efficacy as Homburg and Stolberg's (2006) measure of secondary appraisal, secondary appraisal was found to have no correlation with direct pro-environmental behaviour and a small correlation with indirect pro-environmental behaviour. The current findings may also be consistent with Helm et al. (2018) who found perceived ecological stress correlated with pro-environmental behaviour. It should be considered that Homburg and Stolberg's (2006) measures of primary and secondary appraisal and the measure of perceived ecological stress in Helm et al. (2018) differed from the stress appraisal measures used in this study. This may impact on the ability to make accurate comparisons between studies.

In general, there were relationships between most dimensions of stress appraisal and pro-environmental behaviour, suggesting that many of the stress appraisal processes may be associated with higher pro-environmental engagement. As all studies (including the current study) had differing measures of primary and secondary appraisal and perceived stressfulness, it is difficult to accurately compare findings. As different measures were used, there is the possibility that the measures are assessing slightly different constructs, and this may explain the discrepancies between the results.

4.2.3 Value orientations and stress appraisal of anthropogenic environmental degradation

Correlational analysis found that biospheric value orientation had positive relationships with all dimensions of stress appraisal. Biospheric value orientation had

moderate, positive relationships with challenge appraisals, centrality appraisals and overall perceived stressfulness appraisals of anthropogenic environmental degradation. Individuals who have strong values around the environment and biosphere may be more likely to appraise anthropogenic environmental degradation as a challenge (anticipating growth or gain), central to wellbeing and perceive the overall situation as stressful. Weaker, positive relationships were found between biospheric value orientation and threat appraisals, controllable-by-self appraisals and controllable-by-others appraisals of anthropogenic environmental degradation. These findings suggest that values around the environment and biosphere are also associated with greater perceptions of threat and controllability around anthropogenic environmental degradation. There was also a weak, negative relationship between biospheric value orientation and uncontrollable-by-anyone appraisals of anthropogenic environmental degradation. Participants with stronger values around the environment and biosphere were less likely to perceive anthropogenic environmental degradation as uncontrollable. Overall, the findings could suggest that though there is a relationship between biospheric values and all measures of stress appraisal, biospheric values may have stronger relationships with overall perceived stressfulness around environmental degradation and certain primary appraisal components (challenge and centrality).

Egoistic value orientation had weak to moderate, negative relationships with two of the primary appraisal measures (threat and centrality), and with overall perceived stressfulness. These findings suggest that individuals with values around self-enhancement and power may view anthropogenic environmental degradation as less of a threat and may not view it as important to their wellbeing. It can be noted that Peacock and Wong (1990) found that threat and centrality appraisals were consistently significant predictors of overall perceived stressfulness. This could suggest that egoistic value orientation may have a negative relationship with certain aspects of primary appraisal (threat and centrality appraisal). No known studies have explored the relationship between general value orientation and perceptions of stress around environmental issues. In their study regarding differentiating environmental concern, Helm et al. (2018) found biospheric, altruistic and egoistic concern all correlated with perceived ecological stress. Biospheric concern was found to have the strongest relationship with perceived ecological stress while egoistic had the weakest. As their

study looked at the values underlying environmental concern rather than general value orientation, it may be hard to interpret comparisons between the study's findings.

Conservative value orientation was also found to have a weak positive correlation with uncontrollable-by-anyone appraisals and a weak negative correlation with perceived overall stressfulness. Those with more traditional, conservative values may be less more likely to view anthropogenic environmental degradation as uncontrollable and less likely to view it as stressful. No other relationships were found between conservative values and any of the stress appraisal dimensions. Findings in the United States indicate that individuals identifying as Republican are less likely to view climate change as anthropogenic and are less likely to view it as threatening (Dunlap & McCright, 2008). Individuals who vote for centre-right political parties attribute greater importance to security, tradition, conformity, power and achievement (i.e. constructs that are associated with conservative and egoistic values) (Schwartz, Caprara & Vecchione, 2010) and therefore the current study's findings are consistent with previous research.

Overall, some value orientations (biospheric, egoistic, conservative) had relationships with some of the stress appraisal dimensions. The current study found that there was a relationship between biospheric values, and all stress appraisal dimensions. This relationship suggests that values around the protection and respect for the environment may be related to the stress appraisal processes around anthropogenic environmental degradation. The relationship between biospheric values and certain primary appraisal measures (challenge and centrality) and overall perceived stressfulness was strongest, suggesting that biospheric values are most associated with higher appraisals in these areas. Egoistic value orientation was found to have a negative relationship with aspects of primary appraisal (threat and centrality) and overall perceived stressfulness of anthropogenic environmental degradation. Individuals with values around self-enhancement may be less likely to appraise anthropogenic environmental degradation as threatening, central to wellbeing and view it as stressful. Conservative value orientation was found to have a small, positive relationship with uncontrollable-by-anyone and a small, negative relationship overall stressfulness appraisals. These findings are consistent with past literature, indicating that those who tend to hold conservative values may view environmental degradation as something out

of human control, as well as having lower perceptions of threat around anthropogenic environmental degradation.

4.3 Predicting Pro-Environmental Behaviour

Hierarchical multiple regression analysis was used to address the research question: *'How well do value orientations and stress appraisals of anthropogenic environmental degradation predict pro-environmental behaviour?'* Analyses showed that after controlling for age and gender, biospheric value orientation, egoistic value orientation and centrality appraisals of anthropogenic environmental degradation were all found to be independent, unique predictors of pro-environmental behaviour, explaining around half of the variance in pro-environmental behaviour.

4.3.1 Demographic variables as predictors of pro-environmental behaviour

Findings showed that age was the largest unique contributor when predicting pro-environmental behaviour, suggesting that older adults are more likely to engage in higher amounts of pro-environmental behaviour. This is consistent with previous findings (Gilg, Barr & Ford, 2005; Hines et al., 1987; Roberts, 1993; Swami et al., 2011; Wiernik et al., 2013) which also found that older adults are more likely to engage in pro-environmental behaviour. Gifford and Nilsson (2014) suggests that this effect may be explained events that may have happened to the older generation. A background of conserving limited resources may come from the 1930's depression and the wartime of the 1940's. Pro-environmental behaviours do not always involve conservation but can include purchasing choices. Older adults may be more likely to be in better financial position to make these purchase choices and environmentalists tend to be middle or upper-middle class individuals (Gifford & Nilsson, 2014). A meta-analysis conducted by Wiernik et al. (2013) found that most relationships between age and pro-environmental behaviours were negligibly small. However, the current findings highlight age as an important contributing factor in explaining pro-environmental behaviour. It should be noted that the current study did not control for other variables such as education level and social economic status, potentially impacting the relationship between age and pro-environmental behaviour. This will be discussed in the limitations of this study.

Gender was the smallest significant predictor of pro-environmental behaviour and suggested that those identifying as female were more likely to engage in larger amounts of pro-environmental behaviour. This is consistent with previous findings that women were more likely to engage in environmental concern and behaviour (Hunter et al., 2004). This may be explained by certain personality factors. For example, agreeableness, which is a personality trait that is prominent among women (Gifford & Nilsson, 2014), may contribute to individuals placing importance on social and environmental issues. Milfont and Sibley (2016) suggest that women may have higher environmental values due to higher empathy and lower social dominance orientation, potentially contributing to higher pro-environmental engagement. The disproportionate number of females to male participants in the current study (190 female, 23 male) may also have impacted the results and this will be discussed in the limitations section.

4.3.2 Value orientations as predictors of pro-environmental behaviour

Of all value orientations measured, only biospheric and egoistic values independently predicted pro-environmental behaviour. Among the variables, biospheric value orientation was the strongest predictor of pro-environmental behaviour apart from age (though beta coefficients were similar for these two variables). This suggests that greater biospheric values independently predict increased engagement in pro-environmental behaviour. In contrast, egoistic values were found to negatively predict pro-environmental behaviour, though admittedly to a lesser extent. That is, the presence of egoistic values independently predicts lower engagement in pro-environmental behaviour, but to a lesser degree than the predictive ability of biospheric value orientation. Ashwell's (2018) small qualitative study on young adults in New Zealand suggested that pro-environmental behaviour was a function of value-oriented behaviour. The current study's findings provide supporting evidence to this claim, suggesting that pro-environmental behaviour in individuals may be action aligned with their biospheric values. The current study's findings provide further evidence to support previous literature which indicates the importance of biospheric values in influencing pro-environmental behaviour, as well as a negative relationship between egoistic value and pro-environmental behaviour (De Groot & Steg, 2009; Gatersleben et al., 2014; Helm et al., 2018; Schultz et al., 2005; Steg et al., 2014; Stern, 2000; Stern et al., 1995). The

results are also in line with Steg et al. (2014) who suggest that biospheric values are more strongly related to pro-environmental actions (as well as beliefs, norms, attitudes) than other values.

The findings of the current study highlight the importance of value orientation in influencing pro-environmental behaviour and could be explained by De Groot and Steg's (2009) model of the influence of egoistic, altruistic and biospheric values on pro-environmental beliefs (also referred to as 'concerns'), intentions and behaviour. In this model, value orientation influences environmental concern or beliefs, which in turn influence intentions and behaviour in a given situation (De Groot & Steg, 2009). Previous studies (De Groot & Steg, 2009; Stern et al., 1993; Schultz, 2001; Schultz et al., 2005) have suggested that egoistic, altruistic and biospheric value orientations may all lead to environmental concern and therefore pro-environmental behaviour, although certain value orientations may be stronger predictors. The strongest predictors of pro-environmental behaviour in previous literature have consistently been biospheric value orientation or self-transcendence value orientation (Gatersleben et al., 2014; Helm et al., 2018; Stern et al., 1995; Schultz et al., 2005) and the current study's findings also provide supporting evidence. One explanation could be that pro-environmental behaviour is often associated with societal and environmental benefits. Pro-environmental behaviour is often seen as 'morally right' and congruent with biospheric and altruistic values (De Groot & Steg, 2018).

The current study found that egoistic value orientation predicted lower pro-environmental engagement. Though it is theoretically possible that egoistic values may lead to pro-environmental behaviour through egoistic environmental concern, there is little evidence to support this relationship and many previous studies have found that egoistic values negatively predict pro-environmental behaviour (Gatersleben et al., 2014; Helm et al., 2018; Stern et al., 1995; Schultz et al., 2005). There may be several possible explanations for this finding. Firstly, pro-environmental behaviours may be presented in such a way that they are incongruent with self-interest, with the costs often outweighing the personal benefits (De Groot & Steg, 2009; Schultz et al., 2005). Environmental problems may be a result of individuals acting in self-interest and it could be suggested that because the environment is viewed as an object external to one's self, worries about the environment may inherently be worries about the broader

context (rather than one's self) (Schultz et al., 2005). Finally, the negative relationship between egoistic value orientation and pro-environmental behaviour may be explained by the activating conditions. Perhaps the seriousness of local environmental problems has not yet reached a magnitude at which egoistic environmental concerns activate pro-environmental behaviour in line with self-interest (Schultz et al., 2005). As this current study was conducted within a New Zealand context, this could be a feasible explanation for egoistic value orientation predicting lower pro-environmental behaviour in the findings. Over the past decade, New Zealand has promoted a 'clean, green' image used as a branding strategy by corporations and producers, achieving almost celebrity status (Morgan, Pitchard & Piggott, 2002). This 'clean, green' image has a complex genealogy and has become a key component of the New Zealand identity. While most New Zealanders acknowledge this image as a myth, it is often used to justify polluting practices (Coyle & Fairweather, 2005).

Previous studies such as Helm et al. (2018) suggest the role of altruistic values in predicting pro-environmental behaviour (through altruistic environmental concern) and studies such as Stern et al. (1995) and Schultz et al. (2005) found that biospheric and altruistic values predicted pro-environmental behaviour as a single construct (measured as Schwartz's (1994) self-transcendence value cluster). The current study did not find evidence to support altruistic value orientation as a predictor of pro-environmental behaviour, indicating that biospheric values may be the only significant component when explaining the link between self-transcendence values and pro-environmental behaviour. The findings of the current study support De Groot and Steg's (2009) argument that although egoistic values may influence pro-environmental behaviour (through egoistic environmental concern), promotion of biospheric values and their cognitive accessibility would be a plausible solution for increasing pro-environmental engagement. The current study, however, does not support De Groot and Steg's (2009) suggestion of promoting altruistic values, to promote pro-environmental behaviour.

In summary, the findings of this study support the importance of biospheric values in predicting higher pro-environmental engagement, as well as the importance of egoistic values in predicting lower pro-environmental engagement. These findings could be explained by pro-environmental behaviour being associated with societal and

environmental benefit, making it inherently more compatible with biospheric value orientation than egoistic value orientation. The current severity of global anthropogenic environmental degradation may not yet be at a level in which it activates pro-environmental behaviour in line with self-interest. The separation of the self-transcendence value cluster provides a more detailed view than past studies (Stern et al., 1995) which fail to separate biospheric and altruistic constructs. Diverging from previous literature (Helm et al., 2018; Schultz et al., 2005), altruistic value orientation was not found to be an independent predictor of pro-environmental behaviour, though this may be due to the current study's focus on general value orientation rather than values underlying environmental concern.

4.3.3 Dimensions of stress appraisal of anthropogenic environmental degradation as predictors of pro-environmental behaviour

Out of all the measures of stress appraisal, centrality appraisal was the only significant predictor of pro-environmental behaviour. Centrality is an important factor in the stress process, as it significantly predicts overall perceived stressfulness and is conceptualised as a dimension of primary appraisal. Centrality appraisals encapsulate the perceptions of importance of the situation on wellbeing and how much an individual has at stake (Peacock & Wong, 1990). Although centrality appraisal was shown to be a weaker predictor of pro-environmental behaviour than biospheric value orientation, results showed similar predictive capability, suggesting that centrality is an important predictor of pro-environmental behaviour. As the current study's results are consistent with the findings of Ashwell's (2018) qualitative study around pro-environmental behaviour in young adults. Ashwell (2018) found that participants engaged in pro-environmental behaviour as response to perceived distress and personal threat from anthropogenic environmental degradation. The current study's findings suggest that in particular, perceptions of the importance of anthropogenic environmental degradation to wellbeing, may be important in influencing pro-environmental behaviour.

As the current study measured specific dimensions of stress appraisal, it is difficult to compare results with previous studies, which all use different measures of stress appraisal, perceived ecological stress or threat (Helm et al., 2018; Homburg & Stolberg, 2006; Schmitt et al., 2018). The overall perceived stressfulness subscale from

the stress appraisal measure is included in the current study and could be compared with some of the general measures of ecological stress and threat used in past studies (Helm et al., 2018; Schmitt et al., 2018). However, in the current study, over half of the variance in overall perceived stressfulness was accounted for by threat and centrality appraisals, and it is not known if the scale provides any valuable information beyond threat and centrality (Peacock & Wong, 1990). This may explain why overall perceived stressfulness did not significantly predict pro-environmental behaviour (while centrality was a significant predictor) in the current study.

While centrality appraisals were the only primary appraisal measure to predict pro-environmental behaviour in the current study, threat and challenge appraisal were not significant predictors. Despite the difficulties in comparing the results with previous studies, there is some consistency with the findings of Homburg and Stolberg (2006), who found primary appraisal measures of environmental problems (largely in the form of health threat but also health harm appraisals) predicted pro-environmental behaviour through problem-focused coping. The current study also found evidence of the role of primary appraisal processes (through centrality appraisal) in predicting pro-environmental behaviour. As Homburg and Stolberg (2006) used a differing measure of primary appraisal, it cannot be concluded how well their measures of health threat and health harm align with the primary appraisal measures used in this current study. It can be noted that the appraisal measures used in Homburg and Stolberg (2006) concern the consequences and impacts on health, which can be compared to the measure of centrality appraisal used in this study (which places emphasis on the perceived importance of an event on wellbeing). The measure of threat appraisal used in the current study does not specifically measure threat to health, which may explain why threat appraisal was not a significant predictor of pro-environmental behaviour in this current study. This could suggest that primary appraisals of anthropogenic environmental degradation concerning the impact on health and wellbeing may be of importance in explaining pro-environmental behaviour.

Interestingly, Homburg and Stolberg (2006) found that their resource secondary appraisal measure of self-efficacy was not a significant predictor of pro-environmental behaviour. The current study included a similar secondary appraisal measure, controllable-by-self, which was also found not to be a significant predictor. Homburg

and Stolberg's study, however, found that collective (rather than individual) efficacy resulted in coping attempts and pro-environmental behaviour. The current study found that secondary appraisal measures involving the collective (both the controllable-by-others and uncontrollable-by-anyone appraisal subscales) were not significant predictors of pro-environmental behaviour. The disparity between the studies may be explained by the use of different measures (i.e. the construct assessed by Homburg and Stolberg's (2006) measure of collective efficacy may not be completely captured by the controllable-by-others and uncontrollable-by-self subscales), which may impact our findings. Although secondary appraisal measures intend to reflect on the evaluation of efficacy and personal coping resources (Peacock & Wong, 1990), perceived controllability (rather than efficacy) may be more strongly related to the secondary appraisal measures used in the current study. Perceived controllability is similar to the concept of efficacy in that both are components of a higher-order construct of perceived behavioural control (Ajzen, 2002). Although controllability and efficacy are correlated, they are distinguishable. Controllability relates to the belief that (coping) behaviours are up to the individual while efficacy relates to the perceived ease or difficulty of engaging in this behaviour (Ajzen, 2002). The perceived controllability of behaviour may be related to an external locus of control (outcomes of behaviour attributed to external factors), while efficacy beliefs are related to an internal locus of control (outcomes of behaviour attributed to internal factors (Ajzen, 2002)). Peacock and Wong (1990) found no correlation or a weak correlation between an internal locus of control and the secondary appraisal measures, which may suggest the distinction between this study's secondary appraisal measures and measures of efficacy. This may further suggest that the secondary appraisal measures within the stress appraisal measure may not capture the entirety of the secondary appraisal process. These findings, in combination with those of Homburg and Stolberg (2006), suggest that secondary appraisals on an individual level (both self-efficacy and controllable-by-self appraisals) do not predict pro-environmental behaviour. At a broader level, collective efficacy may predict pro-environmental behaviour, while, controllable-by-others and uncontrollable-by-anyone appraisals do not appear to influence pro-environmental engagement.

This study found that overall perceived stressfulness appraisal of anthropogenic environmental degradation was not a significant predictor of pro-environmental behaviour. This potentially provides some evidence to support the findings of Helm et

al. (2018), who reported that perceived ecological stress did not predict pro-environmental behaviour. Again, as measures of perceived stress differed from those used in this study, it is not known how well the constructs measured in each study align with one another. The findings of Schmitt et al (2018) suggest that overall ecological threat significantly predict pro-environmental behaviour, differing from the current study which found that threat appraisals did not predict pro-environmental behaviour. Schmitt et al. (2018) measured ecological threat using items from the New Ecological Paradigm scale – a scale measuring the extent to which an individual has an ecocentric world view, which has been used in past studies to measure environmental values (Dunlap et al., 2000; Gatersleben et al., 2014). The measure of ecological threat used by Schmitt et al (2018) related to perceptions of threat or harm to the environment rather than a specific measure of threat appraisal, which may explain why Schmitt et al. (2018) had different results to those of the current study. Their findings may reflect the importance of an ecocentric worldview in predicting pro-environmental behaviour, rather than the perceptions of threat to the individual.

In summary, the results of this study suggest that although overall perceived stressfulness of anthropogenic environmental degradation may not predict pro-environmental behaviour, specific components of the primary appraisal process (such as centrality appraisals or appraisals concerning the impact on health and wellbeing) may relate to pro-environmental engagement. Perceptions of threat around anthropogenic environmental degradation may not necessarily influence pro-environmental behaviour, especially if the threat perceived is not specifically in regard to individual health or the environment. Secondary appraisal measures (such as controllable-by-self, controllable-by-others and uncontrollable-by-anyone appraisals) were not found to predict pro-environmental behaviour, although the measures used in this study may be more concerned with controllability rather than efficacy. As previous research (Homburg & Stolberg, 2006) found secondary appraisal (measured by collective efficacy) to be a predictor of pro-environmental behaviour, it could be suggested that collective efficacy plays a key role in predicting pro-environmental behaviour.

4.3 Predicting Stress Appraisals of Anthropogenic Environmental Degradation

The research question: ‘*How well do value orientations predict stress appraisals of anthropogenic environmental degradation?*’ was answered using a series of hierarchical multiple regression analyses. Regression analyses controlled for age, gender and pro-environmental behaviour and aimed to determine whether or not value orientations independently impact upon the dimensions of stress appraisals of anthropogenic environmental degradation. Results showed that across the stress appraisal measures, only threat, centrality and overall perceived stressfulness appraisals had value orientations as significant predictor. Considering that threat and centrality appraisal are key components of primary appraisal (and are significant predictors of overall perceived stressfulness) (Peacock & Wong, 1990), it could be suggested that value orientations may only be relevant in predicting primary appraisal processes.

4.3.1 Predicting threat, centrality and overall perceived stressfulness

In a model controlling for age, gender and pro-environmental behaviour, this study found that only age and egoistic value orientation significantly predicted threat appraisals of anthropogenic environmental degradation. This suggests that younger adults may be more likely to have higher threat appraisals of anthropogenic environmental degradation. Egoistic value orientation was the only value orientation shown to predict threat appraisals. The findings suggest that individuals who are more inclined towards egoistic values are more likely to appraise anthropogenic environmental degradation as a threat. Although age and egoistic value orientation are significant predictors, it should be noted that they only explained a very small amount (16%) of the variance in threat appraisals.

Analyses showed that when predicting centrality appraisals of anthropogenic environmental behaviour, age, pro-environmental behaviour and biospheric value orientation were significant independent predictors, accounting for 31% of the variance in centrality appraisals. Age and pro-environmental behaviour emerged as the strongest predictors. The findings suggest that younger adults and those who engaged in more pro-environmental behaviours tended to have higher centrality appraisals of anthropogenic environmental degradation and therefore, perceived anthropogenic environmental degradation as central to personal wellbeing. Of all the value orientations, only biospheric values independently predicted centrality appraisals. The

current study suggests that the presence of values relating to the protection of and respect towards the environment have some influence on the extent to which an individual perceives anthropogenic environmental degradation to have an important impact on their wellbeing.

Age, pro-environmental behaviour and biospheric value orientation also significantly predicted overall perceived stressfulness of anthropogenic environmental degradation, accounting for 24% of the variance. As with predicting centrality appraisals, older age predicted higher overall perceived stress appraisal of anthropogenic environmental degradation. Again, biospheric value orientation was the only value orientation which significantly predicted overall perceived stressfulness. Those with higher biospheric value orientation may perceive higher overall stressfulness around anthropogenic environmental degradation.

The findings of the current study are consistent with those of Baldassare and Katz (1992) which suggested that younger adults were more likely to perceive environmental threat. Their study used a different measure of environmental threat and therefore the individual measures of primary stress appraisal in the current study cannot be compared. Even so, the current study suggests that younger adults have higher primary appraisals of anthropogenic environmental degradation, at least in terms of threat and centrality. Pro-environmental behaviour as a predictor of centrality and overall perceived stressfulness appraisals is consistent with the current study's previous claim that centrality appraisals predict pro-environmental behaviour. As centrality appraisals are a significant predictor of overall perceived stressfulness (Peacock & Wong, 1990), this may be why overall perceived stressfulness was previously found to not be a significant predictor of pro-environmental behaviour. Egoistic value orientation was found to predict lower threat appraisals and biospheric value orientations were found to predict lower centrality and overall stressfulness appraisals. This is consistent with the findings of Helm et al. (2018) which suggest that only biospheric environmental concern predicts perceived ecological stress. The findings of the current study go further in suggesting that egoistic values not only have no influence on predicting perceived ecological stress, but they may also predict lower perceived threat around anthropogenic environmental issues. The fact that the current study

concerned value orientation in general rather than value orientation underlying environmental concern, may also explain why the current study found these results.

To summarise, the current study found that age, biospheric values and egoistic values had some influence on two primary stress appraisal measures (threat and centrality), as well as overall perceived stressfulness around anthropogenic environmental degradation. These findings suggest that age and values may only influence certain aspects of primary appraisal. As the current study explored the various dimensions of stress appraisal instead of a general measure of perceived ecological stress, it was difficult to compare the results with those of previous studies. However, the current findings provide a more detailed view of the influence of values (and age) on the specific components of stress appraisals of anthropogenic environmental degradation.

4.3.2 Lack of predictive capability across stress appraisal measures

It can be noted that across all three appraisal measures, models accounted for a small portion of the variance (16% to 31%), suggesting that value orientation (as well as age, gender and pro-environmental behaviour) explains a very small (but statistically significant) amount of the variance in threat, centrality and overall perceived stress appraisal. Though past literature (De Groot & Steg, 2009; Gatersleben et al., 2014; Helm et al., 2018; Schultz et al., 2005; Steg et al., 2014; Stern, 2000; Stern et al., 1995) has highlighted the importance of values (specifically biospheric values) in influencing individuals' responses to anthropogenic environmental degradation (by influencing pro-environmental behaviour, attitudes, beliefs and norms), value orientation was found to have very little influence over the extent to which anthropogenic environmental degradation was appraised as stressful. One explanation for this finding could lie within the magnitude of environmental problems. Anthropogenic environmental degradation is associated with devastating global consequences and predictions of widespread ecological disaster, threatening both natural and human systems (IPCC, 2014; Oskamp, 2000). These consequences will indiscriminately impact individuals, regardless of what they value. Stern et al. (1993) established that environmental concern could arise from self-interest (egoistic values), concern for others (altruistic values) and concern for other species and natural environments (biospheric values). It is possible that stressful

appraisals of anthropogenic degradation may arise if they are perceived to impact self-interests (egoistic values), other people (altruistic values), or other species and natural environments (biospheric values). Stress appraisals of anthropogenic environmental degradation would therefore be possible, regardless of value orientation. This study did not account for variables such as education, environmental knowledge or felt responsibility and these missing constructs may impact or account for some variance in the stress appraisal measures.

Interestingly, this study did not find any significant predictors for challenge appraisals and across all secondary appraisal measures. Challenge appraisals involve the anticipation of growth or gain from the experience while the secondary appraisal measures focus on perceptions of controllability (evaluations of efficacy and coping) across three levels: self, others and anyone (Peacock & Wong, 1990). There has been no previous research regarding value orientation and secondary stress appraisals of anthropogenic environmental degradation and the current study provides evidence that such values do not appear to impact secondary stress appraisals. Variables such as environmental knowledge have been shown to influence efficacy and concern over the risks of environmental issues (Milfont, 2012) and demographic variables such as social economic status may be related to appraisals of resources. Dispositional optimism is also found to influence secondary appraisal (Chang, 1998). Considering that these variables were not included in the current study, it is understandable that there were no significant predictors found among secondary appraisal measures. Challenge appraisal was the only component of primary stress appraisal that value orientation had no influence over, although there has been no previous research to suggest otherwise. It can also be noted that the challenge appraisal subscale had the lowest internal consistency of all the stress appraisal subscales, which could impact the results.

In summary, although value orientations seem to have a significant predictive influence over some of the stress appraisal measures, it cannot be ignored that overall, the variance explained by values is very small. Considering the fact that anthropogenic environmental degradation is a huge global issue which may have devastating consequences on matters which are valued across all value orientations, the lack of influence from specific value orientation is understandable. Other variables such as education, environmental knowledge, felt responsibility, levels of optimism and social

economic status were not measured in this study but have been found in the past to be related to pro-environmental behaviours, concerns, levels of efficacy and secondary appraisal (Chang, 1998; Gifford & Nilsson, 2014; Milfont, 2012). This may explain more of the variance in the stress appraisals of anthropogenic environmental degradation and will be discussed further in the limitations.

4.4 Limitations

The current study had several limitations which may have influenced the findings. These include limitations of the sample, the measures used in the study and the exclusion of certain variables.

4.4.1 Limitations of the sample

The sample used in this study may not be an accurate representation of the general population. Firstly, participants were recruited online, through social media and included recruitment within Facebook groups which inherently targeted certain demographics that may be more interested in environmental issues than the general population. Participation was also self-selected, imposing bias towards certain kinds of individuals. These limitations are common with survey research designs and participants may be biased as some may be more motivated, more concerned about the topic, have different lifestyles or come from a certain social class (Kelley et al., 2003; Seers & Crichton, 2001). Overall, the potential limitations of the study include biases towards individuals who have access to internet, individuals who engage in social media, individuals who are more open to completing opinion-based research surveys and individuals who are more interested in environmental issues.

Additionally, the sample was predominantly females, with 180 females, 23 males and 2 non-binary individuals. Past research (Hunter et al., 2004; Milfont & Sibley, 2016) has indicated that women are more likely to show environmental concern, engage in pro-environmental behaviour and hold stronger environmental values. This gender difference could result in certain biases (such as higher reported engagement in pro-environmental behaviour or biospheric values) in the current findings of the current study. Furthermore, the gender disparity amongst the participants may be a finding in

itself, suggesting that women may be more likely to participate in environment-related survey studies. It could be suggested that participating in environmental research may be considered pro-environmental behaviour and considering that women may be more likely to engage in such behaviours, it would be logical for this study to recruit a higher number of women than men.

4.4.2 Limitations of measures used

This study utilised two established measures: a brief inventory of values (Stern et al., 1998) and the stress appraisal measure (SAM) (Peacock & Wong, 1990). Alpha reliability scores for the brief inventory of values reported from Stern et al. (1998) were sufficient but not ideal (.85 to .62) and reliability analyses conducted in the current study found similar but lower scores (.80 to .54). Brief scales may sacrifice some reliability (Stern et al., 1998) and it is common to have low alpha reliability scores in scales with less than 10 items (Pallant, 2016). Nonetheless, it may be important to acknowledge the impact that this lack of reliability may have on the findings of the current study.

The stress appraisal measure had acceptable alpha reliability coefficients as reported in Peacock and Wong (1990). The reliability analyses of the current study found good internal consistency among most of the subscales (.90 to .71), except for the challenge appraisal subscale which presented with an alpha coefficient of .41. The item 'Is this going to have a positive impact on me?' had an item-total correlation of .05, suggesting that this item may not have been measuring challenge appraisal. As the stress appraisal measure is an established scale, the challenge appraisal measure was kept as is in the analysis, yet this may have had an effect on the findings. Low internal consistency suggests that items within the scale are not measuring the same construct (Pallant, 2016) and this may mean that the challenge appraisal subscale may not be an accurate measure of challenge appraisal. This may be one explanation for why challenge appraisal was not found to be a predictor of pro-environmental behaviour or why challenge appraisal was found to be the only primary appraisal measure that was not predicted by value orientation. It also should be mentioned that a few participants commented that they found the stress appraisal measure difficult to complete due to perceived repetition of items. Participants generally thought that they were answering

very similar questions, multiple times. Survey participants may have been frustrated or tired as they progressed through the survey, potentially impacting the accuracy of their answers. Factor analysis provides empirical support for the conceptualisation of stress appraisal subscales as independent stress appraisal dimensions (Peacock & Wong, 1990), but it should be acknowledged that the scale may not be particularly user-friendly. Peacock and Wong (1990) also found that secondary appraisal measures had small or no correlations with an internal locus of control. Considering that efficacy includes attributions related to an internal locus of control, the secondary appraisal measures may be more concerned with the construct of controllability (Ajzen, 2002). As secondary appraisals are intended to reflect evaluations of efficacy (Peacock & Wong, 1990), this may suggest that the secondary appraisal measures used in this study may not be an accurate measure of actual secondary appraisal processes.

Another limitation concerning the measures used in the current study lies with the inconsistency of measurements used across previous research, making it difficult to draw firm conclusions. In general, previous studies (Gatersleben et al., 2012; Helm et al., 2018; Schultz, 2001; Schultz et al., 2005; Stern et al., 1993; Stern et al., 1995) measured values based on theory stemming from Schwartz's (1994) value clusters. Studies either measured values underlying environmental concern (originating from Stern and Dietz's (1994) value basis of environmental concern) or directly measured values from Schwartz's (1994) value survey. As this study utilised a brief value inventory directly derived from Schwartz's values inventory (Stern et al., 1998), there is at least some theoretical consistency with the measurement of value orientation and measurements used in other studies. In terms of measuring perceived ecological or environmental stress, there is a lack of consistency across studies as there is, to date, no valid and reliable measure of environment-related stress. Homburg et al. (2007) developed a set of scales which measure coping with global environmental problems, although this does not equate to perceived stress. In general, studies either utilise non-validated scales to measure stress from environmental problems or adapted scales which attempt to measure aspects of the stress appraisal process (Davydova et al., 2018; Helm et al., 2018; Homburg & Stolberg, 2006; Homburg et al., 2007). As different scales are used across studies, it cannot be determined whether the constructs measured are the same or how they may differ. Psychological distress related to the environment also does not always manifest as stress and can include a variety of emotional responses,

including anxiety, worry, guilt and despair (Doherty & Clayton, 2011). There appears to be a lack of consideration of the various aspects of environment-related psychological distress in existing measures, and there may be a need for a measure which captures its entirety. This is an important limitation which should be considered when comparing the findings of the current study with past literature and could be considered as an area for future research.

4.4.3 Limitations regarding the exclusion of certain variables

Due to the size of this current study as a Master's Practice Research Project (60 point), there were limitations regarding the number of variables/measures that could be included in the study. There are many other personal and social factors that may impact pro-environmental concern and behaviour in the literature, which include: childhood experience, knowledge and education, personality constructs, locus of control, goals, felt responsibility, cognitive biases, place attachment, chosen activities, religion, place of residence, norms, social class (social economic status) and proximity to (environmental) problem sites (Gifford & Nilsson, 2014). As this project aimed to focus upon values and stress appraisals, it was not feasible to include many of these other variables. However, it could be noted that the exclusion of some of these variables may have been useful. For example, environmental knowledge has been found to be important in predicting personal efficacy (through environmental concern), pro-environmental values and pro-environmental behaviour (De Groot & Steg, 2009; Levine & Strube, 2012; Milfont, 2012). As efficacy may be part of the secondary appraisal process (Peacock & Wong, 1990), this suggests that environmental knowledge and concern may also impact stress appraisal processes (as well as pro-environmental behaviour). Felt responsibility may also have been a useful variable to include. Attributions of responsibility (for causation or mitigation) are an important part of environmental concern and shown to facilitate positive relationships between perceptions of threat and collective control beliefs around climate risks (Davydova et al., 2018; Gifford & Nilsson, 2014). As these variables are important influences on certain components of stress appraisal, the exclusion of these variables may explain the lack of predictive capability across stress appraisal measures in the current study.

4.5 Future Directions

The current study examined the relationships between value orientations, pro-environmental behaviour and dimensions of stress appraisal of anthropogenic environmental degradation. The findings suggest that value orientations (biospheric and egoistic) and centrality appraisals of anthropogenic environmental degradation are both independent, unique predictors of pro-environmental behaviour. Previous research has indicated that pro-environmental behaviour may be a problem-focused coping response (Homburg & Stolber, 2006; Ojala, 2013), which may even suppress the negative impact environmental threats may have on wellbeing (Schmitt et al., 2018), making it an important, clinically relevant area to focus on. Future research could include a measure of overall wellbeing to explore the role of values in a model examining perceived stress of anthropogenic climate change, pro-environmental behaviour and overall wellbeing. As acceptance and commitment therapy research has highlighted the importance of committed, value-oriented action on overall wellbeing and psychological flexibility (Harris, 2006; Harris, 2007; Hayes et al., 2007), it may be worth examining the impact of pro-environmental behaviour as value-oriented action.

As previously mentioned, certain personal and social factors were not included in this current study. The future inclusion of variables such as environmental knowledge and felt responsibility may give more insight into the structure of the relationships between values, pro-environmental behaviour and stress appraisal measures. Environmental knowledge has been shown to be related to pro-environmental behaviour, concern, efficacy (Gifford & Nilsson, 2014; Levine & Strube, 2012; Milfont, 2012) and may play a role in increasing the saliency of biospheric and altruistic values (De Groot & Steg, 2009). Felt responsibility has previously been shown to influence threat and control beliefs around climate risks and influence environmental concern (Davydova et al., 2018; Gifford & Nilsson, 2014). Future studies regarding the role of knowledge and responsibility and how they may influence the pathways to pro-environmental behaviour through values and stress appraisals may provide more insight into the underlying mechanisms. Values, age, gender and pro-environmental behaviour were found to predict a very small amount of variance in pro-environmental behaviour. The inclusion of a wider variety of demographics and personal variables in future

studies may also provide additional knowledge on the predictors of stress around anthropogenic environmental degradation.

Finally, this current study revealed the lack of a validated and reliable measure of perceived stress around anthropogenic environmental degradation. It is also noted that psychological responses to anthropogenic environmental degradation are not limited to stress. There has been much acknowledgment of the wide range of indirect psychological impacts of anthropogenic environmental degradation, from ‘eco-anxiety’ to depressive emotions such as guilt and despair (Doherty & Clayton, 2011; Fritze et al., 2008; Gifford & Gifford, 2016). The future development of a reliable, valid psychological tool in measuring psychological responses to anthropogenic environmental degradation would be useful in promoting consistency between studies and providing a more holistic view of individuals’ internal responses.

4.6 Conclusion

This current study aimed to explore the relationships between value orientation, pro-environmental behaviour and stress appraisals of anthropogenic environmental degradation. Four main research questions were addressed in this study: 1) *‘Is there a significant relationship (or significant difference) among value orientations, pro-environmental behaviour and stress appraisals of anthropogenic environmental degradation, and (or between) demographic variables (or groups)?’*, 2) *‘What is the relationship between value orientations, pro-environmental behaviour and stress appraisals of anthropogenic environmental degradation?’*, 3) *‘How well do value orientations and stress appraisals of anthropogenic environmental degradation predict pro-environmental behaviour?’* and 4) *‘How well do value orientations predict stress appraisals of anthropogenic environmental degradation?’* The conclusions made from the findings of the current study are discussed below.

In general, the findings of the current study were similar to those of previous studies in terms of demographic variances. Correlational analyses found that value orientation generally did not vary with age. The exception to this was for openness to change, as older age was also associated with lower openness to change value orientation. Older age was associated with higher pro-environmental engagement and

lower stress appraisals of anthropogenic environmental degradation. Regression analyses found that older age predicts higher engagement in pro-environmental behaviour, which inconsistent with past research and further provides evidence to suggest that older adults are more likely to engage in pro-environmental behaviour (Gilg, Barr & Ford, 2005; Hines et al., 1987; Roberts, 1993; Swami et al., 2011; Wiernik et al., 2013). Younger age was found to predict increased threat appraisals, centrality appraisals and overall perceived stressfulness appraisals, which is in line with findings of Baldassare and Katz (1992) that suggests that younger adults are more likely to perceive environmental threat. Gender and ethnicity were found to have no correlation with any of the variables in this study. However, gender was found to be a predictor of pro-environmental behaviour, suggesting that show women to be more likely to engage in more pro-environmental behaviour, consistent with previous research that women are more likely to have pro-environmental values, attitudes and behaviours (Hunter et al., 2004; Milfont & Sibley, 2016).

Overall, biospheric values had positive relationships with pro-environmental behaviour, while egoistic values had negative relationships with pro-environmental behaviour, both of which are consistent with the findings of Stern et al. (1995) and Schultz et al. (2005). While the present study found no correlation between altruistic value orientation and pro-environmental behaviour, altruistic value orientation may still be associated with pro-environmental behaviour if they underly environmental concern (Helm et al., 2018). Generally, most of the dimensions of stress appraisal had correlations with pro-environmental behaviour. This was consistent with past research suggesting relationships between measures of threat appraisal and ecological stress with pro-environmental behaviour (Homburg & Stolberg, 2006; Helm et al., 2018). As different measures of stress and primary appraisal were used, results are difficult to compare. Biospheric value orientation was correlated with all stress appraisal dimensions but was more strongly correlated with primary appraisal measures (challenge and centrality) and overall perceived stressfulness. Egoistic value orientation was negatively correlated with primary appraisals (threat and centrality) and overall perceived stressfulness. Although value orientations may be correlated with all stress appraisal dimensions to some extent, they may be more strongly associated with primary appraisal processes.

This was the first study (to current knowledge) to consider the role of general value orientations in predicting both pro-environmental behaviour and stress appraisals of environmental degradation. Additionally, this was also the first study to include separate measures of each dimension of stress appraisal, allowing for more in-depth exploration of the functions of specific components of stress appraisal. The findings identified the importance of biospheric and egoistic value orientation in predicting pro-environmental behaviour. Altruistic values did not emerge as a predictor of pro-environmental behaviour, diverging from previous literature (Helm et al., 2018; Schultz et al., 2005). As the self-transcendence value cluster was broken into separate biospheric and altruistic value clusters in the current study, the findings provide a more detailed view than past studies (Stern et al., 1995) which fail to separate biospheric and altruistic constructs. The study also built upon the findings of Ashwell's (2018) qualitative study, providing evidence for pro-environmental behaviour as value-oriented action. The study provided new insight into the specific components of stress appraisal of anthropogenic environmental degradation and the influence of these on pro-environmental behaviour. Although not all dimensions of stress appraisal of anthropogenic environmental degradation predicted pro-environmental behaviour, specific components of the primary appraisal process (such as centrality appraisals or appraisals concerning the impact on health and wellbeing) may be related to pro-environmental engagement. Measures of secondary appraisal were not found to predict pro-environmental behaviour, although this study used measures that may be more concerned with controllability rather than efficacy. The current study found additional evidence to support Ashwell's (2018) claim that pro-environmental behaviour may be a form of problem-focused coping in response to distress around anthropogenic environmental degradation. However, pro-environmental behaviour may only be a response to distress related to individual's perceptions that anthropogenic environmental degradation is important to their wellbeing.

In general, it was found that values have little influence over stress appraisal processes around anthropogenic environmental degradation, although they may have a small influence on certain aspects of primary appraisal. Value orientations emerged as significant predictors of two primary stress appraisal measures (threat and centrality), as well as overall perceived stressfulness around anthropogenic environmental degradation. Egoistic value orientation negatively predicted threat appraisals, while

biospheric value orientation positively predicted centrality and overall perceived stressfulness appraisals. As threat and centrality are significant predictors of overall perceived stressfulness (Peacock & Wong, 1990), it could be suggested that values may be only relevant in predicting some aspects of primary appraisal of anthropogenic environmental degradation. Overall, the current study has provided further understanding into a growing area of research and has offered additional insight into the relationships between demographic variables, specific value orientations, dimensions of stress appraisal of anthropogenic environmental degradation and pro-environmental behaviour.

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Appendix A: Survey

Values, Environmentally-Friendly Behaviour and Human-Caused Environmental Destruction

Start of Block: Welcome

Q1

2/06/2019

Values, environmentally-friendly behaviour and human-caused environmental destruction

My name is Dana and I'm inviting people in New Zealand to take part in a research study around **the associations between people's values, their environmentally friendly behaviour and their views around human-caused environmental destruction**. There is a growing concern about climate change and the state of our environment and so we invite New Zealanders to share their experiences with us.

The findings of this study may be used for academic publications or presentation. By participating in the study, you will be helping us create an understanding of the potential impact that environmental destruction and climate change may have on the wellbeing of New Zealanders. Your participation will also help promote awareness of the importance of both environmental and mental health issues in New Zealand.

To participate in this study, you must be aged 18 years or older and a New Zealand resident.

This survey should take approximately **10-15 minutes** to complete and will ask you to answer questions or rate various statements around your values, environmentally-friendly actions and your views around human-caused environmental destruction.

This survey is completely **anonymous** and it is not mandatory to share your personal information. You will be given the opportunity to share your contact details to enter a **prize draw to win one of 16 \$25 supermarket vouchers** after completing the survey. You will also be able to request a summary of the findings after the study has been completed. All personal information shared will be collected separately from your responses.

Participation is free and **voluntary** and you may cease the completion of this survey at any time.

Surveys will be kept **confidential** and will only be assessed and used by the researchers.

By completing the survey and submitting your answers you consent to the participation in this research study.

Thank you in advance for taking the time to share your views with us. It is very much appreciated.

Please note: Though it is unlikely that any of the questions in this survey will cause any discomfort or distress, please be aware that exploring topics such as environmental destruction and stress may be triggering for some. Should you feel uncomfortable at any point during this survey, please feel free to stop and exit the window at anytime .

If you have any questions or concerns, please do not hesitate to contact the primary researcher:
Dana Ashwell Email: vjv6527@autuni.ac.nz

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor:
Dr. Jackie Feather
Jackie.Feather@aut.ac.nz

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTECH:
Kate O'Connor
ethics@aut.ac.nz
921 9999 ext 6039

Approved by the Auckland University of Technology Ethics Committee on 05/06/2019 AUTECH
Reference number 19/179

- I consent to the participation in this study. (1)
- I do not consent to the participation in this study. (2)

End of Block: Welcome

Start of Block: Personal Values

The following statements will explore your own **personal values**.

Please tell me how **important** each of these are, as a **guiding principle** in your life.

1 Social justice, correcting justice, care for the weak

- Opposed to my values (1)
 - Not important (2)
 - little importance (3)
 - Some importance (4)
 - Moderately important (5)
 - Important (6)
 - Quite important (7)
 - Very important (8)
 - Extremely important (9)
-

2 Protecting the environment, preserving nature

- Opposed to my values (1)
 - Not important (2)
 - Little importance (3)
 - Some importance (4)
 - Moderately important (5)
 - Important (6)
 - Quite important (7)
 - Very important (8)
 - Extremely important (9)
-

3 Honouring parents and elders, showing respect

- Opposed to my values (1)
 - Not important (2)
 - Little importance (3)
 - Some importance (4)
 - Moderately important (5)
 - Important (6)
 - Quite important (7)
 - Very important (8)
 - Extremely important (9)
-

4 Wealth, material possessions, money

- Opposed to my values (1)
- Not important (2)
- Little importance (3)
- Some importance (4)
- Moderately important (5)
- Important (6)
- Quite important (7)
- Very important (8)
- Extremely important (9)

5 Curiosity, interest in everything, exploring

- Opposed to my values (1)
 - Not important (2)
 - Little importance (3)
 - Some importance (4)
 - Moderately important (5)
 - Important (6)
 - Quite important (7)
 - Very important (8)
 - Extremely important (9)
-

6 An exciting life, stimulating experiences

- Opposed to my values (1)
 - Not important (2)
 - Little importance (3)
 - Some importance (4)
 - Moderately important (5)
 - Important (6)
 - Quite important (7)
 - Very important (8)
 - Extremely important (9)
-

7 Unity with nature, fitting into nature

- Opposed to my values (1)
 - Not important (2)
 - Little importance (3)
 - Some importance (4)
 - Moderately important (5)
 - Important (6)
 - Quite important (7)
 - Very important (8)
 - Extremely important (9)
-

8 Authority, the right to lead or command

- Opposed to my values (1)
 - Not important (2)
 - Little importance (3)
 - Some importance (4)
 - Moderately important (5)
 - Important (6)
 - Quite important (7)
 - Very important (8)
 - Extremely important (9)
-

9 Equality, equal opportunity for all

- Opposed to my values (1)
- Not important (2)
- Little importance (3)
- Some importance (4)
- Moderately important (5)
- Important (6)
- Quite important (7)
- Very important (8)
- Extremely important (9)

10 Family security, safety for loved ones

- Opposed to my values (1)
 - Not important (2)
 - Little importance (3)
 - Some importance (4)
 - Moderately important (5)
 - Important (6)
 - Quite important (7)
 - Very important (8)
 - Extremely important (9)
-

11 Influence, having an impact on people and events

- Opposed to my values (1)
 - Not important (2)
 - Little importance (3)
 - Some importance (4)
 - Moderately important (5)
 - Important (6)
 - Quite important (7)
 - Very important (8)
 - Extremely important (9)
-

12 A world at peace, free of war and conflict

- Opposed to my values (1)
- Not important (2)
- Little importance (3)
- Some importance (4)
- Moderately important (5)
- Important (6)
- Quite important (7)
- Very important (8)
- Extremely important (9)

13 A varied life, filled with challenge, novelty and change

- Opposed to my values (1)
 - Not important (2)
 - Little importance (3)
 - Some importance (4)
 - Moderately important (5)
 - Important (6)
 - Quite important (7)
 - Very important (8)
 - Extremely important (9)
-

14 Self-discipline, self-restraint, resistance to temptation

- Opposed to my values (1)
 - Not important (2)
 - Little importance (3)
 - Some importance (4)
 - Moderately important (5)
 - Important (6)
 - Quite important (7)
 - Very important (8)
 - Extremely important (9)
-

15 Respecting the earth, harmony with other species

- Opposed to my values (1)
- Not important (2)
- Little importance (3)
- Some importance (4)
- Moderately important (5)
- Important (6)
- Quite important (7)
- Very important (8)
- Extremely important (9)

End of Block: Personal Values

Start of Block: Environmentally-Friendly Behaviour

The following is a list of **environmentally friendly behaviours or activities**.

Please indicate how often in the past **year**, you have engaged in each of these behaviours or activities **for the purposes of protecting or minimising the negative impact on the environment**.

1 Made specific dietary choices or changes (e.g. followed a vegan diet, reduced meat intake, avoided dairy products etc.)

- Never (1)
 - Rarely (2)
 - Sometimes (3)
 - Often (4)
 - Always (5)
-

2 Used alternative or public transport (e.g. bus, train, bike, scooter etc.)

- Never (1)
 - Rarely (2)
 - Sometimes (3)
 - Often (4)
 - Always (5)
-

3 Consciously reduced waste

- Never (1)
 - Rarely (2)
 - Sometimes (3)
 - Often (4)
 - Always (5)
-

4 Consciously reduced material purchases

- Never (1)
 - Rarely (2)
 - Sometimes (3)
 - Often (4)
 - Always (5)
-

5 Consciously avoided plastic or packaging

- Never (1)
 - Rarely (2)
 - Sometimes (3)
 - Often (4)
 - Always (5)
-

6 Purchased second hand or re-purposed goods

- Never (1)
 - Rarely (2)
 - Sometimes (3)
 - Often (4)
 - Always (5)
-

7 Purchased eco-products

- Never (1)
 - Rarely (2)
 - Sometimes (3)
 - Often (4)
 - Always (5)
-

8 Recycled

- Never (1)
 - Rarely (2)
 - Sometimes (3)
 - Often (4)
 - Always (5)
-

9 Purchased organic goods

- Never (1)
 - Rarely (2)
 - Sometimes (3)
 - Often (4)
 - Always (5)
-

10 Conserved water usage

- Never (1)
 - Rarely (2)
 - Sometimes (3)
 - Often (4)
 - Always (5)
-

11 Conserved power or energy usage

- Never (1)
 - Rarely (2)
 - Sometimes (3)
 - Often (4)
 - Always (5)
-

12 Composted food scraps

- Never (1)
 - Rarely (2)
 - Sometimes (3)
 - Often (4)
 - Always (5)
-

13 Engaged in environmental activism or advocacy (e.g. went to a protest, signed a petition, participated in an environmental group etc.)

- Never (1)
 - Rarely (2)
 - Sometimes (3)
 - Often (4)
 - Always (5)
-

14 Talked to friends or family about environmental issues

- Never (1)
- Rarely (2)
- Sometimes (3)
- Often (4)
- Always (5)

End of Block: Environmentally-Friendly Behaviour

Start of Block: Human-Caused Environmental Destruction

The following questions are related to your views on various aspects of the current global situation regarding **human-caused environmental destruction**.

Please respond accordingly to how you view the **current global situation around human-caused environmental destruction**.

1 Is this a totally hopeless situation?

- Not at all (1)
- Slightly (2)
- Moderately (3)
- Considerably (4)
- Extremely (5)

2 Does this situation create tension for me?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

3 Is the outcome of this situation uncontrollable by anyone?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

4 Is there someone or some agency I can turn to for help if I need it?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

5 Does this situation make me feel anxious?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

6 Does this situation have important consequences for me?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

7 Is this going to have a positive impact on me?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

8 How eager am I to tackle this problem?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

9 How much will I be affected by the outcome of this situation?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

10 To what extent can I become a stronger person because of this problem?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

11 Will the outcome of this situation be negative?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

12 Do I have the ability to do well in this situation?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

13 Does this situation have serious implications for me?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

14 Do I have what it takes to do well in this situation?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

15 Is there help available to me for dealing with this problem?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

16 Does this situation tax or exceed my coping resources?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

17 Are there sufficient resources available to help me in dealing with this situation?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

18 Is it beyond anyone's power to do anything about this situation?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

19 To what extent am I excited thinking about the outcome of this situation?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

20 How threatening is this situation?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

21 Is the problem unresolvable by anyone?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

22 Will I be able to overcome the problem?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

23 Is there anyone who can help me to manage this problem?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

24 To what extent do I perceive this situation as stressful?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

25 Do I have the skills necessary to achieve a successful outcome to this situation?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

26 To what extent does this situation require coping efforts on my part?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

27 Does this situation have long-term consequences for me?

- Not at all (1)
 - Slightly (2)
 - Moderately (3)
 - Considerably (4)
 - Extremely (5)
-

28 Is this going to have a negative impact on me?

- Not at all (1)
- Slightly (2)
- Moderately (3)
- Considerably (4)
- Extremely (5)

End of Block: Human-Caused Environmental Destruction

Start of Block: Global Environmental Issues

Please write down any **thoughts, feelings or views** you may have in regard to the following questions.

1 What kind of thoughts or feelings do you have around the current global environmental issues?

2 How have your thoughts or feelings around global environmental issues impacted on your life?

End of Block: Global Environmental Issues

Start of Block: Personal Information

Thank you for completing the survey!

Please provide some general information for statistical purposes.

Please enter your age below

Please indicate which ethnicity you most identify with

- NZ European/ Pākehā (1)
- Māori (2)
- Pacific Islander/ Pasifika (3)
- Asian (4)
- Middle Eastern (5)
- Other (please indicate) (6) _____

Please indicate which gender you identify with

- Male (1)
- Female (2)
- Non-binary/ gender fluid (3)

End of Block: Personal Information

Appendix B: Ethics Approval



Auckland University of Technology Ethics Committee (AUTEC)

Auckland University of Technology
D-88, Private Bag 92006, Auckland 1142, NZ
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

AUT

TE WĀNANGA ARONUI
O TĀMAKI MAKĀU RAU

5 June 2019

Jackie Feather
Faculty of Health and Environmental Sciences

Dear Jackie

Re Ethics Application: **19/179 Values, pro-environmental behaviour, and appraisals of anthropogenic environmental degradation in New Zealand.**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved for three years until 5 June 2022.

Standard Conditions of Approval

1. A progress report is due annually on the anniversary of the approval date, using form EA2, which is available online through <http://www.aut.ac.nz/research/researchethics>.
2. A final report is due at the expiration of the approval period, or, upon completion of project, using form EA3, which is available online through <http://www.aut.ac.nz/research/researchethics>.
3. Any amendments to the project must be approved by AUTEC prior to being implemented. Amendments can be requested using the EA2 form: <http://www.aut.ac.nz/research/researchethics>.
4. Any serious or unexpected adverse events must be reported to AUTEC Secretariat as a matter of priority.
5. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEC Secretariat as a matter of priority.

Please quote the application number and title on all future correspondence related to this project.

AUTEC grants ethical approval only. If you require management approval for access for your research from another institution or organisation then you are responsible for obtaining it. You are reminded that it is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard.

For any enquiries, please contact ethics@aut.ac.nz

Yours sincerely,

Kate O'Connor
Executive Manager
Auckland University of Technology Ethics Committee

Cc: dashwell@hotmail.co.nz; Kirsten Van Kessel

Appendix C: PGR1 Approval



Auckland University of Technology
Private Bag 92006, Auckland 1142, NZ
T: +64 9 921 9999
www.aut.ac.nz

6th May 2019

Dana Ashwell
Unit 1, 460 East Coast Rd
Windsor Park
Auckland 0630

Dear Dana

Thank you for submitting your PGR1 Research Proposal application for the Master of Health Science in Psychology.

Your proposal has been reviewed and approved by the Faculty of Health and Environmental Sciences, at the Postgraduate Research Committee June 2019 meeting.

Details are:

Current programme:	Master of Health Science in Psychology
Enrolment:	60pt dissertation enrolment 36 weeks
Student ID	1259560
Topic:	Values, pro-environmental behaviour and appraisals of anthropogenic environmental degradation in New Zealand
Primary supervisor:	Dr Jackie Feather
Secondary supervisor:	Dr Kirsten van Kessel
Start date:	25th February 2019
Expected completion date:	8th November 2019

For more information about the programme of study, please refer to the *Postgraduate Handbook*.

The AUT website for forms and handbooks is:

<http://www.aut.ac.nz/being-a-student/current-postgraduates/academic-information/postgraduate-forms>

Yours sincerely

A handwritten signature in black ink, appearing to read 'Nigel Harris'.

Assoc Prof Nigel Harris
Associate Dean (Postgraduate Research)
Postgraduate and Research Office
Faculty of Health and Environmental Sciences

Cc Primary supervisor Dr Jackie Feather