

The environmental matriarchy: Older women lead the way in pro-environmental behaviours  
in New Zealand

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A thesis submitted in partial fulfilment of the requirements for the degree of

Master of Science in Psychology

At the University of Canterbury

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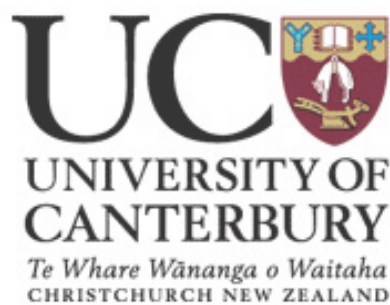
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### Abstract

Climate change is arguably the most important issue facing humanity today. To help address this issue, the current research aimed to better understand the psychological and demographic antecedents that predict pro-environmental behaviour. The 2012 NZGSS, a survey of 8,462 New Zealand men and women aged 15 years and over, was used to assess the predictive power of several variables on people's recycling, energy conservation and water conservation behaviours. Results showed that women, older people, higher income people and higher qualification people showed the highest levels of pro-environmental behaviour, while psychological variables had varying effects. The current research adds to the collective knowledge around pro-environmental behaviour, and a theory is proposed to help explain demographic differences.

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More is now known about the environmental impact of humans than ever before. Since the 1970s, research into environmental issues has increased steadily. There are thousands of organisations worldwide aimed at addressing environmental issues, and it could be argued that there is no single issue of more importance globally. According to the 2007 Global Environment Outlook report, there has been increased pressure on land resources due to increasing population, economic development and global markets, causing resource depletion and ecosystem degradation (United Nations Environment Programme, 2016). The document advises that more is needed to be done with regards to water supply and sanitation, and the document puts forth a warning in no uncertain terms: organisations and individuals need to be more proactive than they are currently to prevent further ecosystem degradation that could potentially endanger the future of human life (United Nations Environment Programme, 2016).

Deforestation remains a large threat to forests worldwide. South America suffered the largest net loss of forests from 2000 to 2005—about 4.3 million hectares per year—followed by Africa, which lost 4.0 million hectares per year. North and Central America had a slightly increasing trend in net loss, while Oceania had a slightly decreasing trend (United Nations Environment Programme, 2016).

In New Zealand, trends are similar to those worldwide. A government-produced 2015 report found that the amount of carbon dioxide in our atmosphere has increased; diversity and conservation status of some native species have declined; water quality in rivers that run through intensively-used land has worsened; and more than three quarters of soils under dairy

farming are now badly affected by compaction (Ministry for the Environment & Statistics New Zealand, 2015). There is also widespread concern that the state of the rivers in New Zealand has lowered to an unacceptable standard, with local commentators likening the freshwater ways to "gutter holes" and "sewer pipes" (NZ Herald, 2016), and arguing that New Zealand's natural environment is "nowhere near" the clean, green image that is portrayed in the tourism industry (Preston, 2012).

With a clear need for attention to environmental issues identified both internationally and in New Zealand, it is necessary to determine the specific actions that are required to ensure the protection of the natural environment. While global efforts and law reforms are paramount in the pursuit of environmental betterment, it is also true that individual, personal choices are important in creating real change. There are many ways in which individuals can contribute to improving the state of the environment, including recycling, energy conservation and water conservation. The goal of the present research is to understand what psychological and demographic variables are important in predicting pro-environmental behaviours in individuals.

Recycling is one of the easiest environmental efforts individuals can make in their homes. In New Zealand, most residential and commercial premises are provided with adequate recycling bins that are collected weekly or fortnightly by the city council. However, not everyone engages in as much recycling of their waste as they could. In an Australian survey, people reported recycling only 75% of their recyclables (White & Hyde, 2011). It therefore becomes important to investigate the factors which differentiate those people who recycle frequently and those who do not.

Energy and water conservation are also important ways individuals can have a positive effect on the environment at the household level. By conserving power usage, individuals can help ameliorate the strain that global energy consumption is having on the planet. Similarly, by



conserving water usage, individuals can lessen their impact on their local water supplies, which vary in availability from area to area. Both energy and water conservation behaviours can be done in the household on an everyday basis, and are often seen as ‘invisible’ environmental behaviours.

*Environmental motivation: selfless or self-serving*

A main aim for the research on pro-environmental behaviour is the attempt to understand an action which, if viewed from a rational self-interest perspective, appears to be counterintuitive. Rational self-interest, an early approach favoured by economic psychologists, posits that people will act in ways which provide the best outcome for that individual using the most efficient route to get there (Miller & Ratner, 1998). The problem then is to understand individual pro-environmental behaviours, like recycling, which require extra effort from the individual without any immediate payback. The action is a short-term personal sacrifice for the long-term good of the larger community.

Interestingly, and contrary to intuition, it has been found that there does not seem to be an underlying factor influencing people’s tendency to act in environmentally-friendly ways (Mainieri, Barnett, Valdero, Unipan, & Oskamp, 1997; Oskamp et al., 1991). Where we might assume that such a construct as ‘general environmental concern’ or ‘pro-environmental attitude’ might predict a host of pro-environmental behaviours (e.g. recycling, buying environmentally responsible products, reducing pollution, etc.), this does not appear to be the case. In Oskamp and colleagues’ studies on environmental predictors, they found no such general construct, suggesting instead that people are motivated to act towards specific environmental causes due to individual importance to them. This might be linked with the idea of personal relevance and personal involvement in environmental research. It has been proposed that a large influencing factor in people’s tendencies to act in pro-environmental ways is the personal relevance of that cause (Gregory & Di Leo, 2003). Similarly, it has been found

that if people feel that there is a very serious threat to their personal health or wellbeing, they are more likely to become environmentally active (Baldassare & Katz, 1992). For example, if a person knows that their community is experiencing a drought and they may face water restrictions, they are likely to act to consciously reduce their water use. Likewise, if a person has first-hand involvement in a waste management centre through their work, they may act to reduce their own household's weekly waste. This theory goes some way to bridging the gap in the idea of personal sacrifice for the greater good of the community; if an environmental cause has great personal significance to an individual, then they are likely to act in ways to further that cause, where they may not feel as strongly about another environmental cause that is not so personally significant. Therefore, we might think of individuals who act environmentally as doing so out of personal relevance *as well as* for the benefit of the greater society.

#### *Attitudes, values, beliefs and behaviour*

Psychological research is interested in people's internal motivations to engage in a behaviour, such as attitudes, values and beliefs (Clark, Kotchen, & Moore, 2003). While the need for environmental change has long been known, behaviour to effect these changes has been slow. Knowledge of environmental issues does not appear to be a sufficient antecedent to pro-environmental behaviour. Moreover, it has been a common finding in scientific research that there is a substantial gap between people's environmental attitudes and concerns and their tendencies to act in pro-environmental ways; what people say is important and what they do are often very different (Maloney & Ward, 1973).

In a classic study, researchers found that people overall showed high levels of environmental concern and were emotive when talking about protecting the environment, but that coincided with relatively low levels of knowledge about environmental issues and low levels of actual commitment to them. This weak link between verbal concern and actual behaviour was a surprising finding, and one that has been included in several theories of

environmental behaviour (Maloney & Ward, 1973). A possible explanation for this discrepancy is proposed using Schwartz's norm-activation theory. Norm-activation theory suggests that people act in environmental ways in response to personal moral norms. Personal norms are the ways in which people perceive they should act in each situation. According to the theory, these norms are activated when people perceive that their circumstances pose a threat to others (Stern, Dietz, Abel, Guagnano, & Kalof, 1999). This theory has seen some success, due to the fact that it takes into account conflicting motivations such as economic factors, social norms and personal norms (Matthies, Klockner, & Preisharpner, 2006), and as such can help to explain the discrepancy seen between people's reports regarding how important environmental issues are to them and their actual pro-environmental behaviour. Another often-utilised theory in environmental behaviour research is value-belief-norm theory, which posits that an action is dependent upon people's personal values, their beliefs and their perceived norms. This theory has helped explain more of the variance in behaviour than other psychological theories (Stern et al., 1999).

Many researchers have found that it is useful when analysing people's pro-environmental behaviours that a distinction be made between low-effort and high-effort demands, as they tend to elicit different rates of behaviour (Ramkissoon, Liam David Graham, & Weiler, 2013; Schultz & Oskamp, 1996). This effort hypothesis proposes that when the effort required is high, pro-environmental attitudes are important in predicting environmental action, whereas when effort required is low, such attitudes are not as important (Schultz & Oskamp, 1996). As for the activities analysed in the current study: recycling is a relatively easy activity, with recyclables being collected from residents' roadsides; energy and water conservation simply involve using less of these resources. Therefore, when compared with some other environmental behaviours, like activism, these activities are relatively low effort. The implication of this may be that any effect found of attitudes on behaviour will likely be smaller

than the effect on other important pro-environmental behaviours that require more effort on the part of the consumer.

*Cultural identity, place identity and place attachment*

Amongst the literature on environmental behaviour and the factors that predict it, another concept that emerges is that of identity. More specifically, environmental behaviour has been linked with ideas about role identity, place identity, place attachment, national identity and more (Marta, Manzi, Pozzi, & Vignoles, 2014; Takahashi & Selfa, 2015; Vaske & Kobrin, 2001).

Role identity theory is built on the assumption that people identify themselves with many different roles in their daily lives: mother, employee, student, etcetera (Marta, Manzi & Pozzi, 2014; Nigbur, Lyons & Uzzell, 2010). Role identity theory proposes that if a person identifies with a particular role, they will act in ways that are in line with that role. For example, if people see themselves as “environmentally-responsible people” or “recyclers”, they are likely to act in ways that reinforce these identities. If this is the case, policy-makers and campaigners would do well to focus on appealing to people’s positive feelings about themselves in these roles. This sort of tactic can be seen in advertising campaigns such as the long-running “Be a tidy Kiwi!” campaign, one that began in New Zealand in the 1970s in a bid to discourage littering ([www.beatidykiwi.nz](http://www.beatidykiwi.nz)).

Place identity has been described as the “symbolically important connection between an individual and a setting” (Lalli, 1992; Stedman, 2002, as cited in Vaske & Kobrin, 2001). We can understand this connection by supposing that if a person feels an attachment to a particular place, perhaps even integrating that place as a part of their self-identity, they are likely to act in ways that help protect and look after it. In a structural equation model, Vaske and Kobrin (2001) indeed found that both place identity and place dependence (two concepts, together comprising place attachment) predicted both general and specific environmental behaviours

(including recycling). They found that as place identity increased, self-reported pro-environmental behaviour also increased. Similar findings have been shown with both national identity (Lai, Ren, Wu, & Hung, 2013) and place attachment (Takahashi & Selfa, 2015).

Another way in which identity can be linked with environmental behaviour comes from ideas about pride and guilt. In the past, there has been an assumption that in order to bring about pro-social behaviours, the public should be made to feel guilty about the current state of a certain aspect of the society, for example through shock tactics in advertising. This idea of eliciting guilt in order to bring about behavioural change has been shown to be ineffective when dealing with environmental behaviour (Bissing-Olson, Fielding, & Iyer, 2016). In fact, when researchers compared the effect of eliciting guilt with eliciting pride in participants, they found pride to be a much more effective precursor to behavioural change. This can be seen to link in with the idea of identity; if somebody feels pride about a place they will act in ways that protect it.

#### *Tikanga and kaitiakitanga*

Some authors on the theories relating to pro-environmental behaviours propose that these behaviours are a reaction to a strong affinity with the land. Several authors have pointed to beliefs that the land is sacred as facilitators to environmental actions (Dietz, Stern, & Guagnano, 1998; P. C. Stern, 2000).

Among the issues to be considered in the current research are the concerns that relate specifically to New Zealand people. Approximately 16% of the New Zealand population are of Māori descent (Statistics New Zealand, 2013), and Māori have certain views about the environment that should be considered. Of particular importance is the notion of *tikanga*, that is, the customs and traditions that are handed down over generations (Mead, 2003). *Tikanga* has many purposes, one of which is to ensure people have a special relationship with the land (Drury, 2011). An important part of *tikanga* is the *kaitiaki*, the guardian that is entrusted with

protecting the natural resources. From the word *kaitiaki* comes the word *kaitiakitanga*, which refers to the process and practices of protecting the land, mountains and rivers for the current and future generations (Mead, 2003). *Tikanga* and *kaitiakitanga* can both be likened to the notion of place identity. Given the importance in Māori culture of *tikanga* and *kaitiakitanga*, it may be the case that Māori have heightened levels of place identity, and therefore may engage in more pro-environmental behaviours than do non-Māori.

### *Environmental satisfaction*

There is a rich literature in the environmental research that has focused on the importance of environmental concern and attitudes for environmental behaviour. Generally, this research has consisted of questionnaires that inquire about people's views on the importance of looking after the natural environment, on who is responsible for environmental action (for example, the individual or the government), and about people's intentions to act environmentally or not (Luc G. Pelletier, Legault, & Tuson, 1996). It has generally been found that pro-environmental attitudes correlate with environmental behaviours. Using the theory of planned behaviour model, studies have found that people's attitudes and beliefs tend to affect their intentions to act environmentally, and that those intentions in turn affect their environmental behaviours. Attitudes therefore have an indirect effect on behaviours, with intentions to act being the mediating variable (Nigbur, Lyons, & Uzzell, 2010).

The current research will focus on a subscale of environmental attitudes and concern, that of environmental satisfaction. Environmental satisfaction is thought to be a measure of people's concern for the environment. People who express *greater dissatisfaction* with their surrounding environment exhibit greater concern for environmental issues (Luc G. Pelletier et al., 1996). It is measured by indicating one's level of agreement with such statements as "Environmental conditions in my neighbourhood are satisfactory" (Legault & Pelletier, 2000). There have been several studies that have focussed on the effect of environmental satisfaction

on environmental behaviour (Green-Demers, 1999; Legault & Pelletier, 2000; Luc G. Pelletier et al., 1996; Luc G Pelletier, Tuson, Green-Demers, Noels, & Beaton, 1998). Pelletier and colleagues (1996) developed the Environmental Satisfaction Scale, which measures satisfaction with both local environmental conditions and governmental environmental policies. The scale includes subscales measuring motivation toward the environment, perceived importance of the environment, frequency of environmental behaviours, and level of activism. In the Environmental Behaviours subscale, recycling was measured, and showed good internal consistency ( $\alpha = .78$ ). This is evidence of good support for the proposition that dissatisfaction with environmental conditions is related to people's self-reported environmental behaviours. The authors concluded that, indeed, "dissatisfaction seems to be a potential determinant of environmentally friendly behaviors" (Luc G. Pelletier et al., 1996, p. 23).

Environmental satisfaction has also been assessed in relation to an educational programme for children (Legault & Pelletier, 2000). Environmental satisfaction, along with several other measures, were assessed for both parents and children before and after the children embarked on an environmental education programme. When compared with a control group who did not participate in the education programme, parents of the children who did participate showed an increase in environmental dissatisfaction after the programme. This provides support for the link between environmental knowledge and environmental dissatisfaction, and hopefully would provide the catalyst for ecological action (Legault & Pelletier, 2000).

#### *Healthy lifestyle and political engagement*

Research has shown a link between behaviours that constitute a "healthy way of life" and subsequent pro-environmental behaviours (Mohd Suki, 2013). Behaviours included in a healthy way of life include making wise decisions regarding the following: smoking, exercise, food choices and alcohol consumption. In a study on primarily young people aged between 17

and 22 years, authors found that, after controlling for age and sex, a healthy way of life had a strong correlation with young consumers' ecological behaviour ( $r = 0.30$ ). It is therefore plausible to expect that respondents who rate highly in behaviours related to a healthy way of life—not smoking, and being physically fit and healthy—will engage in higher rates of environmental behaviour.

Another potential predictor of environmental behaviour is thought to be people's level of political engagement. While some studies have found no link between the two variables (Oskamp et al., 1991), others have found there to be a connection (Dietz et al., 1998). It has been noted that, in order for young people to maximise their involvement with environmental change they need to become involved in political issues also (Chawla & Cushing, 2007). Among a group of East Europeans, interest in politics and willingness to discuss politics was found to have a strong connection to people's likelihood of engaging in unconventional political activity (Lee & Norris, 2000). It has even been suggested that global environmental change is "easily the most important rallying point for contemporary environmental politics" (Loftus, 2012, p. xvi).

#### *Demographic and structural variables*

Social structural context is an important factor in the implementation of pro-environmental habits (Walton & Austin, 2011). Social structural context encompasses the way the social structure is set up in people's lives, and includes government-run programmes such as curb-side recycling collection. It has been said that "[t]he most important determinant of recycling behavior is access to a structured, institutionalized program that makes recycling easy and convenient" (Derksen & Gartrell, 1993, p. 439). While environmental attitudes alone did not predict pro-environmental behaviour, social structural context alone did. Given this relevance, it is clear that examination is needed not solely of psychological variables, but also



other structural and demographic variables that may be influential in people's pro-environmental behaviour.

Some of the early research on environmental behaviour looked to establish what sorts of demographics were important in predicting these behaviours. The research found mixed results, with some suggesting that being white, younger, male and living in a middle- or upper-class neighbourhood increased one's chances of engaging in environmentally-friendly behaviours (Domina & Koch, 2002), and others positing that demographic factors have little to no impact on environmental behaviours, when other psychological influences like attitudes are taken into consideration (Hornik, Cherian, Madansky, & Narayana, 1995; Walton & Austin, 2011).

Age as a predictor variable for pro-environmental behaviour has been well researched. A meta-analysis was carried out, which analysed the effect of age on a variety of environmental behaviours over studies from 1970 to 2010 (Wiernik, Ones, & Dilchert, 2013). Environmental concern, values, and commitment were all found to be negligible in their relationship with age. Environmental awareness and knowledge were found to not have a meaningful relationship with age either, with negligible to small effect sizes ( $\rho$  values were used as a non-parametric measure for the data, and ranged between -.02 and -.09). One domain that did see a notable age effect, however, was to do with motives for environmental concern. Older people appeared to be more motivated to act environmentally due to social norms, when compared with younger people. Where there emerged the most meaningful differences across age, however, was in the acts of pro-environmental behaviours, rather than in attitudes, concerns and intentions. The meta-analysis showed that, specifically, avoiding harm, engaging with nature, active protection of ecosystems, avoidance of pollution and conserving resources increased significantly as people aged (Wiernik et al., 2013). Overall, the meta-analysis can be summarised thus: as people age, they tend to act more environmentally—a finding supported by Baldassare and

Katz (1992) and Otto and Kaiser (2014)—but the relationship is not as strong as is often assumed, with attitudes and intentions showing negligible age effects.

Sex is another variable that has been widely studied in the environmental behaviour literature. It has generally been found that women engage in more pro-environmental behaviours than men (Mainieri et al., 1997; Schahn & Holzer, 1990). In a questionnaire of middle-class residents in Los Angeles, women were found to have higher rates of green consumer behaviour and rated more highly on pro-environmental attitudes than men (Mainieri et al., 1997). Some studies, however, have found the opposite effect (Arcury, Scollay, & Johnson, 1987).

Income level is often implicated in its relation to pro-environmental behaviour. Some authors have found a positive correlation between income and pro-environmental behaviour, with wealthier individuals showing more inclination towards pro-environmental attitudes and concerns. Van Liere and Dunlap state that “concern for environmental quality is something of a luxury which can be indulged only after more basic material needs (adequate food, shelter, and economic security) are met” (Cottrell, 2003). This suggests that income may be positively correlated with, if not environmental behaviour, then at least environmental concern. Conversely, a study of students found that those from more wealthy families were less likely to go without certain environmental resources like water and power (Thompson & Gasteiger, 1985). Another study found a similar trend among home dwellers in the Netherlands—the more affluent households conserved energy less often than the less affluent ones,  $r = .27$  (Poortinga, Steg, & Vlek, 2004).

There are many potential explanations for the different relationships income may have with resource conservation: perhaps more affluent households have higher quality insulation, thus reducing their energy use, or perhaps less affluent households are more aware of the economic benefits of using less energy and so are more conservative than the more affluent.

Another demographic variable that may be predictive of environmental behaviour is education level. Education level has been found to be a good indicator of environmental knowledge and concern, and as such can predict pro-environmental behaviour (Cottrell, 2003; Ostman & Parker, 1987). In a self-report study, environmental knowledge was found to account for 18% of the variance in people's pro-environmental behaviours. In a similar study, environmental knowledge was found to account for 6% of participants' environmental behaviours (Frick, Kaiser, & Wilson, 2004). It is feasible to postulate that environmental knowledge could be related to people's overall education level. As such, we might expect higher education level to be somewhat related to increased environmental knowledge, exhibited through elevated levels of pro-environmental behaviours. This effect was found in a study of home energy use in a group of 455 questionnaire respondents in the Netherlands—higher education level was correlated with lower rates of household energy use (Poortinga et al., 2004).

Some studies have found interaction effects of certain demographic factors, such as sex and age, in their influence on pro-environmental behaviours. One such study analysed participants' frequency of adopting eco-friendly driving behaviours, relating to checking their vehicles regularly, planning their itineraries and journeys economically, and driving their vehicles in ways that conserve energy (Delhomme, Cristea, & Paran, 2013). Results showed significant interaction effects, with older women reporting a higher frequency of eco-friendly driving, and younger, less environmentally-concerned drivers reporting a higher perceived difficulty in adopting eco-friendly driving behaviours. This age effect was only found among the weaker environmentally-concerned group.

#### *The current study*

The aim of the current research is to ascertain what variables are important in predicting people's pro-environmental behaviours. To achieve this aim, data from the 2012 New Zealand

General Social Survey (NZGSS) was utilised. The NZGSS is a nation-wide survey that examines a wide range of social and economic outcomes, with a specific focus on how wellbeing outcomes are distributed across different groups within the New Zealand population. It consists of fifteen modules which include questions relating to work life, health, safety, social connectedness and culture among New Zealanders (Welch, 2013). The current research analysed several variables from the 2012 NZGSS and explored their relative strength in predicting pro-environmental behaviours.

In consideration of the past research and theory on the psychological and behavioural predictors of pro-environmental behaviours, the following four hypotheses were made for the current research:

*Hypothesis 1:* People who report stronger cultural identity with New Zealand will engage in more pro-environmental behaviours.

*Hypothesis 2:* People who report lower environmental satisfaction will engage in more pro-environmental behaviours.

*Hypothesis 3:* People who lead healthy lifestyles will engage in more pro-environmental behaviours.

*Hypothesis 4:* People who are highly politically engaged will engage in more pro-environmental behaviours.

Moreover, the following four hypotheses were made with regards to the role of demographic factors on pro-environmental behaviours:

*Hypothesis 5:* Older people will engage in more pro-environmental behaviours than younger people.

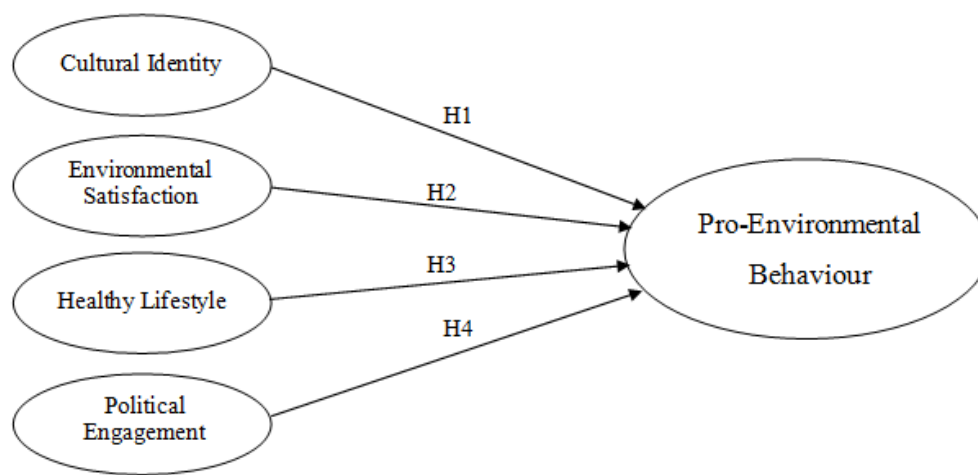
*Hypothesis 6:* Females will engage in more pro-environmental behaviours than males.

*Hypothesis 7:* People with higher income will engage in less pro-environmental behaviours than those with lower income.

*Hypothesis 8:* People with higher education will engage in more pro-environmental behaviours than those with lower education.

### *Theoretical framework*

Figure 1 shows a visual representation of the current research framework, including the four main psychological and behavioural hypotheses.



*Figure 1.* Research framework for the study of the predictors of pro-environmental behaviour

## Method

### *Participants*

Participants were 8,462 individuals from private dwellings around New Zealand. Target respondents were usually-resident occupants of private dwellings, aged 15 years or over, in the North, South or Waiheke Islands. Forty-four percent of respondents were males and 56% were females. The median age was 47 years.

*Procedure*

Data was used from the 2012 New Zealand General Social Survey (Welch, 2013). Modules and specific variables assessed in the 2012 NZGSS can be viewed on the Statistics New Zealand website ([www.stats.govt.nz](http://www.stats.govt.nz)). Use of the microdata from this survey was approved by correspondence with Mr. Arvind Saharan, Microdata Access Coordinator. The microdata had had all identifying characteristics removed to ensure respondents' anonymity. As such, important correlations and findings could be made, but the privacy of all respondents was maintained.

Approval was obtained by the Māori Research Consultant, Mr. Nigel Harris, on behalf of the Ngāi Tahu Consultation and Engagement Group (approval letter can be seen in Appendix A.) Ethics approval was sought from the Human Ethics Committee, and the researcher was advised that this approval was not required, since the use of existing data was utilised and the research did not include data collection from new participants.

Analyses were carried out in a serial, rather than simultaneous, manner; this allowed for careful inspection of any effect at different stages of analysis. Prior to analyses, all answers of "Don't know/Refused" were excluded from analysis. This amounted to 114 respondents who were excluded, and this number was deemed acceptable given the large data set of 8,462 respondents.

Several of the existing variables were coded backwards and thus needed to be reverse coded. For example, for volunteering frequency, answers were coded from 11 to 15, with 11 being "every day" and 15 being "at least once in the last four weeks". For this reason, these variables were reverse coded prior to analysis. This applied to the following variables: Volunteering frequency, cultural identity strength, environmental satisfaction of land, environmental satisfaction of waterways, and recycling.

*Measures**Dependent variables*

The dependent measure, pro-environmental behaviour, was measured using three separate dependent variables. These variables are discussed in the following paragraph.

*Pro-environmental behaviour.* Pro-environmental behaviour was the dependent measure, and was assessed using three items from the 2012 New Zealand General Social Survey. These items related to three types of environmental behaviours in the household: recycling behaviour, energy conservation frequency and water conservation frequency. Together, these variables make up the broader construct of pro-environmental behaviour. The recycling behaviour item asked respondents how much of what they can recycle they do recycle. This was measured on a 5-point Likert scale, ranging from “all of it” to “none of it”. The energy conservation frequency item asked respondents how often they make the effort to reduce energy use. It was measured on a 5-point Likert scale, ranging from “all of the time” to “none of the time”. The water conservation frequency item asked respondents how often they make the effort to reduce water use. Water conservation was measured on a 5-point Likert scale, ranging from “all of the time” to “none of the time”.

Pro-environmental behaviour – environmental reasons. A follow-up question was utilised for additional analysis relating to the reasons for conservation behaviour. Following the energy and water conservation frequency questions, respondents indicated why they conserved these resources, and these answers were grouped into either “environmental reasons” or “non-environmental reasons”. For follow-up analysis of certain independent variables, only respondents who indicated environmental reasons for their conservation were analysed.

*Independent variables*

There were four independent variables analysed, which related to the four specific hypotheses—cultural identity, environmental satisfaction, healthy lifestyle, and political engagement. Also analysed for their predictive ability were several demographic and household variables. Detailed descriptions of each dependent measure are outlined below.

*Cultural identity.* Cultural identity was measured using two survey questions. The first simply asked respondents whether they felt that they belonged to New Zealand. Respondents answered with a “Yes” or “No” answer. A follow-up question—cultural identity strength—was also assessed, which asked how strongly respondents felt about the previous answer. Respondents answered along a 3-point Likert scale, ranging from “very strongly” to “not very strongly”. Analyses were drawn based on answers to both questions. For median-split analyses, an answer of 1 or 2 was regarded as Weak Cultural Identity, and an answer of 3 was regarded as Strong Cultural Identity.

*Environmental satisfaction.* Environmental satisfaction is a component of the more general construct of environmental concern, and assesses how satisfied respondents are with the state of certain natural places in their community. This construct was assessed using two questions. The first, environmental satisfaction of waterways, asked respondents how they felt about the state of the lakes, rivers, harbours, oceans and coastlines they have been to. Answers were measured on a 5-point Likert scale, ranging from “very satisfied” to “very dissatisfied”. The second, environmental satisfaction of land, asked respondents how they felt about the state of the native bush, forests, nature reserves, and open green spaces that they have been to. Answers were measured on the same Likert scale as the first question. For median-split analyses of environmental satisfaction of waterways, a score of 1-3 was considered “low environmental satisfaction” and a score of 4 or 5 was considered “high environmental satisfaction”. This same criterion was used for analyses of environmental satisfaction of land.



*Healthy lifestyle.* The construct of healthy lifestyle was measured using a composite variable included in the 2012 NZGSS. This variable was a scaled measure of a variety of lifestyle and health questions relating to physical health, tiredness, physical restrictions and smoking behaviours. The healthy lifestyle variable (labelled Physical Health Status in the survey) resulted in individual scores ranging from a possible 1 to 100. A score of between 1 and 52 was considered “Low Health”, and a score of between 53 and 100 was considered “High Health”.

*Political engagement.* The construct of political engagement was based on two questions regarding voting behaviours. The first question asked whether respondents voted in the last local election—respondents answered simply “Yes” or “No”. The second question asked whether respondents voted in the last general election, with the same answers available. To create a Political Engagement Status, answers were summed together, creating a possible value of 1 to 3. A value of 1 meant the respondent did not vote; 2 meant they voted in only one election; and 3 meant they voted in both elections. A score of 1 was regarded as Low Political Engagement, and a score of 2 or 3 was regarded as High Political Engagement.

*Demographic and household factors.* Several demographic and household factors that were thought to possibly predict the dependent variable were also assessed. These included sex, age, nationality, income level, qualification level, country of birth, number of dependent children in family, household size, employment status, and social marital status. Refer to Appendix A for the survey questions used from the 2012 NZGSS, and Appendix B for reference of the recoding of the variables.

### *Statistical analyses*

SPSS statistical program was used to perform statistical analyses on the data set. The following analyses were carried out:

1. Predictor variables were split into groups depending on whether they were continuous or categorical in nature. For categorical variables, frequency tables were generated. For continuous variables, the mean, median, standard deviation and the distribution of each variable were analysed. Tests were also run to assess normal distribution, skewness and kurtosis. Respondents who did not answer or answered that they did not know, were deleted from analysis.
2. Three dependent measures—recycling, energy conservation and water conservation—were combined to form a single Environmental Behaviour Score for each respondent. Reliability statistics for this new scale were generated and checked, including Cronbach's alpha. Normality testing was also carried out.
3. Pearson correlations were created between each predictor variable and Environmental Behaviour Scores.
4. Appropriate bivariate tests were run for each variable, based on whether the variable was categorical or continuous, and whether the distribution was skewed or not. As such, several statistical analyses were used, including t-test for independent means, one-way ANOVA, Mann-Whitney U test, Pearson correlation, and Spearman's Rho.
5. Any variables which showed significant predictability in bivariate analyses were used in a multiple regression analysis.
6. Median-splits were created for all continuous predictor variables, generating 'How' and 'High' categories, and then variables were tested for possible interaction effects. Refer to Appendix B for low and high variable splits.
7. A latent class analysis was carried out analysing the top environmental conservers. Mplus version 6 was used for this analysis. Model comparison statistics, including the Akaike information criterion, were used to select the number of classes.

*P* values of greater than 0.05 were considered statistically significant when assessing all bivariate analyses. *P* values were reported as either  $p < 0.05$  or  $p < 0.01$ , where applicable.

It was decided to report both the mean and the median in the bivariate analyses. Due to the skewness or partial skewness of the dependent measures, the median is suggested as a more appropriate measure of central tendency than the mean. However, due to the nature of the data, which is measured mostly using short 5-point Likert scales, analysing only the median may exclude any minor differences between groups that would otherwise be meaningful. Therefore, both were reported.

## Results

### *Descriptive statistics*

Descriptive statistics were generated for the dependent variables and several predictor variables, shown in Tables 1 and 2.

Table 1. *Categorical Variables Frequencies*

| <i>Variable</i>           | <i>Level</i>        | <i>Percent (%)</i> | <i>N</i> | <i>Missing</i> |
|---------------------------|---------------------|--------------------|----------|----------------|
| Sex                       | Male                | 43.9               | 8462     | 0              |
|                           | Female              | 56.1               |          |                |
| Māori ethnicity           | Māori               | 13.2               | 8462     | 0              |
|                           | Non-Māori           | 86.8               |          |                |
| Māori descent             | Māori descended     | 16.8               | 8435     | 27             |
|                           | Non-Māori descended | 82.9               |          |                |
| Volunteering              | Volunteers          | 29.7               | 8444     | 0              |
|                           | Non-volunteers      | 70.0               |          |                |
| Cultural identity         | Belong              | 94.6               | 8418     | 44             |
|                           | Doesn't belong      | 4.9                |          |                |
| Social marital status     | Partnered           | 54                 | 8462     | 0              |
|                           | Non-partnered       | 46                 |          |                |
| Place of birth            | Born in NZ          | 76.2               | 8460     | 2              |
|                           | Born elsewhere      | 23.8               |          |                |
| Dependent children status | Children            | 66.5               | 8462     | 0              |
|                           | No children         | 33.5               |          |                |

|                             |                         |      |      |     |
|-----------------------------|-------------------------|------|------|-----|
| Political engagement status | Did not vote            | 16.2 | 8082 | 380 |
|                             | Voted in one election   | 19.1 |      |     |
|                             | Voted in both elections | 64.7 |      |     |

Table 2. *Continuous Variables Descriptive Statistics*

| <i>Variable</i>                | <i>Min</i> | <i>Max</i> | <i>Mean</i> | <i>SD</i> | <i>Median</i>                | <i>N</i> | <i>Missing</i> | <i>Skewness</i> |
|--------------------------------|------------|------------|-------------|-----------|------------------------------|----------|----------------|-----------------|
| RECYC <sup>a</sup>             | 1          | 5          | 3.96        | 1.03      | 4 (most of it)               | 8439     | 23             | 1.35**          |
| ECON <sup>b</sup>              | 1          | 5          | 3.67        | 0.98      | 4 (most of the time)         | 8433     | 29             | 0.74*           |
| WCON <sup>c</sup>              | 1          | 5          | 3.29        | 1.26      | 4 (most of the time)         | 8422     | 40             | 0.54*           |
| Age                            | 1          | 15         | 7.39        | 3.73      | 7 (45 to 49 years)           | 8462     | 0              | 0.11            |
| Volunteering frequency         | 1          | 5          | 2.59        | 1.13      | 3 (1-2 times per week)       | 2513     | 5949           | -0.15           |
| Cultural identity strength     | 1          | 3          | 2.49        | 0.59      | 3 (very strongly)            | 7991     | 471            | 0.68*           |
| Enviro. satisfaction waterways | 1          | 5          | 3.65        | 0.95      | 4 (satisfied)                | 8155     | 307            | 0.89*           |
| Enviro. satisfaction land      | 1          | 5          | 3.98        | 0.75      | 4 (satisfied)                | 8063     | 399            | 1.09**          |
| Highest qualification 1        | 1          | 15         | 7.97        | 3.66      | 8 (diploma or cert. level 6) | 4072     | 4390           | 0.03            |
| Highest qualification 2        | 1          | 10         | 4.34        | 2.84      | 4 (level 3 certificate)      | 7725     | 737            | 0.34            |
| Household size                 | 1          | 8          | 2.55        | 1.41      | 2 (two people)               | 8462     | 0              | 1.00**          |
| Personal income                | 1          | 15         | 7.55        | 3.71      | 7 (\$25,001 - \$30,000)      | 8462     | 0              | 0.11            |
| Household income               | 1          | 15         | 10.50       | 3.48      | 11 (\$50,001 - \$60,000)     | 8462     | 0              | -0.53*          |
| Health status                  | 4          | 70         | 48.55       | 10.79     | 53                           | 8405     | 57             | -1.45**         |

\*\*Highly skewed

\*Moderately skewed

<sup>a</sup>Recycling<sup>b</sup>Energy conservation frequency<sup>c</sup>Water conservation frequency

There are several points worth noting from Tables 1 and 2. The average person indicated that they recycle most of what they can recycle. Similarly, people indicated that they conserve

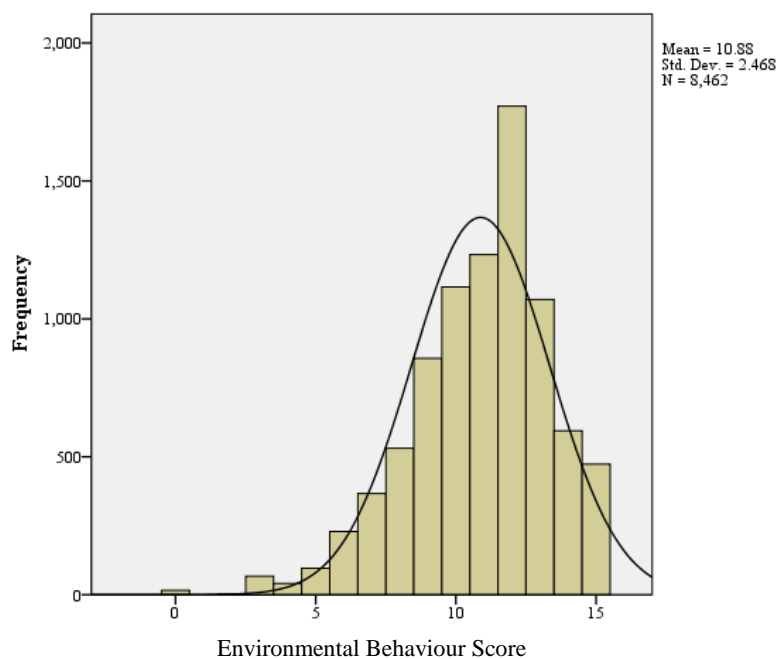
energy and water most of the time. On average, people also reported being satisfied with the state of the waterways and land places they have been to.

As can be seen in Table 1, some variables have fairly uneven proportions between their levels. Māori make up less than 20% of the total respondents in this study. This is not surprising, and is a relatively true representation of the New Zealand population. Also, the item measuring cultural identity elicited a near-unanimous answer of “Yes” (94.6%). While it is an encouraging finding to know that almost all New Zealanders feel that they belong to New Zealand, it may pose problems when analysing at the bivariate level due to the very uneven numbers of the groups for analysis. Furthermore, as can be seen in Table 2, there are two variables with high numbers of missing data—volunteering frequency and highest qualification 1. The reason for the high number of missing data in the volunteering frequency item is that this is a follow-up question; only those who answered “Yes” to the previous question enquiring whether or not they volunteer go on to report how often they volunteer. As we can see, less than a third of respondents reported that they volunteered in the last month. This is a somewhat surprising result, and it explains why the *N* value drops from 8,444 to 2,513 in the follow-up question. For the highest qualification 1 question, the high number of missing data is due mostly to system missing data, meaning that nearly 4,000 respondents chose not to answer this question. This may have been due to the fact that there were two questions assessing qualification level, and many respondents chose to answer only one. This should be kept in mind when assessing further analyses. The final point relates to skewness.

As can be seen, several variables, including recycling, were found to be highly skewed (more than 1 or less than -1) or moderately skewed (between -1 and -0.5 or between 0.5 and 1). However, due to the low range of scores in the variables (only 4 for recycling), it was decided that this level of skewness was acceptable, and standard parametric tests were used.

### *Environmental Behaviour Scale*

Scores for the three dependent variables—recycling, energy conservation frequency, and water conservation frequency— each ranged from 1 to 5. To create a combined dependent measure, titled ‘Environmental Behaviour Scale’, or where appropriate ‘Environmental Behaviour Score’, respondents’ scores were summed for these three measures to create a score out of 15. Figure 2 shows a histogram of all environmental behaviour scores.



*Figure 2.* Frequency histogram of all scores in the Environmental Behaviour Scale

Figure 2 shows that the scores were moderately skewed,  $M = 10.88$ ,  $SD = 2.47$ , skewness = -0.71. This means that most respondents indicated that they act in environmental ways most of the time. This moderate skewness was considered acceptable, so parametric tests were used for the following analyses.

*Scale Reliability.* With the development of the environmental behaviour scale, analyses were run to test the reliability, internal consistency and item-total correlations. Table 3 shows a summary of these test results.

Table 3. *Summary of Reliability Statistics for Three-Item Environmental Behaviour Scale*

| <i>Item name</i>   | <i>Cronbach's alpha</i> | <i>Scale mean if item deleted</i> | <i>Scale variance if item deleted</i> | <i>Correlated item-total correlation</i> | <i>Squared multiple correlation</i> | <i>Cronbach's alpha if item deleted</i> | <i>Grand mean</i> | <i>ANOVA F value</i> |
|--------------------|-------------------------|-----------------------------------|---------------------------------------|--|-------------------------------------|---|-------------------|----------------------|
| RECYC <sup>a</sup> |                         | 7.79                              | 2.00                                  | 0.23                                     | 0.06                                | 0.66                                    |                   |                      |
| ECON <sup>b</sup>  |                         | 8.03                              | 1.80                                  | 0.45                                     | 0.25                                | 0.33                                    |                   |                      |
| WCON <sup>c</sup>  |                         | 8.14                              | 1.63                                  | 0.43                                     | 0.25                                | 0.34                                    |                   |                      |
| Total              | 0.56                    |                                   |                                       |  |                                     |   | 3.99              | 132.66<br>(.000)     |

<sup>a</sup>Recycling<sup>b</sup>Energy conservation frequency<sup>c</sup>Water conservation frequency

Table 3 shows that the scale's three items combined have a Cronbach's alpha of 0.56. This value is slightly lower than is usually desirable for a scale, but since there were only three items used here, the value was considered acceptable. We can also see that the Cronbach's alpha, if the recycling variable was removed, would actually increase to 0.66. Therefore, the other two items in the scale are more highly correlated. But once again, since this scale is so short, this item was considered an integral part of the scale and it was decided to keep it in the scale.

A theoretical issue arose in regards to the two questions concerning energy and water conservation. It is feasible to assume that these two questions could elicit answers due to their economic outcomes rather than their environmental outcomes; it saves one money to conserve electricity and water as well as being beneficial to the environment. To help address this problem of environmental intent, follow-up questions were utilised which categorised respondents' reasons for conserving energy and water into either environmental or non-environmental reasons. Analyses were therefore rerun including only these 'Environmental Conservers'. Intercorrelations among this data set were similar to those including all conservers, at between 0.19 and 0.49.

Table 4. *Pearson Correlations Between Predictor Variables for the Environmental Behaviour Scale (Environmental Behaviour Scale – Environmental Conservers)*

| <i>Environmental Behaviour Scale<br/>(Environmental Conservers<br/>only)</i> | <i>Recycling</i> | <i>Energy Conservation</i> | <i>Water Conservation</i> |
|--|------------------|----------------------------|---------------------------|
| Recycling  |                  | 0.22** (0.21**)            | 0.21** (0.19**)           |
| Energy Conservation  | 0.22** (0.21**)  |                            | 0.50** (0.49**)           |
| Water Conservation   | 0.21** (0.19**)  | 0.50** (0.49**)            |                           |

\*\*Significant at  $p < 0.01$

Means, standard deviations and mean differences between all respondents and only those who conserved for environmental reasons are shown in Table 5.

Table 5. *Means, Standard Deviations and Mean Differences for all Conservers Compared with Environmental-Reason Conservers*

|                                   | <i>Mean</i> | <i>SD</i> | <i>N</i> | <i>Z score</i> | <i>T-difference</i> |
|-----------------------------------|-------------|-----------|----------|----------------|---------------------|
| All energy conservation           | 12.33       | 0.98      | 8433     | 1.96           | -12.17              |
| Environmental energy conservation | 12.10       | 0.80      | 2592     |                |                     |
| All water conservation            | 12.71       | 1.26      | 8422     | 1.96           | -22.11              |
| Environmental water conservation  | 12.27       | 0.90      | 3858     |                |                     |

As can be seen, mean scores for the environmental-reason conservers were lower than for all conservers, meaning that they conserved energy and water more often. It was decided to use data from the environmental-reason conservers for complementary analyses hereafter. Respondent numbers were significantly lower when analysing environmental conservers only, with  $N = 2,592$  for energy conservation and  $N = 3,858$  for water conservation.

### *Correlations*

In the following analyses, several predictor variables were analysed separately for their relationship to pro-environmental behaviour. These predictor variables consisted of the following: cultural identity, environmental satisfaction, political engagement, healthy lifestyle,



sex, age, ethnicity, income level, qualification level, social marital status, place of birth, dependent children status and household size. Table 7 shows a summary of the findings.

Table 6. *Comparison of all Significant Predictor Variables on the Environmental Behaviour Scale Using Pearson Coefficient/Spearman's Rho Effect Sizes*

| <i>Predictor Variable</i>      | <i>r/rho</i> |
|--------------------------------|--------------|
| Cultural Identity              | -            |
| Cultural Identity Strength     | 0.04**       |
| Enviro. Satisfaction Waterways | -            |
| Enviro. Satisfaction Land      | 0.04**       |
| Political Engagement           | 0.11**       |
| Healthy Lifestyle              | -0.07**      |
| Sex                            | -0.05**      |
| Age                            | 0.14**       |
| Māori Ethnicity                | -0.03*       |
| Māori Descent                  | -0.03**      |
| Personal Income                | -0.08**      |
| Household Income               | -0.11**      |
| Qualification Level 1          | 0.05**       |
| Qualification Level 2          | 0.03**       |
| Social Marital Status          | -            |
| Place of Birth                 | -0.09**      |
| Dependent Children             | 0.06**       |
| Household Size                 | -0.07**      |

\*Significant at  $p < 0.05$

\*\*Significant at  $p < 0.01$

*Cultural identity, environmental satisfaction, political engagement and healthy lifestyle.*

In partial support of Hypothesis 1, cultural identity strength showed a small but significant positive correlated with environmental behaviour scores ( $r = 0.04$ ,  $p < 0.01$ ). As people's indications of the strength of their belonging to New Zealand increased, so did their environmental behaviour. At 0.04, the Pearson correlation was very small to insignificant. According to effect size guidelines, 0.2 is considered a small effect, 0.5 is medium, and 0.8 is large (Rice & Harris, 2005). Therefore, the effect size of 0.04 for cultural identity strength on

environmental behaviour must be interpreted as very small. Support was not found for Hypothesis 2. Environmental satisfaction of land showed a weak but positive relationship with environmental behaviour ( $r = 0.04$ ,  $p < 0.01$ ), which was the opposite of the hypothesised relationship. This effect appears to show that people who are more satisfied with the state of the native bush, parks and wildlife sanctuaries in their surroundings do more to act environmentally than those who are less satisfied. Environmental satisfaction of the waterways showed no significant relationship with environmental behaviour.

In support of Hypothesis 3, political engagement showed a weak but positive relationship with environmental behaviour ( $r = 0.11$ ,  $p < 0.01$ ). With an effect size of 0.11 we can be confident with this small effect. People who were highly politically engaged exhibited higher levels of environmental behaviour in this data. Hypothesis 4 proposed that individuals who led a healthier lifestyle would engage in more environmental behaviours. This hypothesis was not supported—indeed the opposite effect was found. Healthier lifestyles were correlated with less environmental behaviour ( $r = -0.07$ ,  $p < 0.01$ ).

In summary, Hypothesis 1 was partially supported, Hypothesis 2 was not supported, Hypothesis 3 was supported and Hypothesis 4 was not supported. It should also be noted that the effect sizes ranged only from  $r = 0.04$  to 0.11, so all effects found were considered small.

*Sex, age, income and qualification level.* Hypotheses 5 – 8 pertained to demographic determinants of environmental behaviour. Sex was found to have a small and negligible correlation with environmental behaviour ( $r = -0.05$ ,  $p < 0.01$ ). This result suggests that women engage in slightly more environmental behaviours than men, but the effect is small to insignificant. Therefore, Hypothesis 5 is only partially supported. Age was the single most important predicting variable in the current study of environmental behaviour, with a positive correlation and a small to medium effect size ( $r = 0.14$ ,  $p < 0.01$ ). The data shows clear evidence that older individuals act more environmentally than younger individuals. This is consistent

with past research, and supports Hypothesis 6 in the current study. Income was found to have a weak negative correlation with environmental behaviour ( $r = -0.08$  and  $-0.11$ ,  $p < 0.01$ ). Income, therefore, can be said to have a small but consistent effect on people's environmental behaviour; the wealthier a person is, the less likely they are to act environmentally. This result shows support for Hypothesis 7. Lastly, qualification level was found to be positively but very weakly related to environmental behaviour ( $r = 0.05$  and  $0.03$ ,  $p < 0.01$ ). This result suggests that individuals with higher qualifications and therefore more education engage in more pro-environmental behaviour. The result is very weak, however, so while the results show partial support for Hypothesis 8, the effect is not a strong one.

In summary, Hypothesis 5 was partially supported, Hypothesis 6 was supported, Hypothesis 7 was supported and Hypothesis 8 was partially supported. Effect sizes ranged between  $r = 0.05$  and  $0.14$ , meaning that all effects were small.

### *Multiple regression*

A multiple regression was carried out using all predictor variables. This first multiple regression had a poor predictive ability, with an R square of 0.079, meaning that the variables included helped to explain only 7.9% of the variance in environmental behaviour. It fit the data well,  $F(19, 1276) = 6.82$ ,  $p < 0.01$ . Several of the predictor variables were not significant in the regression analysis, leaving the equation for environmental behaviour as follows:

$$\begin{aligned} \text{Environmental Behaviour} = & 9.92 + 0.09(\text{Age}) - 0.29(\text{Sex}) - 0.62(\text{Place of Birth}) \\ & + 0.28(\text{Cultural Identity}) - 0.09(\text{Household Income}) + 0.20(\text{Political Engagement}) \end{aligned}$$

Table 7. *Model Summary for Multiple Regression of Environmental Behaviour*

| Model Summary |   |          |                   |                            |
|---------------|---|----------|-------------------|----------------------------|
| Model         | R | R Square | Adjusted R Square | Std. Error of the Estimate |

|   |       |       |       |       |
|---|-------|-------|-------|-------|
| 1 | 0.304 | 0.092 | 0.079 | 2.099 |
|---|-------|-------|-------|-------|

Predictors: (Constant), political engagement, health status, sex, volunteering frequency, environmental satisfaction waterways, cultural identity strength, highest qualification 2, number dependent children, Maori ethnicity, social marital status, place of birth, environmental satisfaction land, personal income, age, household income, household size, dependent children status, Maori descent, highest qualification 1

A second regression was conducted, using stepwise regression. For this, several predictor variables were eliminated due to their collinearity. These variables were: personal income, Māori descent, cultural identity, qualification level 2, environmental satisfaction of land and volunteering. This regression had a similar R square value as previously, with the variables explaining 8.6% of the variability in environmental behaviour. The appropriate model chosen was Model 6, and this included the following variables: (1) household income; (2) age; (3) place of birth; (4) sex; (5) cultural identity strength; and (6) political engagement. This model fit the data well,  $F(6, 1309) = 20.47$ ,  $p < 0.01$ . Variance inflation factors (VIF) for all six variables were just over 1, which indicates that multicollinearity was not a problem for this data. The equation to explain environmental behaviour with this model is as follows:

$$\begin{aligned} \text{Environmental Behaviour} = & 11.25 + 0.08(\text{Age}) - 0.35(\text{Sex}) - 0.66(\text{Place of Birth}) \\ & + 0.27(\text{Cultural Identity}) - 0.12(\text{Household Income}) + 0.21(\text{Political Engagement}) \end{aligned}$$

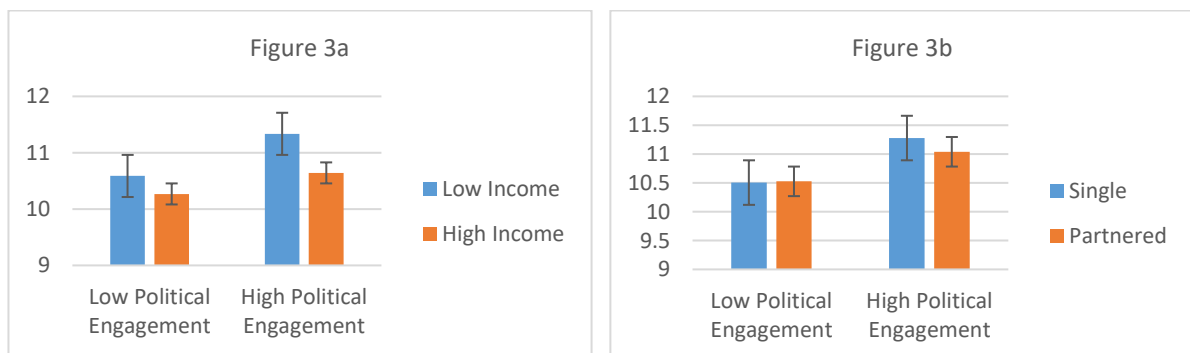
When comparing the results from the two regressions equations, the beta weights were similar for each variable. Thus, the stepwise regression can be seen as the appropriate measure to use, and the beta weights of the six variables can be accepted with confidence.

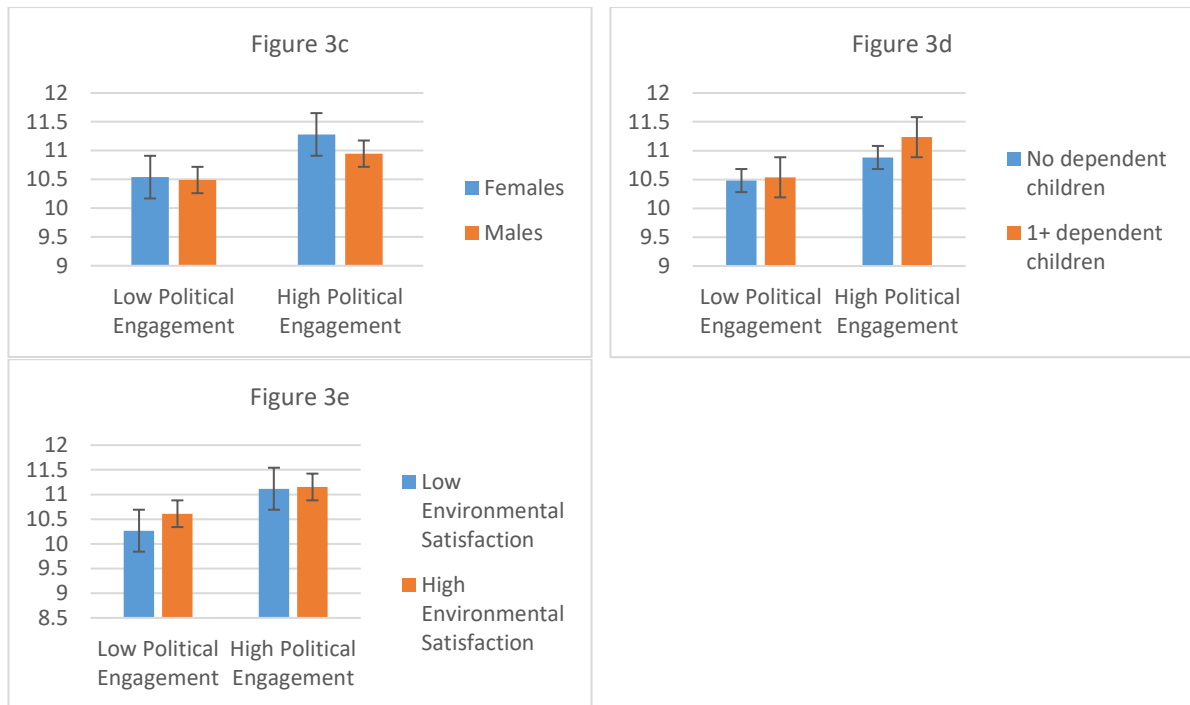
### *Interaction effects*

While certain variables may not have exhibited much of an influence on pro-environmental behaviours on their own, effects can often be hidden when only analysing individual correlations in isolation. Therefore, several variables were analysed for possible

interaction effects in their influence on pro-environmental behaviours. For this analysis, two-way ANONAs were carried out and analysed by both visual inspection and analysis of means,  $F$  scores and  $p$  values. The most interesting and theoretically relevant interactions are presented in the following paragraphs.

*Political engagement.* As seen in Figures 3a – 3e, several variables were found to interact with political engagement. An interaction effect was found between political engagement and income (Figure 2a). Among respondents who were highly politically engaged, those with high personal income engaged in pro-environmental behaviour significantly less ( $M = 10.92$ ) than those with low personal income ( $M = 11.42$ ). Among respondents who were not politically engaged, however, there was very little difference between high and low income groups ( $M = 10.42$  and  $10.64$ , respectively,  $F = 6.42$ ,  $p < 0.05$ ). The same effect was found when analysing household income, with low-income individuals acting in a more environmentally-concerned manner than high-income individuals only among the highly politically engaged ( $M = 11.34$  and  $10.64$ , respectively), not the less politically engaged ( $M = 10.59$  and  $10.27$ , respectively,  $F = 8.27$ ,  $p < 0.01$ ).





Figures 3a - 3e. Mean environmental behaviour scores for low political engagement and high political engagement groups, analysed by income (3a), social marital status (3b), sex (3c), dependent children status (3d) and environmental satisfaction (3e).

There was also an interaction between political engagement and social marital status (Figure 3b). Again, differences in pro-environmental behaviours only became evident in the highly politically engaged group—where non-partners acted more environmentally ( $M = 11.28$ ) than did partners ( $M = 11.04$ )—whereas there was no effect of social marital status on environmental behaviour in the low political engagement group ( $M = 10.51$  and  $10.53$ , respectively,  $F = 5.28$ ,  $p < 0.05$ ). Sex was found to interact with political engagement in predicting pro-environmental behaviour (Figure 3c). Among low politically engaged respondents, males and females were similar in their environmental behaviour ( $M = 10.49$  and  $10.54$ , respectively). In the highly politically engaged group, however, females engaged in significantly more pro-environmental behaviour than males ( $M = 11.28$  and  $10.95$ , respectively,  $F = 6.32$ ,  $p < 0.05$ ).

An interaction of political engagement and dependent children status was found (Figure 3d). Among the low political engagement group there were no differences in pro-environmental

behaviours between those with children and those with none ( $M = 10.54$  and  $10.48$ , respectively). In the high political engagement group, however, individuals with children were shown to engage in significantly more pro-environmental behaviours than those without children ( $M = 11.23$  and  $10.88$ , respectively,  $F = 6.15$ ,  $p < 0.05$ ).

The data showed that there was a significant interaction effect between environmental satisfaction and political engagement (Figure 3e). While those in the high political engagement group showed no difference in their pro-environmental behaviours depending on whether they had low or high environmental satisfaction of the waterways ( $M = 11.12$  and  $11.15$ , respectively), among individuals in the low political engagement group those who exhibited high environmental satisfaction engaged in more pro-environmental behaviours ( $M = 10.61$ ) than those who exhibited low environmental satisfaction ( $M = 10.27$ ). This could be interpreted in part as evidence against Hypothesis 2, whereby it was predicted that environmental dissatisfaction should predict pro-environmental behaviour. It is interesting, however, that it is only among the non-politically-engaged this backwards effect is found. Among the highly politically engaged (who show much higher environmental behaviour overall) there is no effect of environmental satisfaction on behaviour.

Overall, these political engagement interactions seem to show that for certain demographic variables, predicting environmental behaviour only becomes apparent if we look at the more highly politically engaged group of individuals in isolation. In this way, political engagement can be thought of as a catalyst for other effects to emerge.

*Age interactions.* For the following analyses, the younger group were those aged under 45 years of age, and the older group were those aged 45 years and older. Age was found to interact with environmental satisfaction in predicting people's pro-environmental behaviour (Figure 4a). In the older group of respondents, there were no differences in pro-environmental behaviour between the highly environmentally satisfied and those stating less environmental

satisfaction ( $M = 11.18$  and  $11.14$ , respectively). However, in the younger respondent group, those who showed high pro-environmental satisfaction engaged in more environmental behaviours than those who showed low environmental satisfaction ( $M = 10.64$  and  $10.31$ , respectively,  $F = 6.08$ ,  $p < 0.05$ ).

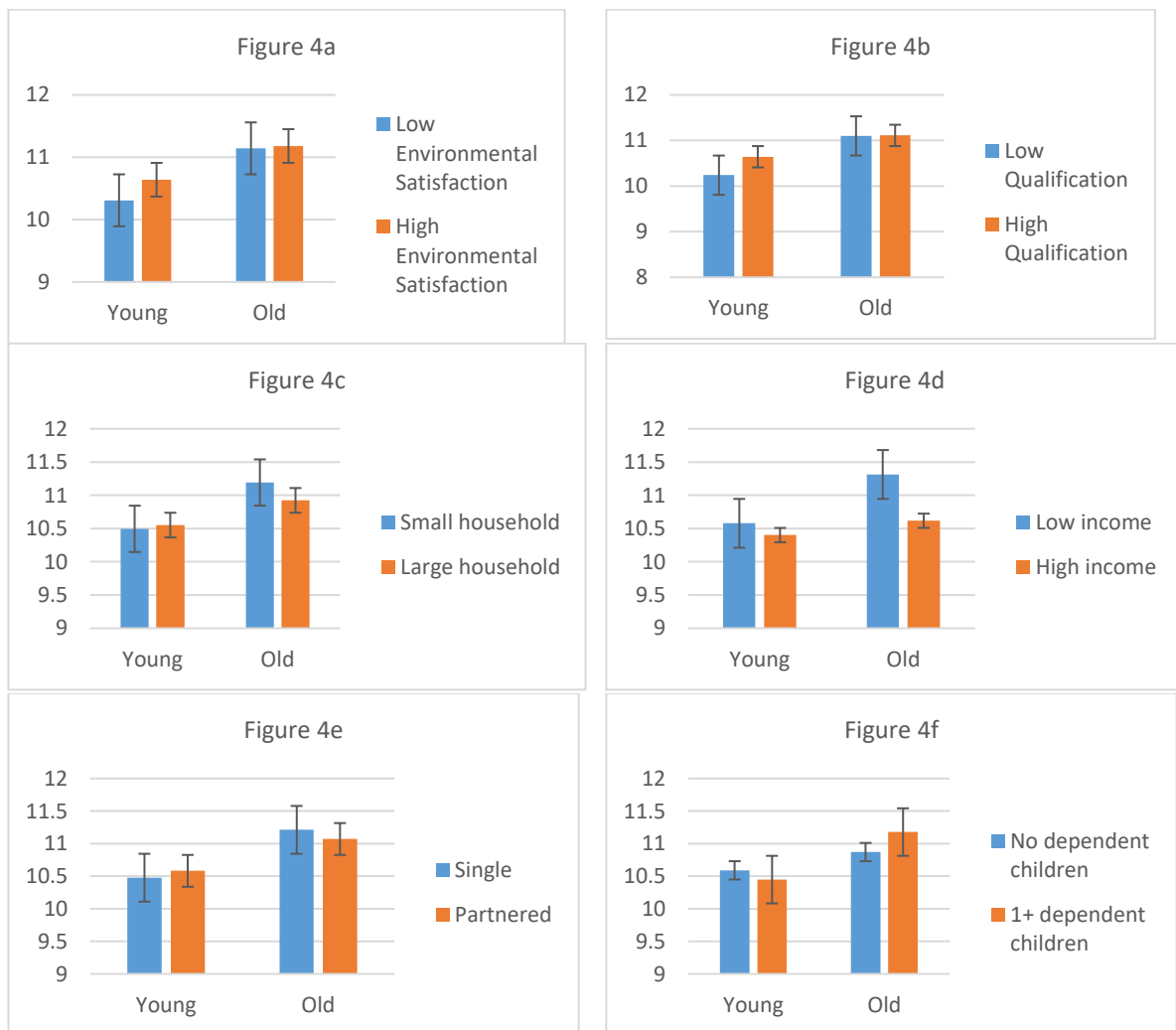


Figure 4a - 4f. Mean environmental behaviour scores for young and old groups, analysed by household size (4a), household income (4b), social marital status (4c), dependent children status (4d), environmental satisfaction (4e) and qualification level (4f).

Age was found to interact with qualification level (Figure 4b). Among older individuals, high qualification individuals and low qualification individuals showed the same level of pro-environmental behaviour ( $M = 11.11$  and  $11.10$ , respectively). However, among the younger group, those with higher qualifications were more likely to engage in pro-environmental

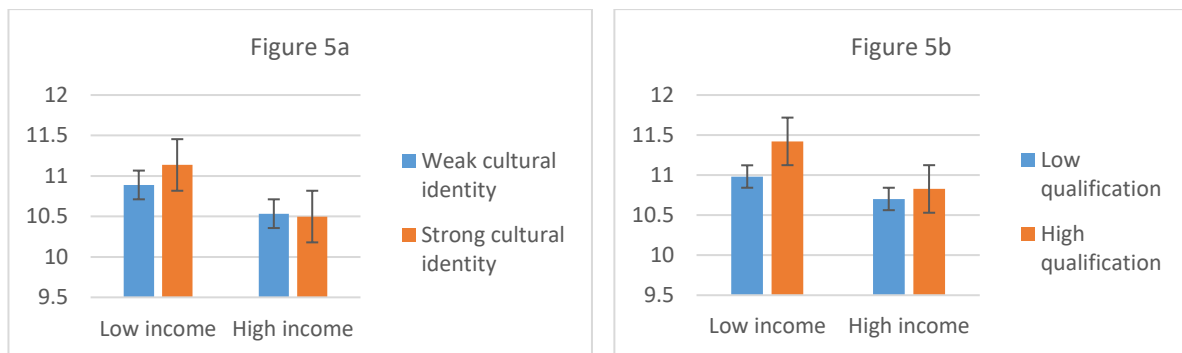


behaviours than those with lower qualifications ( $M = 10.64$  and  $10.24$ , respectively,  $F = 11.71$ ,  $p < 0.01$ ). Age was also found to interact with household size (Figure 4c). Among the younger group of respondents, there was no difference in environmental behaviour between those in small or large households ( $M = 10.49$  and  $10.55$ , respectively). However, among the older group, those in a small household engaged in more pro-environmental behaviours than those in larger households ( $M = 11.19$  and  $10.92$ , respectively,  $F = 7.07$ ,  $p < 0.01$ ). Another interaction effect was found between age and income (Figure 4d). Among younger respondents, personal income level did not appear to be relevant in predicting environmental behaviour, with low-income and high-income individuals showing the same levels of pro-environmental behaviour ( $M = 10.56$  and  $10.51$ , respectively). However, among the older group, those with low personal income engaged in significantly more pro-environmental behaviours than those with high personal income ( $M = 11.37$  and  $10.93$ , respectively,  $F = 12.77$ ,  $p < 0.01$ ). The effect was even more pronounced when looking at household income and age ( $M = 10.58$  and  $10.40$ , respectively, and  $M = 11.31$  and  $10.62$ , respectively,  $F = 17.91$ ,  $p < 0.01$ ).

Age was found also to interact with social marital status (Figure 4e). Analysis found that, among the younger group of respondents, being in a relationship predicted pro-environmental behaviour ( $M = 10.58$ ) slightly more than being single ( $M = 10.48$ ), while in the older group, being single predicted pro-environmental behaviour ( $M = 11.21$ ) more than being in a relationship ( $M = 11.07$ ,  $F = 5.19$ ,  $p < 0.05$ ). Interestingly, there was also an age-dependent children interaction (Figure 4f). For the younger group, having children meant they engaged in less pro-environmental behaviour than those that who do not have children ( $M = 10.45$  and  $10.59$ , respectively). For the older group, however, the opposite was true—having children meant that they engaged in more pro-environmental behaviour than those without children ( $M = 11.18$  and  $10.87$ , respectively,  $F = 11.71$ ,  $p < 0.01$ ). The many and varied interactions

involving age likely relate to the various aspects of life that change as people age, and this is explored in the Discussion section.

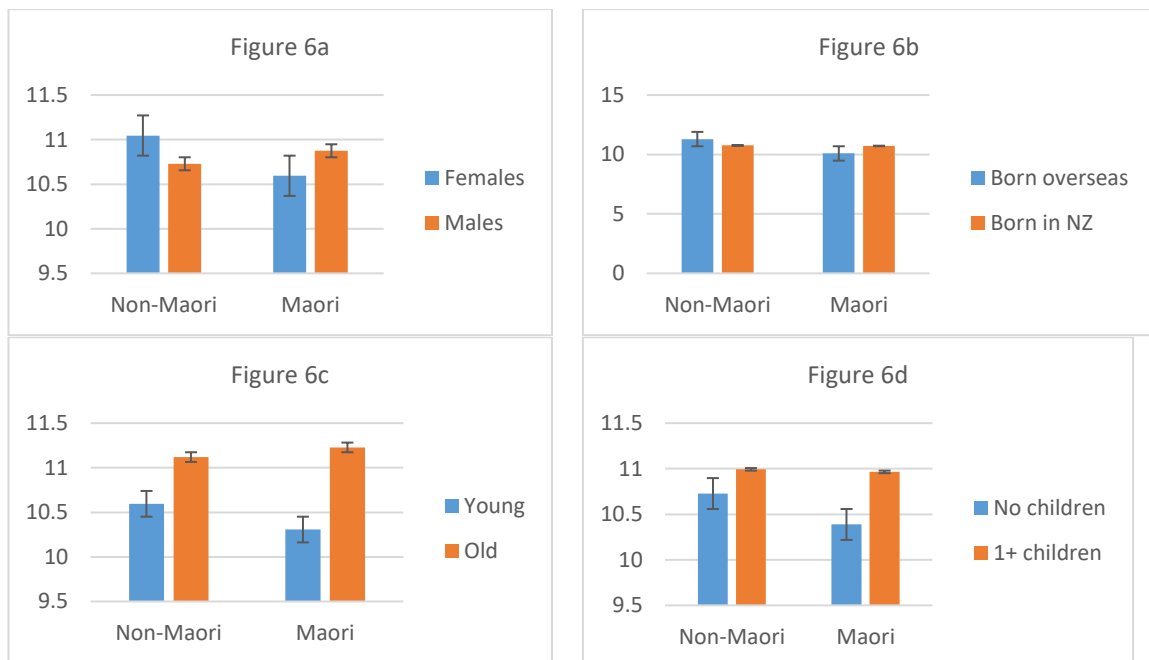
*Income interactions.* Two interactions were found with income. There was a significant interaction between income and cultural identity strength (Figure 5a). Among the low household income group, respondents who exhibited strong cultural identity engaged in more pro-environmental behaviours than those who exhibited weak cultural identity ( $M = 11.14$  and  $10.89$ , respectively,  $F = 5.11$ ,  $p < 0.05$ ). However, among the high household income group, there was no significant difference ( $M = 10.50$  and  $10.53$ , respectively).



*Figures 5a and 5b.* Mean environmental behaviour scores for low and high income groups, analysed by cultural identity strength (5a) and qualification level (5b). Vertical bars represent 1 standard error of the mean.

Analysis also found that there was an interaction effect between income and qualification (Figure 5b). Among the high personal income group of individuals, high qualification and low qualification individuals showed the same level of pro-environmental behaviours ( $M = 10.83$  and  $10.70$ , respectively). However, for the low-income group, qualification became important, with high qualification individuals engaging in significantly more pro-environmental behaviours than low qualification individuals ( $M = 11.42$  and  $10.98$ , respectively,  $F = 4.16$ ,  $p < 0.05$ ). This could perhaps be evidence to support the idea that education promotes environmental action, but it only becomes apparent in lower income brackets.

*Ethnicity interactions.* Several interactions were found purely among demographic variables in their effects on pro-environmental behaviours. Ethnicity was found to be an important variable for uncovering interactions in this data set. Analysis found that Māori males engaged in more pro-environmental behaviours than Māori females ( $M = 10.87$  and  $10.59$ , respectively)—while the opposite was true of non-Māori, with non-Māori females engaging in more pro-environmental behaviours than non-Māori males ( $M = 11.05$  and  $10.73$ , respectively,  $F = 13.57$ ,  $p < 0.01$ , Figure 6a). The same effect was found for those of Māori descent ( $M = 10.80$  and  $10.65$ , respectively, and  $M = 11.05$  and  $10.73$ , respectively,  $F = 10.00$ ,  $p < 0.01$ ).

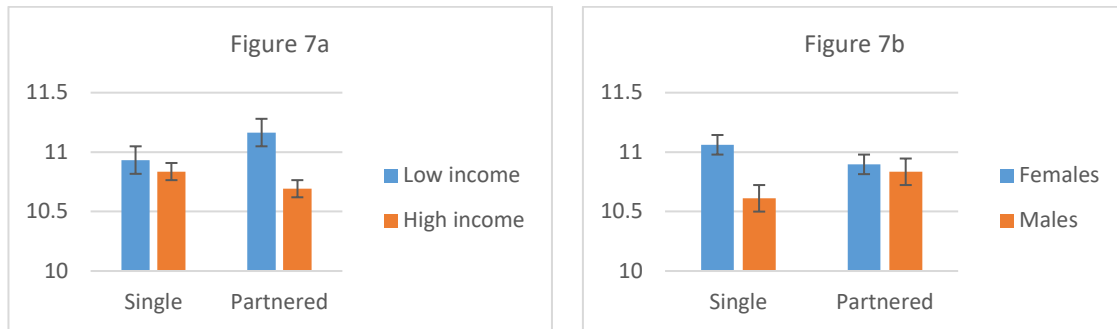


Figures 6a - 6d. Mean environmental behaviour scores for Māori and non-Māori groups, analysed by sex (6a), place of birth (6b), age (6c) and dependent children status (6d). Vertical bars represent 1 standard error of the mean.

As seen in Figure 6b, it was also found that among respondents who were of Māori descent, those who were born in New Zealand engaged in more pro-environmental behaviours than those who were not ( $M = 10.72$  and  $10.38$ , respectively). However, among respondents who were not of Māori descent, those who were born in New Zealand engaged in less pro-environmental behaviours than those who were born elsewhere ( $M = 10.67$  and  $11.30$ ,

respectively,  $F = 4.94$ ,  $p < 0.05$ ). Analysis also found that there was an interaction effect between Māori ethnicity and age (Figure 6c). Among Māori, a significant age effect was found in people's pro-environmental behaviours, with the older group engaging in more pro-environmental behaviours than the younger group ( $M = 11.24$  and  $10.31$ , respectively). However, for non-Māori, this age difference was not significant ( $M = 11.12$  and  $10.58$ , respectively,  $F = 5.90$ ,  $p < 0.05$ ). The same effect was found between age and Māori descent ( $M = 11.23$  and  $10.31$ , and  $M = 11.12$  and  $10.60$ , respectively,  $F = 7.62$ ,  $p < 0.01$ ). There was also evidence of an interaction between Māori descent and dependent children status (Figure 6d). Among respondents of Māori descent, those who had one or more dependent children engaged in more pro-environmental behaviours than those who did not have children ( $M = 10.96$  and  $10.39$ , respectively), while in the non-Māori descended group there was no significant difference in the environmental behaviour of those with children or those without ( $M = 10.99$  and  $10.73$ , respectively,  $F = 4.55$ ,  $p < 0.05$ ).

*Social marital status and dependent children status.* A few interactions were found at the marital level. Analysis found that there was an interaction between social marital status and income (Figure 7a). For those who were not in a relationship, low and high income individuals showed no difference in their environmental behaviours ( $M = 10.93$  and  $10.83$ , respectively). However, for individuals who were in a relationship, income played an important role—low personal income individuals engaged in significantly more pro-environmental behaviours than high personal income individuals ( $M = 11.16$  and  $10.69$ , respectively,  $F = 11.73$ ,  $p < 0.01$ ). In addition, when analysis only includes those who conserve energy and water for environmental reasons, there remains a significant difference between low income and high income individuals ( $M = 12.26$  and  $11.84$ , respectively,  $F = 25.27$ ,  $p < 0.01$ ). This suggests that the difference in environmental behaviour between high income and low income individuals is not simply due to the economic benefits of conserving energy and water.



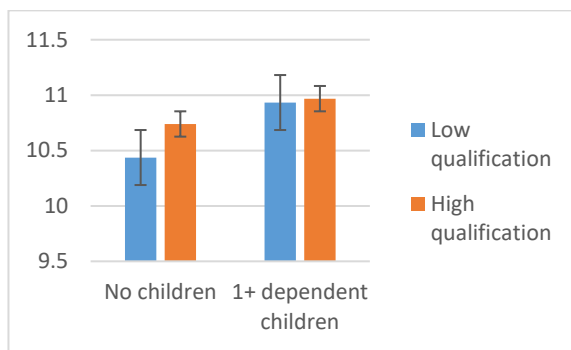
*Figures 7a and 7b.* Mean environmental behaviour scores for single and partnered groups, analysed by personal income level (7a) and sex (7b). Vertical bars represent 1 standard error of the mean.

It was also found that there was an interaction between social marital status and sex (Figure 7b). While the group of respondents who were in relationships showed no substantial differences between males and females in their environmental behaviour ( $M = 10.83$  and  $10.90$ , respectively), among the group who were not in relationships, females engaged in more pro-environmental behaviours than males ( $M = 11.06$  and  $10.61$ , respectively,  $F = 12.59$ ,  $p < 0.01$ ). This is one of the largest effects in the current research, and reasons for this disparity are proposed in the Discussion section.

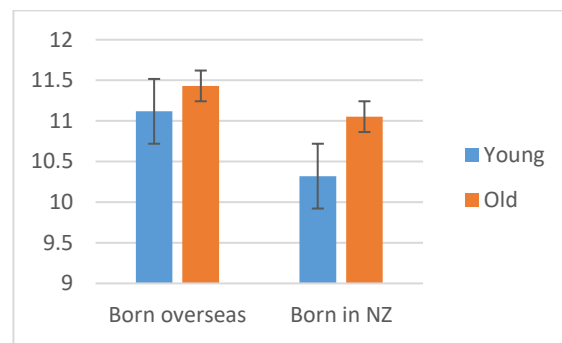
Dependent children status also interacted with qualification level (Figure 8). While people with children did not show any difference in pro-environmental behaviour based on high or low qualification level ( $M = 10.97$  and  $10.93$ , respectively), among respondents without children, those with a high-level qualification engaged in substantially more pro-environmental behaviours than those with a low-level qualification ( $M = 10.74$  and  $10.44$ , respectively,  $F = 4.19$ ,  $p < 0.05$ ). The same finding was found for the second measure of qualification level ( $F = 4.94$ ,  $p < 0.05$ ).

Place of birth was found to interact with age (Figure 9). For respondents not born in New Zealand, there was only a small difference between older and younger respondents in their

environmental behaviour ( $M = 11.43$  and  $11.12$ , respectively). Among those born in New Zealand, however, the older group acted significantly more pro-environmentally than the younger group ( $M = 11.05$  and  $10.32$ , respectively,  $F = 11.26$ ,  $p < 0.01$ ).



*Figure 8.* Mean environmental behaviour scores for respondents with 1+ dependent children and no children analysed by qualification level.



*Figure 9.* Mean environmental behaviour scores for respondents born overseas and born in New Zealand analysed by age.

### *Latent class analysis*

For additional insight into what types of people are the most likely to be involved in high levels of pro-environmental behaviours, a latent class analysis was carried out using only respondents who scored 13 or above on the Environmental Behaviour Scale. This amounted to 2,137 respondents, or 25.2% of the total sample. In the latent class analysis, four classes were identified, with an Akaike information criterion of 107151.450. The model had an entropy of 0.864 which was considered good—entropy with values approaching 1 indicate clear delineation of classes (Celeux & Soromenho, 1996). Table 9 shows the variable means of these four latent classes of top conservers.

Table 8. Means for Variables 1 – 17 for Four Classes of Top Environmental Conservers

| <i>Means</i> |          |            |            |            |            |            |            |            |            |           |
|--------------|----------|------------|------------|------------|------------|------------|------------|------------|------------|-----------|
| <i>Class</i> | <i>N</i> | <i>V1</i>  | <i>V2</i>  | <i>V3</i>  | <i>V4</i>  | <i>V5</i>  | <i>V6</i>  | <i>V7</i>  | <i>V8</i>  | <i>V9</i> |
| 1            | 225      | 9.53*      | 0.25*      | 0.04*      | 2.48*      | 3.61*      | 3.97*      | 0.58*      | 0.05*      | 10.02*    |
| 2            | 732      | 10.04*     | 0.34*      | 0.16*      | 2.58*      | 3.49*      | 3.94*      | 0.84*      | 0.19*      | 4.09*     |
| 3            | 779      | 7.16*      | 0.53*      | 0.16*      | 2.52*      | 3.72*      | 4.05*      | 0.76*      | 0.21*      | 4.73*     |
| 4            | 401      | 7.34*      | 0.38*      | 0.05*      | 2.46*      | 3.78*      | 4.12*      | 0.51*      | 0.05*      | 11.38*    |
| <i>Class</i> |          | <i>V10</i> | <i>V11</i> | <i>V12</i> | <i>V13</i> | <i>V14</i> | <i>V15</i> | <i>V16</i> | <i>V17</i> |           |
| 1            |          | 0.33*      | 1.79*      | 7.52*      | 5.32*      | 6.53*      | 46.55*     | 2.64*      | 1.24*      |           |
| 2            |          | 0.23*      | 1.60*      | 2.25*      | 5.31*      | 6.31*      | 42.04*     | 2.63*      | 0.75*      |           |
| 3            |          | 0.69*      | 2.84*      | 3.14*      | 7.86*      | 12.12*     | 49.92*     | 2.50*      | 0.72*      |           |
| 4            |          | 0.75*      | 2.70*      | 8.29*      | 9.58*      | 12.93*     | 51.50*     | 2.62*      | 1.06*      |           |

V1: age, V2: sex, V3: Maori ethnicity, V4: cultural identity, V5: environmental satisfaction waterways, V6: environmental satisfaction land, V7: place of birth, V8: Maori descent, V9: qualification1, V10: social marital status, V11: household size, V12: qualification2, V13: personal income, V14: household income, V15: health status, V16: political engagement, V17: volunteering frequency

\*ANOVA estimate of the standard error sig. at  $p < 0.01$

Figure 10 shows a graph of the variable means of the four latent classes that were identified in this analysis of top conservers.

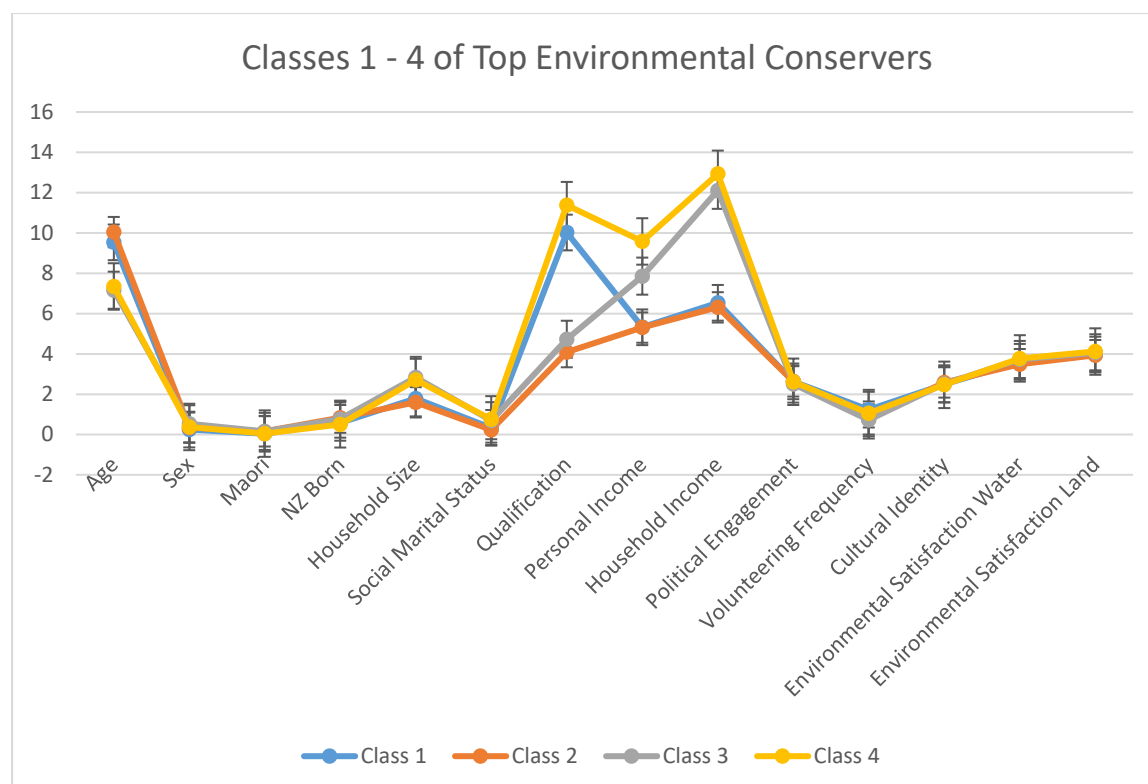


Figure 10. Mean variable scores for the four classes of top environmental conservers.

Class 1 were labelled 'High qualification, low income, female baby boomers'. This class are 60-65 years old, have a university degree, are female, and have a household income of \$20,000-\$25,000 per year. Class 2 were labelled 'Low qualification, low income, female baby boomers'. This class are characterised by being 60-65 years old, having a trade certificate or diploma, being female, and having a household income of \$20,000-\$25,000 per year. Class 3 were labelled 'Low qualification, high income, middle-aged women'. This class are 45-49 years old, have a trade certificate or diploma, are female, and have a household income of \$60,000-\$70,000. Lastly, class 4 were labelled 'High qualification, high income, middle-aged women'. This class are characterised by being 45-49 years old, having a university degree, being female, and making a household income of \$60,000-\$70,000.



## Discussion

### *Comparison to past work*

Research into correlates of environmental actions have garnered differing results, due to different research methods, different focuses and possibly changing phenomena over time. The results in the current research have been similarly inconsistent. With regards to the construct of cultural identity, past research suggested that there has often been a link between people's identity or attachment with a certain place and their actions to protect that place. In the current analysis, the relationship between people's cultural identity—that is, how strongly they felt that they belong to New Zealand—and their levels of environmental activity was positive, but weak to marginal in size. This result can be interpreted as being consistent with past research, but not to the scale that was expected. The large sample size of the data set used in this analysis and the straightforward nature of the question offer a certain confidence to assert that the connection between place identity and place preservation may not be as strong as previously thought. This incongruence between values and action has been noted in the research into theories of environmental behaviour such as the values-norms-beliefs theory. Maloney and Ward (1973) argue that the connection between values and behaviour are notoriously weak, and this is due to the presence of many other conflicting influences on behaviour. The authors argue that the stronger predictors of behaviour are intentions and planning, as outlined in the theory of planned behaviour. It therefore may be that the connection between people's feelings about their belonging to New Zealand are too far removed from their actual behaviour to show a correlation of significant weight.

The second area of research concerned people's attitudes towards the environment. People were asked how satisfied they were with the state of the lakes, rivers, harbours, oceans, coastlines, native bush, forests, nature reserves and open green spaces that they have been to.

It was thought that this question would elicit people's satisfaction with their local environment, and that respondents exhibiting high satisfaction would therefore fail to act as pro-environmentally as those who exhibited low satisfaction. This hypothesis assumes that if someone is less satisfied with something they would act to elevate it towards their satisfaction level. This proved not to be the case in analysis of this construct, with the reverse being true: people who reported being more highly satisfied with the state of the environment reported behaving in more pro-environmental ways than those reporting low environmental satisfaction. It should, however, be noted that this effect was marginally weak. This is a somewhat puzzling phenomenon. One possible explanation can be found in the theory of cognitive dissonance and the use of coping mechanisms. Cognitive dissonance is the theory that, when people feel two differing cognitions at once, they actively try to bring those cognitions closer together so as to align with a single belief or feeling (Harmon-Jones, 1999). In the current research, when people feel a threat to the things important to them they may act in ways that change their own feelings about the issue or object, rather than acknowledging that they may lose that special object. In line with this argument, perhaps the people who act more pro-environmentally do so because they feel that the environment is special and important. They therefore might be motivated to view it in a positive light—reporting that they are highly satisfied with the state of the environment.

In past research, interactions have emerged between demographic variables and attitudes. Women, the more educated, the politically liberal, those with no religious affiliations and postmaterialists are more likely to believe that nature is sacred in itself (Dietz et al., 1998). This shows that there may be many intermediate variables (like beliefs and worldviews) that act as facilitating factors between our demographic variables and pro-environmental behaviour. The 2012 NZGSS did not assess people's beliefs about the importance or specialness of the

environment, so it was not possible to test this theory of causal connections between environmental beliefs, action and satisfaction ratings.

Previous research suggested that there may be a relationship between healthy lifestyle and pro-environmental behaviours. It has been theorised that the same underlying personal qualities that promote healthy life choices—which can be thought of as something like conscientiousness—will also promote positive engagement with the environment. In the current research, this potential relationship was tested by analysing the health status composite variable, which assessed people's levels of smoking, mobility and fitness. Contrary to past research, this correlation was found to be negative, meaning that it was people who scored lower on the health status variable that engaged in higher levels of pro-environmental behaviour. The most likely explanation for this finding is that there were other intermediate variables which were not assessed that were responsible for this relationship.

The last main area of interest in the current research was the connection between political engagement and pro-environmental behaviour. Much has been suggested in past research of the connection between political leaning, involvement in political activism and people's pro-environmental concern and behaviour. It seems reasonable that people who are more heavily involved in political endeavours are also more concerned with certain specific issues, like the environment. And this is what was found in the current research. In one of the strongest effects found, political engagement—that is, having voted in the last general and local elections—was shown to predict pro-environmental behaviour. Not only was there a direct positive relationship, but political engagement also appeared to act as a sort of catalyst for the emergence of other relationships in the data. High political engagement spurred the elevated pro-environmental behaviours for low income groups, single people, females, and for people with one or more dependent children.

Considering that the same trend was found among most of these analyses, it seems that there may be something about being highly politically engaged that is important for the emergence of effects on people's pro-environmental behaviours. It is difficult to provide a complete explanation as to why this variable may act as a catalyst in this way, but there are similarities between political behaviours and environmental behaviours, and this can be utilised to further understand this relationship.

Political engagement can be thought of as a type of active prosocial behaviour. To vote is to care about the developments in your local community and wider country. Therefore, it can be assumed that the types of people who vote are the sorts of people who are engaged with current issues, are proactive about action and change, and care about the people who surround them and the place in which they live. Pro-environmental behaviour fits in with the ideologies of these sorts of people. Pro-environmental behaviour is a prosocial behaviour also. To recycle and conserve resources is to care about the consequences of one's actions and act to lessen one's ecological impact. It is therefore not surprising that these two behaviours are highly linked.

As well as the four main areas of interest, several demographic effects emerged in the current analysis. They included three main areas: age, sex and income level effects. These areas are discussed in the following sections.

*Age effects.* Past studies have differentially suggested that age is related positively and negatively to environmental actions. While some research has found that young individuals tend to act more pro-environmentally, most studies have found that it is the older group who behave in this way. The current research expected to find results to support this second proposition, and that is what was found. In the single strongest effect of this study, age was found to positively predict people's pro-environmental behaviour; older people acted more pro-environmentally than younger people. Two explanations have been proposed for this finding

in the past. The first suggests that older people have the benefit of learning effects; over the lifespan, people learn to act in more environmentally-conscious ways due to an accumulation of knowledge and experience on the subject. The second explanation suggests that older people act more pro-environmentally due to maturation effects; people become more environmentally concerned as they age due to developing physically and emotionally. Of these two explanations, it is the former that is offered as a plausible explanation for the current research. Elaborated further, learning could also encompass past experience, which might include being raised in a time when different principles were instilled in the general consciousness. For example, an individual who was a child during or after the Second World War may have been raised where there was a general feeling of being mindful of the resources one used and being careful not to waste them. This habit is therefore learned and carried through adulthood, resulting in taking better care with recycling and conserving energy and water. This behaviour may not be one that is undertaken with the conscious aim of bettering the natural environment, but may be a consequence of habits created or learned in early life.

In analysis of interactions, it was found that income was an important interacting variable with age; older adults who are poorer engage in significantly more pro-environmental behaviours than older adults who are wealthier, whereas with the younger group there were no significant differences based on income level. As stated above, an argument was put forth that proposed that older people are more environmentally responsible not necessarily because of elevated levels of appreciation of the environment, but rather due to habits created in earlier life, whence principles of mindfulness of resources were instilled. The same theory can help explain the interaction between age and income level. In the low-income older group, perhaps early life was experienced with greater deprivation of resources and hence early habits of frugality and care were instilled at a greater level than high-income older individuals who did not experience this level of deprivation in their early life.

Household structures can also help explain some effects found between age and pro-environmental behaviour. One such effect was an interaction that was found between age and household size on pro-environmental behaviour. It was found that, among the younger group of respondents, there was no difference in environmental behaviour between those in small or large households. However, among the older group, those in a small household engaged in more pro-environmental behaviours than those in larger households. One explanation for this finding is that, in a household, one person may act as the 'recycling manager'. Since it is not necessary for everybody in a large household to carry out recycling tasks, one person may take responsibility for this chore, and others may focus on other tasks. Perhaps older people in large households live with their younger extended family, including their children and perhaps grandchildren. The elders may be exempt from these sorts of household tasks. By contrast, older people who live in smaller households may either live alone or with a spouse. In this sort of household set-up, the older person must take responsibility for recycling chores out of necessity. This would help explain the interaction between age, household size and pro-environmental behaviour.

This theory may have limited power to explain the relationship between age, household size and energy and water conservation. Some behaviours included in these constructs may be the sorts of behaviours that elders are exempt from in large households. For instance, turning off lights and heaters when not in use could be taken care of by the younger family members. Some other behaviours however, such as taking shorter showers, are more personal in their responsibility, so the theory has less explanatory power.

*Sex effects.* One of the more robust findings in the past research on environmental behaviours is the observation that women tend to be more active in this area than men. This finding was supported in the current research, although women only engaged in pro-environmental behaviour at a slightly higher rate than men, so the effect was weak.

One explanation for this sex difference is that women may care more about the environment than men, and act in ways that are in line with these values. However, perhaps a more plausible perspective is to view the sorts of environmental activities in the current research as an aspect of the broader realm of household maintenance. It is a well-known finding that, while women are increasingly working the same hours outside of the house as men, the division of household labour remains significantly unbalanced, with women taking part in these chores more often than men (Bianchi, Milkie, Sayer, & Robinson, 2000; Davis, Greenstein, & Gerteisen Marks, 2007). It is possible, then, that women engage in more recycling and conservation behaviours than men because they engage in more household tasks in general, and these tasks fall under that umbrella.

If the unequal division of labour theory was true, we might expect sex differences to be most pronounced among people who are in relationships, as they are likely to be (generally) living with an opposite-sex partner, where such differences should emerge. However, a reverse interaction effect was found between sex and social marital status. The pro-environmental behaviours of women and men who were in relationships did not differ significantly, but it was the men who were not in relationships who were less environmentally active than women not in relationships. This seems to suggest that unequal division of labour in the household is not a credible explanation for the interaction between sex and social marital status on pro-environmental behaviours. A more plausible theory is that men who are in relationships are encouraged by their partners to take part in pro-environmental behaviours, while men who are not in a relationship do not have this female encouragement, and therefore are less likely to take part. This reasoning is believable, but the question as to why females are more environmentally-responsible has not yet been explained.

It is proposed here that women are more environmentally-active than men due to socialisation practices. In a similar argument to that proposed to explain age effects, it is

suggested that women engage in more of these sorts of responsible, prosocial behaviours because they have been socialised from early in life to do so. Women and girls are encouraged to be the carers (Nielsen, 2014), the gift-buyers (Sinardet & Mortelmans, 2009), the relationship managers (Fletcher, Simpson, Campbell, & Overall, 2013) and so forth. After a lifetime of this sort of socialisation, taking care of environmental chores in the household becomes more of an implicit habit than a conscious activity carried out with the aim of improving the environment.

*Income effects.* Socioeconomic influence on behaviour is an area that has attracted much attention in psychological research. Past environmental research has shown that differences in socioeconomic status can have a substantial effect on people's tendencies to act in pro-environmental ways. Research has often highlighted the incongruence shown by the wealthy, where values and actions are often vastly different. While wealthier individuals are more likely to state that they support pro-environmental endeavours, they usually do not exhibit the daily behaviours to support such a stance. The current research supported this proposition, with higher income individuals engaging in less pro-environmental behaviour than lower income individuals. Interestingly, this effect remained even when assessing only those respondents who reported conserving for environmental reasons. This follow-up assessment was conducted to ensure respondents did not conserve energy and water solely due to economic reasons. The finding that higher income individuals engaged in less pro-environmental behaviour than lower income individuals, even when economic reasons were eliminated, is strong support for the argument that the affluent do not follow up on their claims to be environmentally conscious. One possible explanation could be that this group might be busier than the other group, and therefore struggle to find the time to actively make an effort to recycle and conserve resources. This could be an interesting area for future research.



Qualification level was also assessed, and it was predicted that as this increased, knowledge about the environment should increase too, which in turn may increase levels of pro-environmental behaviour. Qualification level, therefore, was expected to have an indirect positive influence on pro-environmental behaviour. While results suggested that qualification did have some influence, the effect was very weak. Therefore, solid conclusions of qualification level's influence on pro-environmental behaviour cannot be drawn from this research.

*The top environmental conservers.* To garner a more in-depth and precise idea of what a highly environmentally-conscious person in New Zealand looks like, the current research implemented a latent class analysis and created profiles of the top environmental conservers. This technique allowed for synthesis of all variables into a coherent profile of such a New Zealander. Analysis revealed four classes of top environmental conservers: (1) 'High qualification, low income, female baby boomers'; (2) 'Low qualification, low income, female baby boomers'; (3) 'Low qualification, high income, middle-aged women'; and (4) 'High qualification, high income, middle-aged women'. As can be seen, all classes of top conservers include being female as one of their identifiers. When compared to the individual variable correlation analysis which showed only a small to marginal sex effect, this analysis allowed for the real impact of sex to emerge as one of the strongest class identifiers. Age was also a common identifier, with two of the classes classifying as baby boomers and the other two classifying as middle-aged. The younger group of individuals did not appear at all in the four classes of the top environmental conservers.

#### *Concluding remarks and recommendations*

Taken together, the results garnered from the current research do not paint a clear picture of what is important in predicting pro-environmental behaviour in New Zealand. With only

small correlations ranging between  $r = .03$  and  $.14$ , even the strongest predictors showed only a weak to moderate effect on behaviour. While the results were mostly weak, some overall conclusions can be drawn. New Zealand men do not do as much for the environment when it comes to household environmental actions as they could do, or indeed as women do. This is an issue that could be addressed in schools by teaching boys at a young age to be more mindful of the environment and encouraging boys to take responsibility for household environmental duties. Advertisers could also aim to target the male demographic in environmental campaigns, perhaps using masculine words and depicting men caring for the environment in an instrumental way.

Young people also appear to be falling short of environmental responsibility in New Zealand. Of the four classes of top environmental conservers identified, none included people under the age of 45. This is important, as it excludes a 30-year range of survey respondents. It is crucial that younger New Zealanders are encouraged to emulate their older counterparts when it comes to environmental matters. In regards to possible interventions that address the younger demographic in their environmental behaviour, it is proposed that this group be split into two age ranges: 15-25 year olds (the 'young adults') and 25-45 year olds ('parenting-aged adults'). The young adults group might be assumed to be students. Accordingly, a student-oriented intervention could be implemented for this group, such as posters and stalls at universities and polytechnics that promote the active protection of the environment. Since the average age for women to have their first child in New Zealand is 28 years (Statistics New Zealand, 2011), it is assumed that a large proportion of the 25-45-year-old age group are parents who are in the life stage of looking after children who are still living at home. Therefore, the second type of initiative could be aimed at parents, with such interventions as posters at Plunket rooms and advertising on parenting websites.

The implications of the heavy connection between high political engagement and pro-environmental behaviour are many. For one, organisations interested in increasing people's environmental participation may wish to capitalise on this connection. Groups such as Greenpeace could target political groups and clubs when looking to recruit new members or gather donations. This targeted approach could provide a more efficient and effective use of resources than the conventional approach of communicating with the general population on the street or by telephone. It would not, however, address the real issue which is to attempt to elevate pro-environmental behaviours among all people, not just people who are likely to be pro-environmental anyway. Perhaps a better approach would be to attempt to increase pro-environmental behaviour in part by increasing political engagement in the general population.

#### *Limitations and future research*

The current research was constrained due to the use of existing data from the 2012 New Zealand General Social Survey, and as such was limited in which questions were available to be analysed. A thorough investigation into the psychological determinants of pro-environmental behaviours would benefit from the assessment of several additional variables, including questions relating to values, intentions and beliefs. As previously discussed, several theories and much past research have involved the assessment of people's beliefs about the environment, their ideas about what is important, and their own assessment of how they plan to act in the future. Research has found that the strongest predictor of behaviour is intention to act. However, these sorts of questions were not assessed in the NZGSS, and therefore the current research necessarily focussed primarily on demographic predictors of pro-environmental behaviours, with the addition of a few psychology-based questions regarding cultural identity and environmental satisfaction. This may have resulted in the weak correlations found across all predictor variables.

Avenues for future research might include further study into the reasons why younger people and males are engaging in pro-environmental behaviour at lower rates than their older female counterparts. A clearer idea of the mechanisms behind this discrepancy could help to close this gap in the future, which is important because all people need to be more responsible for their own environmental footprint, not just the mothers and grandmothers of our society.

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## Appendix A

*2012 NZGSS Demographic Questions and Possible Answers*

| Variable Name           | Survey Question                               | Answers  |  | Median-Split Levels for Interactions |   |
|-------------------------|---|--|--|--------------------------------------|---|
|                         |   |  |  | Low                                  | High                                    |
| Sex                     | Sex   | 11. male   | 12. female   |                                      |   |
| Age                     | Age   | 01. 15 to 19 years<br>02. 20 to 24 years<br>03. 25 to 29 years<br>04. 30 to 34 years<br>05. 35 to 39 years<br>06. 40 to 44 years<br>07. 45 to 49 years<br>08. 50 to 54 years                               | 09. 55 to 59 years<br>10. 60 to 64 years<br>11. 65 to 69 years<br>12. 70 to 74 years<br>13. 75 to 79 years<br>14. 80 to 84 years<br>15. 85 years or older                                  | 15 to 45 years                       | 46 years and above                      |
| Māori Ethnicity         | Māori ethnic group                            | 0. no  | 1. yes   |                                      |   |
| Māori Descent           | Are you descended from a Māori?               | 1. yes   | 2. no  |                                      |   |
| Personal Income         | Personal income                               | 12. loss/zero income<br>13. \$1 - \$5,000<br>14. \$5,001 - \$10,000<br>15. \$10,001 - \$15,000<br>16. \$15,001 - \$20,000<br>17. \$20,001 - \$25,000<br>18. \$25,001 - \$30,000<br>19. \$30,001 - \$35,000 | 20. \$35,001 - \$40,000<br>21. \$40,001 - \$50,000<br>22. \$50,001 - \$60,000<br>23. \$60,001 - \$70,000<br>24. \$70,001 - \$100,000<br>25. \$100,001 - \$150,000<br>26. \$150,001 or more | \$0 - \$25,000                       | \$25,001 and above                      |
| Household Income        | Household income                              | 02. loss/zero income<br>03. \$1 - \$5,000<br>04. \$5,001 - \$10,000<br>05. \$10,001 - \$15,000<br>06. \$15,001 - \$20,000<br>07. \$20,001 - \$25,000<br>08. \$25,001 - \$30,000<br>09. \$30,001 - \$35,000 | 10. \$35,001 - \$40,000<br>11. \$40,001 - \$50,000<br>12. \$50,001 - \$60,000<br>13. \$60,001 - \$70,000<br>14. \$70,001 - \$100,000<br>15. \$100,001 - \$150,000<br>16. \$150,001 or more | \$0 - \$50,000                       | \$50,001 and above                      |
| Highest Qualification 1 | What is your highest completed qualification? | 11. national certificate level 1<br>12. national certificate level 2<br>13. national certificate level 3   | 20. nursing diploma<br>21. bachelor's degree<br>22. bachelor's honours<br>23. postgraduate certificate/diploma<br>24. master's degree  | Advanced trade certificate or below  | Diploma or certificate level 6 or above |

|                           |  |   |  |                              |                              |
|---------------------------|--|---|--|------------------------------|------------------------------|
|                           |  | 14. national certificate level 4<br>15. trade certificate<br>16. diploma or certificate level 5<br>17. advanced trade certificate<br>18. diploma or certificate level 6<br>19. teachers certificate/diploma                     | 25. PhD<br>26. other - please specify  |                              |                              |
| Highest Qualification 2   | Highest qualification                  | 00. no qualification<br>01. level 1 certificate<br>02. level 2 certificate<br>03. level 3 certificate<br>04. level 4 certificate<br>05. level 5 diploma<br>06. level 6 diploma<br>07. bachelor's degree & level 7 qualification | 08. postgraduate & honours degrees<br>09. master's/doctorate degree<br>10. overseas secondary school qualification<br>11. not elsewhere included | Level 2 certificate or below | Level 3 certificate or above |
| Place of Birth            | Were you born in New Zealand?          | 1. yes  | 2. no  |                              |                              |
| Social Marital Status     | Social marital status                  | 01. partnered   | 02. nonpartnered   |                              |                              |
| Dependent Children Status | Number of dependent children in family | 01. one dependent child<br>02. two dependent children   | 03. three or more dependent children<br>05. no dependent children  | No dependent children        | 1+ dependent children        |
| Household Size            | Household size                         | 11. one person<br>12. two people<br>13. three people<br>14. four people   | 15. five people<br>16. six people<br>17. seven people<br>18. eight or more people  | 1 person                     | 2+ people                    |

## Appendix B

*Recoded Variables used for Statistical Analyses*

| Variable Name           | Survey Question                               | Recoded Answers  |   | Median-Split Levels for Interactions |   |
|-------------------------|---|--|---|--------------------------------------|---|
|                         |   |  |   | Low                                  | High                                    |
| Sex                     | Sex   | 1. female  | 2. male   |                                      |   |
| Age                     | Age   | 1. 15 to 19 years<br>2. 20 to 24 years<br>3. 25 to 29 years<br>4. 30 to 34 years<br>5. 35 to 39 years<br>6. 40 to 44 years<br>7. 45 to 49 years<br>8. 50 to 54 years                               | 9. 55 to 59 years<br>10. 60 to 64 years<br>11. 65 to 69 years<br>12. 70 to 74 years<br>13. 75 to 79 years<br>14. 80 to 84 years<br>15. 85 years or older                                  | 15 to 45 years                       | 46 years and above                      |
| Māori Ethnicity         | Māori ethnic group                            | 0. no  | 1. yes  |                                      |   |
| Māori Descent           | Are you descended from a Māori?               | 0. no  | 1. yes  |                                      |   |
| Personal Income         | Personal income                               | 1. loss/zero income<br>2. \$1 - \$5,000<br>3. \$5,001 - \$10,000<br>4. \$10,001 - \$15,000<br>5. \$15,001 - \$20,000<br>6. \$20,001 - \$25,000<br>7. \$25,001 - \$30,000<br>8. \$30,001 - \$35,000 | 9. \$35,001 - \$40,000<br>10. \$40,001 - \$50,000<br>11. \$50,001 - \$60,000<br>12. \$60,001 - \$70,000<br>13. \$70,001 - \$100,000<br>14. \$100,001 - \$150,000<br>15. \$150,001 or more | \$0 - \$25,000                       | \$25,001 and above                      |
| Household Income        | Household income                              | 1. loss/zero income<br>2. \$1 - \$5,000<br>3. \$5,001 - \$10,000<br>4. \$10,001 - \$15,000<br>5. \$15,001 - \$20,000<br>6. \$20,001 - \$25,000<br>7. \$25,001 - \$30,000<br>8. \$30,001 - \$35,000 | 9. \$35,001 - \$40,000<br>10. \$40,001 - \$50,000<br>11. \$50,001 - \$60,000<br>12. \$60,001 - \$70,000<br>13. \$70,001 - \$100,000<br>14. \$100,001 - \$150,000<br>15. \$150,001 or more | \$0 - \$50,000                       | \$50,001 and above                      |
| Highest Qualification 1 | What is your highest completed qualification? | 1. national certificate level 1<br>2. national certificate level 2<br>3. national certificate level 3<br>4. national certificate level 4   | 10. nursing diploma<br>11. bachelor's degree<br>12. bachelor's degree<br>13. postgraduate certificate/diploma<br>14. master's degree<br>15. PhD   | Advanced trade certificate or below  | Diploma or certificate level 6 or above |

|                           |  |   |   |                              |                              |
|---------------------------|--|---|---|------------------------------|------------------------------|
|                           |  | 5. trade certificate<br>6. diploma or certificate level 5<br>7. advanced trade certificate<br>8. diploma or certificate level 6<br>9. teachers certificate/diploma  | 16. other - please specify  |                              |                              |
| Highest Qualification 2   | Highest qualification                  | 1. no qualification<br>2. level 1 certificate<br>3. level 2 certificate<br>4. level 3 certificate<br>5. level 4 certificate<br>6. level 5 diploma<br>7. level 6 diploma<br>8. bachelor's degree & level 7 qualification | 9. postgraduate & honours degrees<br>10. master's/doctorate degree<br>11. overseas secondary school qualification<br>12. not elsewhere included | Level 2 certificate or below | Level 3 certificate or above |
| Place of Birth            | Were you born in New Zealand?          | 1. no   | 2. yes  |                              |                              |
| Social Marital Status     | Social marital status                  | 1. nonpartnered   | 2. partnered  |                              |                              |
| Dependent Children Status | Number of dependent children in family | 1. no dependent children<br>2. one dependent child  | 3. two dependent children<br>4. three or more dependent children  | No dependent children        | 1+ dependent children        |
| Household Size            | Household size                         | 1. one person<br>2. two people<br>3. three people<br>4. four people   | 5. five people<br>6. six people<br>7. seven people<br>8. eight or more people   | 1 person                     | 2+ people                    |