An Exploration of Children’s Connection to Nature: Aotearoa New Zealand

By

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A 90 point thesis submitted in partial fulfilment of the requirements for the degree of Master of Science in Environmental Studies

School of Geography, Environment and Earth Sciences
Victoria University of Wellington
2016
Abstract

“People protect what they love” - Jacques Cousteau

It’s unavoidable that the next generation will be faced with resolving our current and future environmental issues. It is suggested that children must first care about the environment before they are asked to save it, however, a more indoor childhood is forming a disconnect between child and the natural world.

Rooted in the theory that a connection to nature (i.e. our affective and experiential relationship with the natural world) influences a willingness to protect it, this thesis aims to unearth the relationships between connection to nature and environmental attitudes and behaviours of children in Aotearoa New Zealand. To do so this study will: 1) Explore the underlying dimensions of children’s connection to nature, 2) Identify the factors that are related to children’s connection with nature, 3) Investigate the variables that best predict children’s willingness to act for the environment, 4) Investigate the variables that best predict children’s household pro-environmental behaviour.

Findings from a quantitative questionnaire suggest that a child’s (n = 450) connection to nature is related to a plethora of variables; most notably exhibiting a strong relationship with their willingness to act for the environment. Furthermore, children’s experiences in nature best predict their household’s pro-environmental behaviour. These findings contribute to past research which suggest that positive relationships with nature, partially formed from time spent in nature, relate to pro-environmental attitudes.

This study addresses gaps in Aotearoa New Zealand in regards to children’s connection to nature. It will benefit local policy makers and educators who are dedicated to strengthening the child and nature bond and/or conserving Aotearoa New Zealand’s natural environment.
Acknowledgements

This study could not have occurred without the help of Sustainable Coastlines or the teachers and students who participated in the Love Your Water programme. Thank you all for your amazing support.

I would like to offer my sincerest thanks to Dr. Wokje Abrahamse. I am most thankful for your willingness to take on this study, your patience, and SPSS tutoring, all of which made this thesis possible. Thank you.

I owe my deepest love and gratitude to Oliver Vetter who never stopped believing in me. Your positive attitude, undivided love, and home cooked meals got me through this year and I am forever and ever thankful. I am also grateful for Becca Davis and Nate Currier whose words of encouragement were invaluable and always hilarious. I also acknowledge John Moriarty for your editing help and my graduate school friends, Avril MacFarlane, Sophia Murphy, Sam McLean, Karla Ramirez, and Tui Arona. This year would have been so lonely without you all.

Last but not least, thank you Mom for carrying me into the sea even when I was scared, and thank you Dad for letting me roam wild and free through the hills. My emotional connection to nature, which I owe to you, has guided me through this life and I thank you.
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Chapter I: Introduction

“Peaceful.”
- 10-year-old boy, Cotswold School, Christchurch

Urbanisation and agriculture have led to the pollution of streams, rivers, lakes and wetlands in Aotearoa New Zealand. As a result swimming in these waters or collecting food from them is often considered unsafe (Larned, Scarsbrook, Snelder, Norton, & Biggs, 2004; MfE, 2013-a). An array of interventions has been developed in an attempt to curb such problems, including regulations on intensified farming, policies aimed at encouraging riparian tree plantings and fencing along waterways, educational efforts, and technological innovations (DairyNZ, 2016). While some of these strategies have been successful (MfE, 2014-b), social scientists are encouraging “broader reconceptualizations of our relationship to nature” to help alleviate environmental degradation (Mayer & Frantz, 2004, pg. 503). Many scholars believe that affective attitudes towards nature (i.e. the unbuilt world which usually consists of green vegetation, ocean coastlines, or biodiversity) are essential in fostering pro-environmental behaviour (Kals, Schumacher, & Montada, 1999; Leopold, 1949; Mayer & Frantz, 2004; Orr, 1993; Perkins, 2010).

Connection to nature, (CTN) is the crux of this thesis and is defined as an emotional liking for nature (i.e. affective attitudes towards nature) formed from positive and frequent experiences in the natural unbuilt world (Mayer & Frantz, 2004; Orr, 1993). The CTN literature shows an individual who is connected to nature enjoys being in nature, feels a sense of empathy for other natural life, feels a sense of responsibility for caring for it, and believes that they are an equal member of the broader natural community (i.e. the individual has a sense of oneness with nature) (Cheng & Monroe, 2010).

How CTN influences one’s mental and physical health, wellbeing, and environmental action has attracted the attention of ecologists and social scientists alike. Various
instruments have been developed to measure adults’ cognitive and affective attitudes towards nature, to then compare with some measurement of health, wellbeing, or environmental action (Capaldi, Dopko, & Zelenski, 2014; Mayer & Frantz, 2004). Such research has built a collection of empirical evidence that suggests exposure to nature is beneficial in almost every regard (Louv, 2005). There is less empirical evidence, however, concerned with understanding children’s cognitive and affective attitudes towards nature.

A strong bond with the natural world is important for adults (Louv, 2005; Wilson, 1984); it may be even more important for children as “environmental sensitivity appears to be rooted in childhood experiences in nature” (Ernst & Theimer, 2011, p. 1). Research suggests that when an individual is exposed to nature at a young age they are more likely to develop pro-environmental values and an interest in helping to solve environmental problems (Chawla, 1988, 1999; Wells & Lekies, 2006). Despite children’s innate CTN (Kahn, 1997; Orr, 1993), they are increasingly living more indoor or sedentary lives due to a multitude of lifestyle changes (Louv, 2005). According to Louv (2005), “If we are going to save environmentalism and the environment, we must also save an endangered indicator species: the child in nature” (p.159).

Most research on children’s relationship with nature has taken place in the U.S: Kellert (1985) examined children’s attitudes at different ages towards animals; Wells and Evans (2003) compared children’s life stress with their exposure to nature; Manoli (2007) explored children’s cognitive environmental orientations; Bruni and Schultz (2010) investigated children’s implicit (i.e. exists outside of conscious awareness) beliefs about self and nature, and Cheng and Monroe (2010) measured children’s affective attitudes towards nature using their CTN index tool.

There is also a handful of other international studies interested in children’s environmental attitudes: Bunting and Cousins (1985) developed tools to measure children’s environmental personalities in Canada; Liefländer, Fröhlich, Bogner, and Schultz (2013) examined children’s cognitive inclusion of nature in self in Germany; Collado, Staats, and Corraliza (2013) evaluated the effects of urban and rural summer camps in Spain on children’s cognitive and affective attitudes towards nature; and
Zhang, Goodale, and Chen (2014) explored children’s biophilia/biophobia in relation to their contact with nature in China.

Scientific explorations of children’s attitudes towards nature appear to be under researched in Aotearoa New Zealand. There is a collection of Aotearoa New Zealand research which investigates children’s access to their local environments and their independent mobility (e.g. walking and biking alone) (Carroll, Witten, & Kearns, 2011; Carroll, Witten, Kearns, & Donovan, 2015; Freeman & Quigg, 2009; Tranter & Pawson, 2001). There is also a study which examined parent’s and children’s outdoor play attitudes and the effect of seasonal variations and different degrees of urbanisation within Auckland on these attitudes (Ergler, Kearns, & Witten, 2013). Collectively this research posits that when children are outside they are more often than not accompanied by an adult. It also suggests that children are spending less time outdoors engaging in free play, and/or walking and biking alone, than their parents did at the same age.

1.1 Rationale

The de-naturing of childhood appears to be an international phenomenon (Louv, 2005), yet according to Higgins and Freeman, “a quarter of New Zealanders are experiencing childhood…yet we know little about how childhood is experienced by children” (2013, p. 13). This appears to be especially true in regard to their contemporary bond with nature, hence, this study fills gaps in Aotearoa New Zealand literature regarding children’s CTN and pro-environmental attitudes. More specifically, the rationale of this study is attributed to two main factors. Firstly, it will benefit government groups such as the Department of Conservation by provided them with local and current information about children’s CTN and secondly, it will help Aotearoa New Zealand environmental educators better tailor their programme objectives to meet the needs of today’s child.

As reported in their ‘Statement of Intent 2015-2019’ publication, the Department of Conservation declares that their first goal is to get “90 percent of New Zealander’s lives enriched through connection to our nature” in the next ten years (DOC, 2015). Furthermore, Department of Conservation has recently launched a programme titled ‘Toyota Kiwi Guardians’ which is designed to get children out into nature; exploring Aotearoa New Zealand’s unique native landscape (DOC, 2016 ). Department of Conservation demonstrates great interest in connecting families, specifically children,
with nature yet it appears that they lack local CTN references as a base for the programmes.

In addition, environmental educators who aim to “inspire, educate and enable people to look after the places we all love”, often make the assumption that people love the flora, fauna, or places that the organization intends to protect (Coastlines, n.d.). This study hopes to shed light into this assumption as it is unclear if children love their local natural places. Furthermore, traditional environmental education, aiming to increase student’s knowledge of environmental problems and solutions, focuses more on education about the environment than education in the environment. Yet little evidence illustrates that knowledge, alone leads to pro-environmental behaviour (Eames, Cowie, & Bolstad, 2008; Hungerford & Volk, 1990). Rather, recent environmental education research illustrates that time spent in nature is essential in forging bonds between student and nature as the antecedent to pro-environmental behaviour (Collado et al., 2013; Ernst & Theimer, 2011; Liefländer et al., 2013)

By identifying factors which possibly strengthen or weaken the child-nature bond environmental educators can design their curriculum around their student’s needs, and ultimately cultivate more positive environmental attitudes (Ernst & Theimer, 2011). Measuring the strength of this bond has proven to be difficult and complex (Mayer & Frantz, 2004; Schultz, 2002 ) yet an attempt to do so is warranted, as it is expected to advance knowledge in the applicable fields of environmental education and children’s environmental behaviour in a Aotearoa New Zealand context.

1.2 Aim

The predominant enquiry of this thesis is to explore the factors which contribute to children’s CTN and how CTN relates to children’s willingness to act for environmental causes and their environmental behaviour. Using a four-page questionnaire, designed and distributed with the help of Sustainable Coastlines (i.e. Aotearoa New Zealand Charitable Trust focused on environmental education), children’s CTN scores will be statistically analysed in relation to multiple variables. Correlation analysis and multiple linear regression will be conducted to answer the four research questions and the hypotheses stated in the following chapter. This study aims to do this through the following four objectives:
1) Explore children’s gender, age and the proximity of their home to nature in relation to their CTN.

2) Examine the relationships between certain antecedents to CTN and CTN itself, and determine which of these variables best predicts CTN.

3) Investigate which variables best predict children’s willingness to act for the environment.

4) Investigate which variables best predict children’s household pro-environmental behaviour.

1.3 Keywords

New Zealand children, children’s connection to nature, children’s pro-environmental attitudes, children’s attitudes towards outdoor play, children’s experiences in nature, denaturing

1.4 Thesis Outline

This first chapter has provided a brief summary of past CTN literature, introduced the key objectives and keywords central to this study. Chapter Two provides an overview of five areas of literature pertinent to this thesis: CTN, psychology and nature, attitudes and behaviour, nature-relevant experiences and environmental education. Chapter Three explains the quantitative approach applied to this research and provides a background to the study design, data collection, analysis, and ethical considerations. In addition, it presents the results of the construct’s reliability analysis and principle component analysis. Chapter Four draws on the results derived from statistical analysis in response to the four research questions posed. Chapter Five discusses the results, with insights from the literature on CTN and pro-environmental behaviour, presents recommendations and suggestions based on the findings, and states the limitations to the study. Chapter Six closes with a final conclusion.
Chapter 1
Chapter II: Literature Review

“In my heart ... ya, I feel it in my heart. Now that I’ve planted them it makes me feel in love with them.”

-9-year-old boy, Victory School, Nelson

2.1 Introduction

Rivers are a major part of the cultural identity of citizens of Aotearoa New Zealand, yet in 2013 almost 70 percent of recreational freshwater beaches were classified as ‘fair” to “very poor’ in water quality (MfE, 2013 -a). While people are generally aware of such problems and wish to solve them, that desire is not always reflected in people’s behaviour, as these are multifaceted issues (Kollmuss & Agyeman, 2002; Oskamp, 2002).

It is often assumed that children feel attached to the places that need defending, such as rivers, streams and coastlines, to the extent that they would be someday willing to sacrifice their time or resources to repair ecological damage that has been done. As nearly half the world’s children are living in highly modified and artificial urban landscapes, and/or spending more time indoors separated from nature than past generations ever have, even in Aotearoa New Zealand (Higgins & Freeman, 2013), it is unclear what the implications of a child-nature separation will be for these natural places (Louv, 2005).

Researchers and educators suggest that rather than asking children to worry about these big environmental problems, many of which are beyond their control or understanding, the biological tendency of children to bond with the natural world should be encouraged instead (Orr, 1993; Sobel, 1996; White, 2004).

To address these concerns, five areas of literature will be explored in this chapter. The term ‘connection to nature’ will be reviewed, followed by literature pertaining to
psychology and nature, attitudes and behaviour, experiences relevant to nature, and environmental education.

2.2 Connection to Nature

Connection to nature is born from ideologies such as biophilia (Wilson, 1984), pastoralism (Bunting & Cousins, 1985), emotional affinity towards nature (Kals et al., 1999), biospheric concern (Schultz, 2000), inclusion of nature in self (Schultz, 2002), and environmental identity (Clayton, 2003). New concepts have emerged from these ideologies such as nature relatedness (Nisbet, Zelenski, & Murphy, 2008), commitment to nature (Davis, Green, & Reed, 2009), and love of and care for nature (Perkins, 2010). Such research suggests that the human-nature bond is imperative to environmental care and is measurable.

Many of the authors cited above credit the founder of environmental ethics, Aldo Leopold, for opening the doors to CTN literature through his concept of land ethic, which extends moral considerations to other species and ecosystems instead of exclusively to the human species (Leopold, 1949). In this mind frame an individual member of the community does not have more intrinsic value than the community to which they belong.

Theodore Roszak is also commonly recognized for his development of ecopsychology, which declares that feeling a sense of belonging to the natural world has positive implications for people’s health, as well as for the health of the Earth (1992). His position forms the foundation of this thesis. If rephrased to better describe this thesis, it would be that a child’s sense of belonging to the natural world has positive implications on the child’s health, as well as the health of the earth, both of which are connected. If being in nature brings a sense of peacefulness and happiness to a child, that child may be more likely to frequent these natural places, and that is thought to be the antecedent to their emotional CTN.

Connection to nature can be thought of as the love of nature or as having emotional affinity towards nature: emotion is the root the concept. The following section begins by
expounding further into the research concerning emotions in relation to nature and ends with a summary of how influential papers have measured CTN.

2.2.1 Background Literature

Edward O. Wilson, recognized for his contribution to CTN literature, wrote extensively on the ‘sense of belonging’ to the natural world. Wilson’s biophilia hypothesis (1984) evolved from the thought of psychologist Erich Fromm, who defined biophilia as a “love of life or living systems” represented by an “entire way of being” rather than constituted by a single trait (1964, p. 41). Biophilia is the attraction and comfort that people feel towards the natural diversity of other species, the outdoors and objects in their natural environments. Wilson suggests that there is a genetically based human propensity to affiliate with other forms of life because nature tends to tug at us for reasons that we cannot always explain (Kahn, 1997; Wilson, 1984). Studies have since shown that regular exposure to nature contributes to one’s sense of biophilia (Kahn & Kellert, 2002; Orr, 1993)

Emotional aspects of people’s bonds with nature have been specifically examined by Kals, et al. (1999) who operationalized ‘emotional affinity towards nature’ as a love of nature, more specifically feeling free, good, safe and at one with nature. Prior to their work, most environmental behaviour research overlooked the role of emotions and focused solely on knowledge or cognitive beliefs about the environment. Kals and her colleagues asked 281 German adults about their emotional affinity towards nature and their past experiences in nature and concluded that emotional affinity towards nature is a powerful predictor of nature-protective behaviours, and that emotional affinity toward nature traces back to present and past experiences in natural environments.

Other scholars have focused on the role of identity in relation to CTN and hypothesize that an individual’s connectivity with nature is based on how much an individual includes nature as part of his or her identity (Clayton, 2003; Schultz, 2000, 2002) and/or relates to nature (Nisbet et al., 2008). These concepts contain the cognitive, affective and behavioural/experiential aspects of a person’s CTN. According to ‘inclusion to nature in self’, a person who defines themselves as part of nature has a cognitive sense of self that overlaps with their cognitive sense of nature (Schultz, 2002). Similarly, ‘implicit connection with nature’ explains that sense of self and sense of
nature overlap, although the CTN that one feels is implicit and exists outside of conscious awareness (Schultz, Shriver, Tabanico, & Khazian, 2004).

As an extension, the ‘environmental identity scale’ was developed to evaluate self-identification, useful for capturing experiences and emotions related to nature (Clayton, 2003). Clayton defined CTN as ‘oneness’ with the natural world, and more specifically, “a sense of connection to some part of the nonhuman natural environment, based on history, emotional attachments, and/or similarity, that affects the ways in which we perceive and act toward the world” (as quoted by Cheng and Monroe, 2010, p.34). Thus, Clayton acknowledges that one’s environmental identity is formed by past experiences and emotional attachments towards nature, which then influence one’s actions towards nature.

There are common themes found in CTN literature. Past studies have illustrated that an emotional bond with nature is feeling a sense of sympathy, emotional affinity, altruism, love and care, and empathy towards certain elements of the natural world (Allen & Ferrand, 1999; Geller, 1995; Kals et al., 1999; Mayer & Frantz, 2004; Perkins, 2010; Schultz, 2000). There are subtle differences between these views, and it is important to define the core elements of CTN that best suit the framework of this thesis. According to the creators of the measurement index used in this thesis, and designed for children, CTN is the enjoyment of nature, empathy for its creatures, a sense of oneness with the natural world, and a feeling of responsibility to care for it (Cheng, 2008; Cheng & Monroe, 2010).

2.2.2 Measuring Connection to Nature

Researchers have measured nature connectedness in many different ways, yet Mayer and Frantz’s (2004) measurement tool is the most applicable for this study as it inspired Cheng and Monroe (2010) to develop a similar tool for children. These studies are now explained in greater detail.

Mayer and Frantz (2004) concur with Leopold and with Roszak that a CTN can foster a better land ethic and developed a scale to ‘measure individuals’ feeling in community with nature’ (part of their article’s title). This measurement was named the Connection to Nature Scale and aimed to understand how people viewed their own place in nature,
investigating whether people felt they were a democratic member of the greater natural community, and to what extent the welfare of the natural community affected their own welfare. They conducted five quantitative studies to test the reliability and validity of their 14-item CTN scale. American adults responded to a 7-point Likert scale, where 1 = ‘strongly disagree’ and 7 = ‘strongly agree’. Examples of survey items are: “I often feel a sense of oneness with the natural world around me”, “I think of the natural world as a community to which I belong”, and “I often feel a kinship with animals and plants” (Mayer & Frantz, 2004, p.513). The results indicated the CTN scale was valid and reliable in measuring what the authors coined ‘connection to nature’.

The CTN scale, or closely modified versions of it, have since been used to measure adults’ CTN internationally. The scale has been operationalized in Sweden (Beery, 2013), Germany (Cervinka, Röderer, & Hefler, 2011), Australia (Gosling & Williams, 2010; Luck, Davidson, Boxall, & Smallbone, 2011), the US (Guiney & Oberhauser, 2009), and Finland (Korpela, Ylén, Tyrväinen, & Silvennoinen, 2008), reconfirming the validity and reliability of the scale.

A disconnect between adult and nature is problematic, yet the focus of recent studies has noticeably shifted to the bond between child and nature. This shift is largely due to Richard Louv’s (2005) book, Last Child in the Woods, which has brought worldwide attention to ‘nature deficit disorder’\(^1\), which has negative repercussions on children’s environmental, physical and psychological wellbeing (Louv, 2005). Structural (e.g. lack of bike paths), institutional (e.g. indoor education system), socio-cultural (e.g. living in an urban environment) and personal barriers (e.g. increase in television viewing) are said to be the source of the ‘de-naturing’ of childhood (Louv, 2005).

Prior to Louv (2005), authors recognized the importance of the child-nature bond (Kellert, 2002; Orr, 1993), yet in comparison to research involving adult participants, research into children’s CTN has been minimal. This may be partly due to difficulties in gaining ethical approval from institutions to involve children in research (MacArthur & McKenzie, 2013), or because the concept of nature deficit disorder is relatively new in

\(^1\) A description of the human costs of alienation from the natural world; not meant to be a medical diagnosis.
the public’s eye (Roberts, 2009). It is imperative that the child-nature bond remain resilient because in time today’s children will need to solve our current and future environmental problems, which requires them to have the inclination to do so.

To address this dimension of the environmental crisis, researchers Cheng and Monroe (2010) developed a children’s CTN index built on Mayer and Frantz’s original CTN scale. Like the CTN scale, Cheng and Monroe’s 16-item instrument draws from elements that appear to influence affective attitudes towards nature, but is designed for children from age 8 to 10. Likert-scaled survey items (1 = ‘strongly disagree’ and 5 = ‘strongly agree’) intended for adult participants; “Like a tree can be part of a forest, I feel embedded within the broader natural world” (Mayer & Frantz, 2004, p. 513) were adapted for child participants; “Humans are part of the natural world” (Cheng & Monroe, 2010, p. 41). The highest possible mean score for the measurement is 5.00, meaning that respondents would have answered 5 = ‘strongly agree’ for all items.

Cheng and Monroe’s (2010) study included 5,500 American fourth grade students (8 to 9 years old) who were part of an environmental education programme. The authors’ results suggest that children’s time spent in nature, family values towards nature, home in proximity to nature, and environmental knowledge predicts their emotional CTN, which in turn, influences their interest in participating in nature-based activities and in environmentally friendly practices. The results indicate that the CTN index is valid and reliable in measuring children’s affective attitudes towards nature, i.e. CTN.

The CTN index has since been used internationally to measure children’s CTN. For instance, two studies in the US have used the index (Ernst & Theimer, 2011; Garner, 2012), and one in the UK (Bragg, Wood, Barton, & Pretty, 2013). Adapted versions of the index have also been used in Sweden (Giusti, Barthel, & Marcus, 2014) and Canada (Gilbertson, 2012). Three of these studies published the participant’s mean CTN scores and reported medium to high (4.00-5.00) levels of CTN as determined by Cheng and Monroe (2010). The Canadian study had the mean score of 4.31 (Gilbertson, 2012), an American study had the lowest mean score of 3.92 (Ernst & Theimer, 2011), and the British study had the highest mean score of 4.41 (Bragg et al., 2013).
Cheng and Monroe’s (2010) index was chosen to measure children’s CTN in this study for several reasons. Prior to their work there was no instrument that included the factors listed above to examine children’s CTN. In addition, when a UK study piloted three output measures adapted to measure children’s connection or relatedness to nature, the authors found that the CTN index had the highest internal consistency and the highest ease of completion by the children (Bragg et al., 2013). Lastly, studies which have used the CTN scale have reported it is a valid and reliable scale (Bragg et al., 2013; Ernst & Theimer, 2011; Garner, 2012) and, furthermore, the other two instruments designed for children were found to be not fitting for this purpose. The ‘new ecological paradigm scale’ measured cognitive attitudes towards nature and worldviews rather than affective attitudes towards nature (Manoli et al., 2007), and Ernst and Theimer’s (2011) ‘nature connectedness inventory’ is not widely available for use (Bragg et al., 2013).

It is noteworthy that findings from a recent study question whether CTN is affective (i.e. causes emotion) and imply that Mayer and Frantz’s (2004) CTN scale actually measures cognitive attitudes rather than affective attitudes (Perrin & Benassi, 2009). According to Picard, et al. (2004) this may, in part, be due to the difficulty of separating a cognitive interest in nature, or a belief that one has about their CTN and emotional affinity towards nature. For example: does an individual who is knowledgeable about the process of photosynthesis “feel embedded with the broader natural world” because they are emotionally connected to the forest or is it because they know that their life is physically dependent on the oxygen that this forest produces (Mayer & Frantz, 2004, p. 513)?

Perrin and Benassi (2009) claim that these survey items measure connectedness as a cognitive concept, not as an emotional one. Nonetheless, they conclude that Mayer and Frantz’s (2004) CTN scale indeed taps an affective dimension. Furthermore, whether or not the CTN statements represent emotion, they go beyond strictly cognitive assessment, moving into the realm of sensitivities (i.e. peace, happiness, sadness, etc.) and values, both of which have the ability to inspire emotion (Stern, 2000). In addition, Cheng and Monroe (2010) removed the words ‘I think’ from their index, which produce cognitive assessments, indicating that the index may be more affective in nature than
Mayer and Frantz’s (2004) scale. An explanation, as to the field of study that CTN and environmental behaviour research is found, follows.

2.3. Psychology and Nature

There is a fundamental link between psychology (i.e. the science or study of the mind and behaviour) and environmental conservation. Environmental threats caused by human population growth, over consumption and over exploitation of natural resources can be mitigated through changing human behaviours (Kollmuss & Agyeman, 2002; Mayer & Frantz, 2004; Stern, 2000), therefore, conservation efforts benefit from involving both natural scientists and social scientists in the discussion.

Social psychologists such as ecopsychologists and environmental psychologists share the common goals of creating durable behavioural change at multiple levels whilst maintaining harmonious human-nature relationships. This thesis does not favour one field over the other; instead, it credits both disciplines and hypothesizes that the environmental and psychological implications of a strong human-nature bond are interdependent. Definitions of the terms follow.

2.3.1 Ecopsychology

Ecopsychology is the study of how exposure to nature affects personal wellbeing. It “asks not only what we do for the earth, but what the earth does for us – for our health” (Louv, 2005, p. 44). In his 1992 book *Voice of the Earth*, Ecopsychologist Roszak disputes that “modern psychology has split the inner life from the outer life, and that we have repressed our ecological unconscious that provides our connection to our evolution on earth” (as cited by Louv, 2005, p.44). This quote suggests that we inherently possess, to some degree, a connection to the natural world. Ecopsychology acknowledges the psychological significance of this human-nature bond.

Ecopsychologists have used this theory to explore how nature affects people’s health and wellbeing (Capaldi et al., 2014). In the context of children, time spent in nature can help remedy Attention Deficit Hyperactivity Disorder (ADHD), obesity, and reduce prescribed antidepressants among children and adolescents (Louv, 2005), as well as
moderate the effects of life stress on children’s wellbeing (Wells & Evans, 2003). Influenced by such findings, Cheng and Monroe (2010) included in their CTN index three items which examined how nature made children feel. Confirmatory factor analysis revealed that of the 16 survey items the highest factor loading (0.81) was for the item, “being in the natural environment makes me feel peaceful” (Cheng & Monroe, 2010, p. 41). This finding implies that nature is a restorative environment for children, as other literature has suggested (Kaplan, 1995). Such findings are important contributions to CTN literature because the feelings that children experience while in nature reflect their interest in returning to nature (Kahn, 1997; Orr, 1993; Sobel, 1996), which can in turn impact their CTN (Cheng & Monroe, 2010).

2.3.2 Environmental Psychology

Environmental psychology is the interdisciplinary study of human cognition and behaviour in relation to physical surroundings, whether natural, social, or built (Bechtel & Churchman, 2003). The behaviours that are examined vary with the problem at hand but are generally behaviours and experiences that people normally engage in, e.g. driving, sleeping, eating, shopping, walking, etc. The relationship between a behaviour and the environment in which it takes place is the core subject matter of environmental psychology. More specifically, its task is to discover and elaborate on the relevant relationship of concern, which is one of those that influence either the environment or the behaviour. For example, investigating children’s attitudes and behaviour towards cycling could be related to their physical and psychological preferences, while also having implications for the environment.

No consistent set of variables can be used to predict pro-environmental behaviour. However, many environmental psychologists have focused their research on CTN concepts rather than on examining individual barriers to behaviour change and found CTN to predict environmental action (Cheng & Monroe, 2010; Clayton, 2003; Davis et al., 2009; Kals et al., 1999; Mayer & Frantz, 2004; Nisbet et al., 2008; Perkins, 2010; Schultz, 2000, 2002). Such scholars suggest that to foster greater ecological concern and sustainable behaviour people must first express concern for their natural surroundings; this concern is achieved if an individual feels a bond with nature. Unfortunately, many researchers posit that the necessary level of engagement with the
natural world to foster such concern and behaviour is declining, impeding positive behaviour change. Hence, within pro-environmental behaviour research there is a need to advocate connection with nature (Kellert, 2002; Louv, 2005; Nisbet et al., 2008). A deeper examination of attitude and behaviour research follows.

2.4. Attitudes and Behaviour

2.4.1 Affective Attitudes

According to the influential theory of planned behaviour, attitudes towards a behaviour (in addition to subjective norms and perceived behaviour control) predict intentions to perform different kinds of behaviours and these intentions account for ample variance in an individual’s actual behaviour (Ajzen, 1985, 1991). Hence, attitudes are important antecedents to behaviour.

The term ‘attitude’ has been used by researchers in a variety of ways. Some view attitudes as simply general evaluations, primarily affective in nature (Norman, 1975; Rosenberg, 1956), while others hold that attitudes are composed of both cognitive and affective components (Miller & Tesser, 1986). According to the latter view, the cognitive component consists of the “encoding of attributes” of the beliefs about an attitude object (e.g. people, places, or things), while the affective component is comprised of the “encoding of feelings” linked to the attitude object (Miller & Tesser, 1986, pp. 270-271).

In the context of nature, the cognitive attitude can be made salient by asking people to list the reasons for liking or disliking nature. For example, the cognitive attitude about nature may contain the following elements: nature is pretty, nature is unpredictable, and nature is boring. Alternatively, the affective attitude can be made salient by asking people to list the feelings they experience when they are in the presence of nature. For example, the affective attitude about nature may contain the feeling of happiness, peacefulness, or freedom.

In the words of Stephen Jay Gould, the American palaeontologist and evolutionary biologist, “we cannot win this battle to save species and environments without forging
an emotional bond between ourselves and nature as well—for we will not fight to save what we do not love” (Orr, 1993, p.197). This quote implies that affective attitudes towards nature are more important in motivating ecological conservation and restoration, i.e. environmental behaviour, than are rational/cognitive attitudes. On the contrary, positive experiences in nature increase both affective and cognitive interest in nature, collectively strengthening the human nature bond (Kals et al., 1999). Both are important antecedents to pro-environmental behaviour (Ernst & Theimer, 2011; Hungerford & Volk, 1990; Kals et al., 1999). However, this study aims to better understand children’s affective attitudes towards nature as inspired by Mayer and Frantz (2004) and Cheng and Monroe (2010).

2.4.2 Environmental Behaviour

Pro-environmental behaviour is broadly defined as human behaviour that has positive impacts on the Earth’s systems and natural resources (Stern, 2000). Often pro-environmental behaviour research delineates between public-sphere behaviour (e.g. signing petitions in support of protection of the environment) and private-sphere behaviour (e.g. reducing one’s car use) (Stern, 2000). Children cannot act on environmental behaviours such as signing petitions or reducing car use, so most environmental behaviour research involving child participants investigates their family’s environmental behaviour or values, as these will directly influence children’s own behaviour and values (Chawla, 1988, 1999; Cheng & Monroe, 2010). In addition, researchers also examine the children’s environmental behaviour intentions or willingness to conserve the environment, as intentions have been shown to predict behaviours (Ajzen, 1985; Collado et al., 2013; Zhang et al., 2014).

2.4.3 Willingness to Act

One’s intent to behave pro-environmentally is a valid predictor of one’s pro-environmental behaviour (Abrahamse, Steg, Gifford, & Vlek, 2009; Ajzen, 1985; Bamberg, Ajzen, & Schmidt, 2003; Hinds & Sparks, 2008; Sparks & Shepherd, 1992). In a 1991 study which used the theory of planned behaviour, environmental attitudes explained 40 percent of the variance in pro-environmental behaviour intention, which subsequently explained 75 percent of the variance in pro-environmental behaviour itself.
Kaiser, et al. (1999) defined pro-environmental behaviour intention as the motivation and willingness to perform the target behaviour. Other studies have examined the power of intent to engage in environmental behaviours (Hinds & Sparks, 2008; Oreg & Katz-Gerro, 2006), willingness to commit to environmental action (Montada & Kals, 2007), and willingness to sacrifice for the environment (Stern & Dietz, 1994) and have confirmed that intent and willingness do indeed predict behaviour.

Similarly, Cheng and Monroe (2010) asked participants how interested they were in engaging in environmental behaviours such as, “walking instead of driving” and “picking up trash on the ground” (Cheng, 2008, p. 104; 2010). They also asked the participants about their family’s environmental values. Examples of these items were: “how important is saving energy to your family” and “how important is learning about the environment to your family” (Cheng, 2008, p. 104; 2010). Similarly, Collado, et al. (2013) asked participants about their level of willingness to carry out daily conservation actions and willingness to carry out environmental citizenship behaviours. Examples of the questionnaire items were: “I am willing to help my parents recycle” and “I am willing to remind friends not to litter after they left trash on a picnic table” (Collado et al., 2013, p. 39). Another study asked participants how willing they were to conserve certain animals such as earthworms and butterflies (Zhang et al., 2014). All three studies found that children’s time spent in nature was related to their affective attitudes towards nature (e.g. CTN and biophilia), and predicted their environmental intentions (Cheng & Monroe, 2010), and willingness to commit to environmental action (Collado et al., 2013) and conserve animals (Zhang et al., 2014).

Figure 2.1 Adapted Model Collado, et al. (2013) Hypothesis
Despite this link between CTN and behaviour intentions, CTN is not the only determinant of environmental behaviour. Understanding the factors that either help promote or inhibit the sense of feeling connected to nature is also essential. Research which examines experiences in nature and environmental awareness in relation to CTN is discussed next.

2.5. Experiences Relevant to Nature

Influential research has linked positive and frequent childhood experiences in nature (e.g. free play, hiking, camping, fishing, berry picking, and planting trees and seeds) with environmental professionals and pro-environmental behaviour in adults (Chawla, 1988, 1999; Chawla & Cushing, 2007; Tanner, 1980; Wells & Lekies, 2006). These experiences in nature are increased when one is provided regular access to nature (Cheng & Monroe, 2010; Orr, 1993). For instance, adults who lived in rural areas as children have higher environmental behavioural intentions and perceived behaviour control than adults who grew up in urban settings (Hinds & Sparks, 2008). This research suggests that positive experiences in nature and pro-environmental attitudes and behaviour are inherently linked by the emotional bond that is formed between a child and the natural world (Chawla, 1999).

Despite its contribution to CTN literature, research which examines adult’s distant childhood memories has been criticized because it focuses on the past rather than the present – and therefore possibly more relevant – childhood experiences (Chawla & Cushing, 2007). This is a valid criticism, considering that until recently children grew up with close contact with nature where “their unregimented play would have been steeped in nature” (Louv, 2005, p. 102). But times have since changed. Over the past decades human relationships with nature have declined significantly due to various lifestyle changes; and as a result children are spending more time indoors, separated from nature (Clements, 2004; Pergams & Zaradic, 2006, 2008). In many cases adults have had very different childhood experiences outdoors than children today and for this reason understanding children’s current relationship with nature is essential.
2.5.1 Children and Nature

It has been found that children who live near a natural environment are more likely to have affective attitudes and positive values towards nature than are children who do not live near a natural environment (Bunting & Cousins, 1985; Zhang et al., 2014). Moreover, children who live in cities, yet have nature-rich routines, have also exhibited the ability to develop stronger affinity with the biosphere (i.e. natural world around them) than have children who do not experience nature regularly (Giusti et al., 2014). Most notably and pertinent to this study, the distance from a child’s home to a place of nature significantly predicts their emotional CTN, which significantly influences their interest in environmentally friendly practices, such as “saving energy”, and “not wasting food” (Cheng, 2008, p. 104; Cheng & Monroe, 2010).

In terms of children’s biophilia (i.e. love of and attraction to nature), when children frequent natural places at a young age it helps to discourage fear, aversion to or alienation from nature developing. In a study involving Chinese children (aged 9 to 10) who attend schools with different degrees of urbanization, the authors found that contact with nature significantly increased children’s willingness to conserve animals such as earthworms, beetles, slugs, and spiders (Zhang et al., 2014). These findings are similar to Tomazic’s (2011) study, in which children who encountered toads in the wild had more favourable attitudes towards toads than those without such experiences.

Positive and frequent early experiences in nature become a cycle; the more time children spend in nature the more emotionally connected they feel to it, which influences their perception of being in communion with nature, or as Clayton (2003) describes it, a sense of ‘oneness’ with nature. As a result children are willing to have further experiences in nature, and the cycle continues (Capaldi et al., 2014). Another interpretation of this literature is that families who choose to live near natural places, or regularly frequent places in nature, may be emotionally drawn to nature themselves, which in turn may influence children’s affective attitudes towards nature and their willingness to visit nature again (Cheng & Monroe, 2010).

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2 Cheng (2008) refers to the original dissertation which includes the entire questionnaire in the Appendix. Cheng and Monroe (2010) is the journal article which only includes the CTN index and no other measurements. Cheng (2008) is referenced when questionnaire items, not including the CTN index, are discussed.
Despite evidence that time spent in nature is beneficial for children’s environmental, psychological and physical wellbeing (Cheng & Monroe, 2010; Louv, 2005; Wells, 2000; Wells & Evans, 2003), today’s youth spend less time playing outdoors than past generations did in the U.S. (Clements, 2004; Gaster, 1991; Hofferth, 2009; Hofferth & Sandberg, 2001; Louv, 2005; Pergams & Zaradic, 2006, 2008), England and Wales (Smith & Barker, 2001; Valentine & McKendrick, 1997), Scotland and Ireland (as cited by Louv, 2005, p. 35), Japan (Takeuchi, 1994), and Australia (Gleeson, 2006; Veitch, Bagley, Ball, & Salmon, 2006). This indoor lifestyle is also affecting youth in Aotearoa New Zealand (Carroll et al., 2011; Freeman & Quigg, 2009; Higgins & Freeman, 2013; Kearns, Collins, & Neuwelt, 2003; Tranter & Pawson, 2001; Witten, Kearns, Carroll, Asiasiga, & Tava’e, 2013). For instance, an Aotearoa New Zealand study found that one third of the children surveyed (n = 383) had a television in their bedroom and that 100 percent of the children watched television “on most days” (Bell & Farmer, 2013, p. 196). Increased television viewing is an example of a socio-cultural - or personal - barrier to spending time in nature and is a change in lifestyle from that of prior generations, however, little is known about the consequences of these changes.

A recent string of studies examining children’s access to their local environments fills an important niche in Aotearoa New Zealand literature. Research set in Auckland (Carroll et al., 2011; Carroll et al., 2015; Ergler et al., 2013), Christchurch (Tranter & Pawson, 2001), and Dunedin (Freeman & Quigg, 2009), has confirmed that children currently lead more complex car-dependent lives than their parents’ generation did. Moreover, the findings suggest that children are missing out on the physical and psychological benefits of active travel such as walking, cycling and free outdoor play with friends for social, cultural and structural reasons (Freeman & Quigg, 2009).

In particular, an Auckland study found that traffic safety and ‘stranger danger’ in inner city areas, as well as suburban areas, was highlighted as the most common parental concern when referring to children’s independent mobility. Fears about traffic safety “resulted in parents always walking their children to school and accompanied them on outings” (Carroll et al., 2011, p. 360). As a result, these children did not access neighbourhood parks alone and were confined to home unless going somewhere specific with a parent. A decrease in outdoor play does not necessarily mean that
Children would rather play inside rather than outside. For instance, another Aotearoa New Zealand study observed that if given the choice, four out of five children would rather play outside than inside (Greenfield, 2004). As follows, literature pertaining to gender and age may provide further insight into how children experience nature.

2.5.2 Socio-demographic Factors

Gender

Of the three studies which operationalized the CTN index, only one examined gender as a possible factor in children’s CTN and found that gender was not a significant predictor (Bragg, et al., 2013). Similarly, although females tend to be associated with higher environmental concern, attitudes, and behaviour - according to Capaldi (2014) – he himself did not come to the same conclusion in his review of CTN literature. Being female did not moderate the relationship between CTN and happiness, nor did it correlate with CTN independently. Furthermore, Mayer and Frantz (2004) did not observe any differences between male and female’s CTN scores.

Despite the findings above, males may be more inclined to express positive emotional feelings towards wild animals than girls are (Zhang et al., 2014). One explanation of this finding is that “boys may face pressure from peers and parents to be unafraid of wildlife, whereas girls may be encouraged to be afraid (e.g., discouraged from outdoor activities and being ‘tomboys’) and social desirability may be a strong force” (Zhang, et al., 2014, p.114). Furthermore, boys are given consistently more freedom to independently access their local environments than girls, as observed in a Christchurch (Aotearoa New Zealand) study (Tranter & Pawson, 2001), suggesting that boys spend more time outdoors alone than do girls, increasing the likelihood that relationships with nature will form.

Conversely, in a paper consisting of three studies, which measured individual’s implicit CTN, females scored significantly higher than males did on two out of three studies (Bruni & Schultz, 2010). One of these studies where females scored higher involved child participants (age 10-12) (Bruni & Schultz, 2010). Similarly, in a paper consisting
of three studies which examined gender in relation to implicit CTN, females scored higher than males (Schultz & Tabanico, 2007). Furthermore, a study which used the new environmental paradigm (NEP)\(^3\) to measure children’s ecocentric (i.e. concern for nature, the biosphere, and all living things) environmental attitudes confirmed that females scored higher than males (Zelezny, Chua, & Aldrich, 2000). In addition, Bunting and Cousins (1985) observed that females expressed much greater affinity for the “emotive and aesthetic aspects of pastoralism” (i.e. a positive responsiveness to natural environments, outdoors, and open spaces) than did males (1985, p. 754).

The studies mentioned suggest that gender influences the way in which a child experiences the natural world. More specifically however, studies that have examined variations of CTN pose that females may score higher on CTN itself.

**Age**

In terms of CTN research, there are mixed findings in regard to age’s influence on children’s CTN. For instance, studies suggest that age and CTN do not correlate (Capaldi et al., 2014), including a study which used the CTN index to measure children’s CTN (Bragg et al., 2013) while other literature suggest that age affects how children feel about the natural world (Orr, 1993; Wilson, 1996). More specifically, a German study found that younger children demonstrated a higher inclusion of nature in self than did older children (Liefländer et al., 2013). An explanation may be that young children’s preferences are less likely to be influenced by sociocultural experiences or direct contact with the environment. In other words, as children grow they experience “the growing away from the ‘romance’ aspects of nature” as stated by Bunting and Cousins (1985, p. 754).

A collection of research suggests it is important to give children opportunities, preferably before the age of 11, to spend time in nature if CTN is to be fostered to the greatest extent possible (Chawla, 1988; Kahn, 1997; Kahn & Kellert, 2002; Kellert, 1985; Wells & Lekies, 2006). For instance, the period between the ages of 7 and 10

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\(^3\) Designed to explore the links between environmental attitudes and behaviours. A common item on the NEP scale is “The Earth is like a spaceship with only limited room and resources”, aimed to measure individual’s world views and societal expectations (Dunlap & Van Liere, 1978).
years is “most significantly characterised by a major increase in emotional concern and affection for animals” and that between the ages of 10 and 14 shows “major expansion in ethical and ecological concern for animals and the natural world” (Kellert, 1985, p. 29). Furthermore, by age 14 children’s attitudes toward wildlife appear to be already well formed (Kellert, 2002). For all these reasons, environmental educational efforts would benefit by focusing their attention on young children whose environmental attitudes are still developing (Ernst & Theimer, 2011; Evans et al., 2007). Literature on environmental education follows.

2.6 Environmental Education

Environmental education is a multi-disciplinary field that aims to increase people's knowledge and awareness about the environment and associated challenges, aiming to foster attitudes, motivations, and commitments to make informed decisions and take responsible action towards environmentally friendly behaviour (UNESCO, 1978). It is also said to foster a CTN for those children who are not afforded the opportunity to frequent natural places. However, not all environmental education programmes involve the outdoors; therefore, the definition of environmental education is quite ambiguous, as also the outcomes can be (Eames et al., 2008; Hungerford & Volk, 1990; Sobel, 1996).

Although Aotearoa New Zealand’s Ministry of Education failed to make environmental education “compulsory in a curriculum already widely perceived to be ‘overcrowded’” (Eames et al., 2008, p. 37), they published guidelines in 1999 to help define what environmental education is for Aotearoa New Zealand Schools. One of their guidelines stated that environmental education should include education in the environment, education about the environment, and education for the environment (Eames et al., 2008). However, when 261 teachers in Aotearoa New Zealand were asked what the purpose of their environmental education programme was, 6 percent responded “education in the environment” as opposed to 70 percent of teachers who responded that it was intended for “education about the environment” (Eames et al., 2008, p. 41).

Eames, at al. (2008) found evidence that environmental education varied across the country, with some schools developing their own comprehensive environmental education programmes, and others offering little or no environmental education at all. For this reason, environmental organizations such as Sustainable Coastlines have found
a niche in the Aotearoa New Zealand education system; focusing half of their curriculum on education in the environment and half of their curriculum about the environment, which, according to the literature, appears to be an effective combination of interventions for fostering connections to nature and environmental attitudes (Collado et al., 2013; Ernst & Theimer, 2011).

2.6.1 Environmental Awareness

In their influential paper, Hungerford and Volk (1990) note that traditional environmental education aims to increase student’s knowledge around environmental issues in the hope that pro-environmental behaviour will follow. However, they argue that the antecedents to behaviour involve much more than knowledge and awareness alone (Hungerford & Volk, 1990). Correspondingly, many scholars assert that increased environmental awareness and knowledge do not directly contribute to pro-environmental attitudes, and ultimately behaviour (Hungerford & Volk, 1990; Kahn & Kellert, 2002; Louv, 2005; Orr, 1993; Wells & Lekies, 2006; Wilson, 1997). Hence, promoting education, or time spent, in the environment is recommended.

Rather, these authors believe that an emotional bond with nature is the dominant precursor to environmental action (Cheng & Monroe, 2010; Kahn & Kellert, 2002; Mayer & Frantz, 2004; Sobel, 1996; White, 2004). Contributing to this belief, American naturalist John Burroughs cautioned, "Knowledge without love will not stick. But if love comes first, knowledge is sure to follow” (as quoted by White, 2004). This quote implies that people’s emotional and affective attitudes and values towards nature develop before their abstract, logical and analytical thought, all of which begin to develop at a young age.

Knowledge and awareness of the environment are nonetheless important. For instance, studies have shown knowledge to correlate with emotional connections to nature (Cheng & Monroe, 2010; Cullen & Volk, 2000; Meinhold & Malkus, 2005; Ramsey & Rickson, 1976); and higher academic achievement in children has been known to accompany a higher inclusion of nature in self, which is thought to be a precursor to environmental care and concern (Liefländer et al., 2013). Furthermore, children who experienced environmental education showed higher levels of environmental attitudes
and “vitality” than those who did not, suggesting that it benefited their environmental and psychological wellbeing (Nisbet et al., 2008, p. ii). However, many of these studies have looked at only one variable at a time, and “have been correlational studies that cannot claim cause and effect relationships” (Hungerford & Volk, 1990, p. 258). Furthermore, environmental education programmes vary greatly and there are many other factors that can influence children’s environmental attitudes and behaviours in addition to education.

Knowledge and CTN may be related to one another because children, like adults, tend to develop emotional attachments to what is familiar and comfortable to them (Wilson, 1996). The more children know about the environment, whether as a result of time spent in natural places, environmental education, and/or their environmental role models (i.e. influential adults who hold positive attitudes towards nature), the more they will feel ‘familiar’ and ‘comfortable’ with environmental topics (Chawla & Cushing, 2007). It is suggested that a combination of these three experiences (i.e. time spent in nature, education, and role models) will provide the best results in achieving pro-environmental attitudes and behaviours in children. However, research that examines the relationships between environmental awareness and CTN, in the context of influencing environmental behaviour in children, is minimal. Cheng and Monroe’s (2010) study examined these variables in relation to one another in the US but there is no such study for Aotearoa New Zealand.

2.7 Summary

Five areas of literature were explored in this chapter. To summarize, this literature illustrated that connection to nature is the love that one feels for the broader natural community; not only because one depends on this community for survival but because it evokes emotions such as calmness, peacefulness, and happiness, which in turn draws individuals back to natural environments, creating a cycle. These emotions are thought to be the root in fostering environmental stewardship, however, there is not always a clear path to increasing a sense of belonging to the natural world for today’s youth.
To better understand the multifaceted relationship between youth and nature, ecopsychologists and environmental psychologists have examined the contributing factors of individuals’ affective and cognitive attitudes towards nature in relation to their pro-environmental behaviour. Such researchers suggest that children’s attitudes towards outdoor play and their willingness to help the environment, as well as their environmental knowledge, time spent in nature, their home’s proximity to nature, and certain socio-demographic factors, such as age and gender, are related to CTN, and thus, to environmental behaviours. Cheng and Monroe’s (2010) framework best fits this thesis; however, that study was set in an American context, and did not investigate children’s attitudes towards outdoor play, nor characteristics of gender and age.

Hypotheses evolved after consideration on the theoretical literature discussed. The research questions and their associated hypotheses, leading into Chapter Three, which will present the methodologies of the study, are as follows:

**Research Question 1**

How do children in Aotearoa New Zealand score on connection to nature and what are the underlying dimensions of their connection to nature? What are the relationships between children’s gender, age, and home’s proximity to nature (i.e. socio-demographics) and connection to nature?

- Hypothesis 1a: Females will score higher on connection to nature than males.
- Hypothesis 1b: Home’s proximity to nature is positively related to connection to nature.
- Hypothesis 1c: Age is negatively related to connection to nature.

**Research Question 2**

Are children’s attitude towards outdoor play, experiences in nature, environmental awareness, willingness to act for the environment, and household’s pro-environmental behaviour related to their connection to nature?

Which variable best predicts children’s connection to nature: attitudes towards outdoor play, experiences in nature, environmental awareness, or significant socio-demographic factors?
Hypothesis 2a: Children’s attitude towards outdoor play, nature experiences, environmental awareness, willingness to act for the environment, household’s pro-environmental behaviour are positively related to connection to nature.

Hypothesis 2b: Experiences in nature will best predict CTN.

Research Question 3

Which variable best predicts children’s willingness to act for the environment: connection to nature, attitude towards outdoor play, nature experiences, environmental awareness, or significant socio-demographic factors?

Hypothesis 3: Connection to nature will best predict willingness to act for the environment.

Research Question 4

Which variable best predicts children’s household pro-environmental behaviour: connection to nature, attitude towards outdoor play, nature experiences, environmental awareness, willingness to act for the environment, or significant socio-demographic factors?

Hypothesis 4: Willingness to act will best predict children’s household pro-environmental behaviour.
Chapter III: Methodology

“Good, ya, because I can play and explore, and if there is a whole lot of bushes you can go through them and look for stuff, and wear stylish gum boots.”

- 9-year-old girl, Te Aro School, Wellington

3.1 Introduction

The main objective of this research was to develop an understanding of the degree to which children in Aotearoa New Zealand feel connected to the natural world and to explore the underlying dimensions of this bond. The secondary objective was to investigate the relationship between CTN and certain variables which have been shown in past literature to influence CTN. This study also sought to find what predicts a child’s willingness to act for the environment and the nature of their household’s pro-environmental behaviour. By addressing these objectives this study aims to produce the first known dataset of children’s CTN in Aotearoa New Zealand.

This chapter: 1) describes the study design; 2) summarizes the background information of the study and the selection of study participants and study sites; 3) explains the design of the study instrument and its distribution and collection; 4) outlines the statistical procedures used to analyse the data; 5) reports the results of the construct’s reliability analysis and principal component analysis; and 6) describes the ethical considerations of the study.

3.2 Study Design

This study’s correlational quantitative research design was guided by the research questions, the objectives and foundation of Sustainable Coastlines’ education programme, and the audience for whom the research was conducted (Creswell, 2009). Each of these factors played a role in selecting the most appropriate design for this study.
Despite its inability to take into account individuality and the personal experiences of the participant, or social setting; the quantitative approach was most appropriate for this thesis timeline. In addition, the distribution and collection of questionnaires was a matter that Sustainable Coastlines had experience with and was supportive of. The questionnaire could supply the necessary data for examining the multiple dimensions of children’s CTN and the measurements could be repeated in the future.

A positivist research methodology was chosen for this study based on the research questions stated in Chapter Two. Generally associated with quantitative survey research, the positivism paradigm can be found in experimental psychology “but has its roots in natural and physical sciences” (Guthrie, 2010, p. 43). Positivism is defined as the belief that the world, and the people in it, are objective things that can be measured and quantified (Creswell, 2009; Guthrie, 2010). For instance, researchers have demonstrated that an emotional CTN, or similar constructs of CTN, can be measured via quantitative methods despite the complexities of human emotions (Cheng & Monroe, 2010; Mayer & Frantz, 2004; Nisbet et al., 2008; Perkins, 2010; Schultz, 2002). Through numerical measures and mathematical analysis past CTN studies have broken their data down “into isolate elements to demonstrate cause and effect” of an emotional CTN (Guthrie, 2010, p. 43). Although this thesis cannot demonstrate cause and effect it can identify trends within the data helpful for unearthing what it means to be connected to nature in Aotearoa New Zealand.

3.2.1 Background

Sustainable Coastlines became an Aotearoa New Zealand Charitable Trust in 2008 and has since continued to expand its reach around the Pacific to places like Hawai‘i, Papua New Guinea, and Taiwan. Sustainable Coastlines’ mission is to create positive and sustained environmental behaviour change through the combination of classroom education and hands-on environmental activities. Their area of focus is promoting clean natural water resources from the mountains to the sea.

Sustainable Coastlines has two programmes: 1) The Love Your Coast programme is specifically about salt-water resources (i.e. the beach, ocean, etc.) and consists of a presentation followed by a local beach clean-up. Love Your Coast takes place over the spring/summer months when the weather is most enjoyable. 2) The Love Your Water
programme specifically focuses on fresh-water resources that drain into the ocean (i.e. rivers, lakes, streams, wetlands, etc.) and consists of a presentation followed by a riparian native tree planting event. Love Your Water takes place over the fall/winter months for the winter rainfall.

As part of the programme’s evaluation process the charity administers questionnaires to participating students. The questionnaire includes approximately 30 items, most of which are scaled (agree-disagree) to measure environmental knowledge amongst students, and frequency (everyday-never) of environmental behaviours. With assistance from the school faculty each student is presented with three questionnaires over the course of six months. The first questionnaire (baseline) is administered pre-education/activity, the second questionnaire (interim) is administered approximately one month post-education/activity, and the last questionnaire is administered approximately 5-6 months post-education/activity.

Primary school students, ranging between the ages of 7 and 12, are encouraged to answer the questionnaire. As a result, unpublished results from the 2014 pilot study indicate a strong increase in students’ understanding of all key messages in the 2014 Love Your Coast educational campaign, implying that Sustainable Coastlines increased students’ awareness around ocean resources. In 2015, the charity was interested in measuring more than environmental knowledge as a means of evaluating programme success. Aware that increased knowledge – alone - does not inherently result in behaviour change Sustainable Coastlines subsequently made the decision to incorporate additional variables, shown to correlate with environmental behaviour, into the questionnaire (Hungerford & Volk, 1990; Mayer & Frantz, 2004).

Thus the researcher of this study included items in the questionnaire that aimed to measure students’: 1) emotional CTN; 2) sense of self efficacy; 3) past nature experiences; 4) perceived family environmental values; 5) home’s distance to nature; and 6) attitude towards outdoor play. Items intended to measure students’ behaviour and knowledge remained in the questionnaire. Sustainable Coastlines’ criteria for the questionnaire were that the item topics be specific to freshwater conservation and fit onto a maximum four pages. Furthermore, the questionnaire was to take the students
approximately ten minutes to complete. Below are tables summarizing Sustainable Coastlines’ programme history and questionnaire design (Table 3.1 & 3.2).

Table 3.1 Sustainable Coastlines’ Programmes

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<td><img src="image1" alt="Sustainable Coastlines" /> <img src="image2" alt="Love Your Coast" /> <img src="image3" alt="Love Your Water" /></td>
</tr>
<tr>
<td>Start Date</td>
<td>2008</td>
</tr>
<tr>
<td>Questionnaire Design</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Programme Season</td>
<td>Year Long</td>
</tr>
<tr>
<td>Key Message</td>
<td>Care for the places you love</td>
</tr>
<tr>
<td>Primary Activity (Intervention)</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 3.2 Details of Sustainable Coastlines’ Triple Questionnaire Design

<table>
<thead>
<tr>
<th>Activity</th>
<th>Objectives</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline*</td>
<td>Measure pre-existing knowledge and behaviours</td>
<td>Before presentation</td>
</tr>
<tr>
<td>Interim</td>
<td>Measure short-term behaviour change when compared with previous questionnaire results.</td>
<td>0-4 weeks after presentation</td>
</tr>
<tr>
<td>Post-Interim</td>
<td>Measure sustained behaviour change when compared to previous questionnaire results.</td>
<td>At least 6 after presentation</td>
</tr>
</tbody>
</table>

Note:
* This study used the baseline survey data

3.2.2 Participants

This study employed a selective sampling method comprising primary school students whose class participated in the Love Your Water programme in the winter of 2015. In addition to completing and submitting the required consent forms children needed to be
of a certain age group. Cheng and Monroe (2010) state that their CTN index is best suited to a narrow age range of 8 to 10 years of age. In this study it was not possible to exclude children based on age. It was however possible to exclude certain school years from the study, therefore the questionnaire was administered to children in school years 4, 5, 6, 7, and 8, generally accounting for ages 8 to 12 years (Table 3.3). Because children aged from 9 to 11 years are often granted permission to access their neighbourhood independently, and this thesis aims to investigate children’s attitudes towards outdoor play and their family’s attitude to independent mobility, children aged 11 and 12 years (school year 7 and 8) were also included in the study (Tranter & Doyle, 1996, p. 31). The age of the study sample was older than Cheng and Monroe’s for these reasons (2010).

In total, 501 children took part in this research, with 450 participants included in the final analysis. As the University Human Ethics Committee had not yet granted approval to conduct the study by the time of the Auckland event (June 5th), the twenty-eight participants who completed the questionnaires formed a pilot study, helping to ensure the questionnaire had adequate formatting and language. In addition, nine participants left substantial sections of the questionnaire blank, identified when the data was examined for outliers, and fourteen participants reported that they were in school “year 3-4” rather than just one school year, and were thus possibly too young to participate in the study. These 51 questionnaires were omitted from the final analysis.

Of the 450 participants, 48 % (n = 217) were male and 52 % (n = 233) were female. Of the five year-groups included in the study, the average was year 5.40, making the majority of the participants approximately 9.5 years old (Education New Zealand, 2015). The participants attended 15 different public primary schools located in five of the 16 Aotearoa New Zealand regions (Table 3.4). Horeke School in Northland was the northernmost school and Green Island School in Otago was the southernmost school.

Participants were asked their School year, gender, and two questions regarding their home’s proximity to nature. Approximately 50 % of children reported that they live close to a stream or a river and 73.4 % reported living close to a park or a forest. When responses were amalgamated, 62.2 % of children reported living close to ‘nature’ (i.e. a stream, river, park, or forest).
The home’s proximity to nature items were initially intended to form a scaled construct, but Cronbach’s alpha reported that the reliability was too low. Therefore the data was included in the socio-demographic data as ‘true’ (i.e. “I live close to nature) or ‘false’ (i.e. I do not live close to nature) data. This was considered acceptable by Bunting and Cousins (1985), who included participant’s home proximity to nature data with other ‘personal status characteristic’ data, such as gender and age, in their study.

The 2015 decile ranking of the participant’s school, as designated by the New Zealand Ministry of Education, was also collected as socio-demographic data (MoE, 2015). Eight of the ten Aotearoa New Zealand decile rankings were represented in the study sample, implying that the participants lived in a wide range of economic and social situations. It should be noted that Sustainable Coastlines’ programmes are offered to schools free of charge so the school’s financial standing did not determine their involvement in the programme, or the study. Below is a summary of the participants’ socio-demographic characteristics (Table 3.3).
Table 3.3 Socio-demographic Characteristics of the Study Sample

<table>
<thead>
<tr>
<th>Variable</th>
<th>%</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender (n = 450)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>48.2</td>
<td>217</td>
</tr>
<tr>
<td>Female</td>
<td>51.8</td>
<td>233</td>
</tr>
<tr>
<td><strong>School year (Age(^a))</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 (8)</td>
<td>37.6</td>
<td>169</td>
</tr>
<tr>
<td>5 (9)</td>
<td>20.4</td>
<td>92</td>
</tr>
<tr>
<td>6 (10)</td>
<td>19.3</td>
<td>87</td>
</tr>
<tr>
<td>7 (11)</td>
<td>9.8</td>
<td>44</td>
</tr>
<tr>
<td>8 (12)</td>
<td>12.9</td>
<td>58</td>
</tr>
<tr>
<td><strong>Proximity to nature</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Live close to a stream or a river</td>
<td>50.5</td>
<td>227</td>
</tr>
<tr>
<td>Live close to a park or a forest</td>
<td>73.4</td>
<td>330</td>
</tr>
<tr>
<td>Total: Live close to nature</td>
<td>62.2</td>
<td>373</td>
</tr>
<tr>
<td><strong>Decile</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3.6</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>13.1</td>
<td>59</td>
</tr>
<tr>
<td>3</td>
<td>7.1</td>
<td>32</td>
</tr>
<tr>
<td>5</td>
<td>6.0</td>
<td>27</td>
</tr>
<tr>
<td>6</td>
<td>11.1</td>
<td>50</td>
</tr>
<tr>
<td>8</td>
<td>26.2</td>
<td>118</td>
</tr>
<tr>
<td>9</td>
<td>22.9</td>
<td>103</td>
</tr>
<tr>
<td>10</td>
<td>10.0</td>
<td>45</td>
</tr>
</tbody>
</table>

Note:
\(^a\) Average age based on New Zealand education guidelines  (Education New Zealand, 2015)

3.2.3 Study Sites

The study locations were primary schools selected by Sustainable Coastlines based on two criteria: the school’s interest in participating in the Love Your Water programme and the school’s physical proximity to the stream, river, or wetland that was Sustainable Coastlines’ restoration focus.

Depending on funding and objectives Sustainable Coastlines’ Love Your Water programme travels to different regions each year. Sustainable Coastlines collaborates with local government and community groups within a region to choose a stream, river, or wetland (i.e. freshwater way) in need of restoration work. The location of this waterway is therefore the main determinant of which nearby schools are asked to participate in the programme.
It was not required that schools meet both criteria (i.e. interest and proximity to a waterway). For example, Te Aro School in Wellington expressed interest in participating in the entire Love Your Water programme despite being on the opposite side of the city to the restoration project at Owhiro Stream and was included in the programme and in this research.

The region where the school is located, the school’s decile ranking, and the number of children from each school who participated in the study is summarized in the table below (Table 3.4). The school’s location in relation to the waterway restoration focus area, and within the specific region, are displayed in Figures 3.1 – 3.5.

<table>
<thead>
<tr>
<th>Region</th>
<th>School</th>
<th>Decile</th>
<th>%</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auckland (Pilot Study)</td>
<td>Farm Cove Primary</td>
<td>8</td>
<td>-</td>
<td>28</td>
</tr>
<tr>
<td>Wellington</td>
<td>Thorndon Primary</td>
<td>10</td>
<td>6.4</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>St. Bernards Primary</td>
<td>9</td>
<td>2.9</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Ridgway Primary</td>
<td>9</td>
<td>12.2</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Te Aro Primary</td>
<td>10</td>
<td>3.6</td>
<td>16</td>
</tr>
<tr>
<td>Canterbury</td>
<td>Cotswold Primary</td>
<td>8</td>
<td>6.0</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Waitakiri Primary</td>
<td>8</td>
<td>20.2</td>
<td>91</td>
</tr>
<tr>
<td>Otago</td>
<td>Karitane Primary</td>
<td>6</td>
<td>1.6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Green Island Primary</td>
<td>6</td>
<td>2.2</td>
<td>10</td>
</tr>
<tr>
<td>Nelson</td>
<td>Clifton Terrace Primary</td>
<td>9</td>
<td>7.8</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Victory Primary</td>
<td>2</td>
<td>13.1</td>
<td>59</td>
</tr>
<tr>
<td>Northland</td>
<td>Mangakahia Area School</td>
<td>3</td>
<td>7.1</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Whangaruru Primary</td>
<td>1</td>
<td>1.8</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Maungaturoto Primary</td>
<td>5</td>
<td>6.0</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Horeke Primary</td>
<td>1</td>
<td>1.8</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Tauraroa Area School</td>
<td>6</td>
<td>7.3</td>
<td>33</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td></td>
<td></td>
<td>8/10</td>
<td>100%</td>
</tr>
</tbody>
</table>
Figure 3.1 Wellington

Figure 3.2 Nelson
Figure 3.3 Canterbury

Figure 3.4 Otago
3.3 Study Instrument

3.3.1 Pilot Study

The questionnaire was pre-tested by 28 Auckland students (school year 7 and 8) in June 2015 for independent feedback on the content, layout, and length of the questionnaire. Two alterations were made following the feedback given; one concerning question clarity and the other concerning the University’s Human Ethic Committee guidelines. Of the 67 items only one was skipped (“I know how to talk to my family and friends about how to keep water clean”). This item, along with four others, were included to measure children’s pre-existing knowledge and behaviours relevant to Sustainable Coastlines’ key messages and calls to action. These five behaviours were too specific to measure general pro-environmental behaviour and thus were omitted from the analysis. Based on the results from piloting the questionnaire, it was estimated that it would take children an average of 10 minutes to complete, which was the target time when designing the questionnaire.
3.3.2 Questionnaire Design

Sustainable Coastlines and the researcher co-designed the questionnaire, as it was essential that the questions addressed both parties’ objectives. Formatting the questionnaire required the most time as Sustainable Coastlines requested that the questionnaire fit on two double-sided pages (A4 paper), thus limiting the number of questions to the space available. For this reason the questionnaire was shorter than Cheng and Monroe’s (2010), who measured a similar set of variables (Cheng, 2008). For example, in their questionnaire 15 items measured environmentally friendly behaviours, as opposed to 12 in this study’s questionnaire. Furthermore their questionnaire was predicted to take participants 15 minutes to complete rather than the 10 minutes required for this questionnaire.

Despite the differences in questionnaire content, Cheng and Monroe’s (2010) CTN index and its 16 items was retained in this study, although seven items were adapted from the original version (more details on these changes will be presented in the following section). The questionnaire in this study contained 67 items, 18 of which were multiple choice and 49 of which were five-point Likert-like scaled items. Of the 67 items, 42 were included in the final analysis. Likert-like scaled items (1 = strongly agree to 5 = strongly disagree) were chosen for this instrument because Sustainable Coastlines’ original questionnaire format utilized scaled items and because Cheng and Monroe developed their CTN index as a scaled measurement. The remaining three items were multiple choice items and were included in the study instrument to reduce space. Each item had seven choices for answers including ‘nothing’ and ‘other’.

As required by the University’s Human Ethics Committee, the questionnaire began with a statement summarizing the purpose of the survey, followed by a statement of consent. Respondents were then asked their school’s name, year group, and gender (Appendix A). Socio-demographic data was collected for analysis because it might correlate with CTN and because Sustainable Coastlines wanted to collect a description of the study sample for their records.

3.3.3 Constructs
Initially nine factors were to be measured, but three changes were made as the result of the first analysis. The perceived family value construct and the sense of self efficacy construct were removed from further analysis. The willingness to act construct changed slightly, losing one item while gaining another, and lastly, data from the home’s distance to nature items were included in the socio-demographic characteristics. An explanation of the constructs will be presented in more detail later in the chapter within the analysis results.

3.3.4 Distribution and Collection

Sustainable Coastlines distributed the questionnaires, along with the required ethic’s paper work, to the schools via New Zealand Post approximately three weeks before its Love Your Water environmental presentation. This time frame ensured that the Principal of the school, the teacher of the class and the participants and their parents or legal guardians had sufficient time to read the information sheets and sign the consent forms. In addition, information about administering the questionnaires was included in the packet from Sustainable Coastlines. These documents were also sent through email.

The teacher of the class distributed the questionnaires to the students once he/she had collected the students’ consent forms. The students were instructed to respond to the questionnaire by themselves without the help of their classmates but they were permitted to ask their teacher for clarification on questionnaire items.

The researcher and Sustainable Coastlines collected the completed consent forms and the questionnaires from the teacher of the class prior to the environmental presentation. This interaction was crucial as it allowed time for the researcher and the teacher to discuss, face-to-face, any concerns pertaining to the paperwork. In one instance, when the researcher went to collect the questionnaires from an Otago teacher, the teacher explained that the questionnaires had been sent home with the students to be completed with their parents. Consequently these questionnaires were not collected from the teacher. Information such as this might not have been conveyed to the researcher if a third party was responsible for collecting the questionnaires.

Once the questionnaires were collected and the data entered, they were then photocopied and placed in a locked cabinet in Sustainable Coastlines’ office. As stated
on the University Human Ethics Committee application, hard copies and digital copies of the questionnaires will be destroyed and deleted, respectively, one year from the study’s date of completion.

3.4 Data Analysis

3.4.1 SPSS

The questionnaire data was analysed with IBM’s Statistical Package for Social Sciences version 21. All scaled questionnaire items, except for three, were worded as 1 = strongly agree and 5 = strongly disagree. They were reverse coded in SPSS as 1= strongly disagree and 5 = strongly agree, parallel to Cheng and Monroe’s items (2010). This meant that a higher score on a question corresponded with a higher level of agreement. Missing data was excluded from the analysis and significance levels were set at .05. Nine composite variables were created. Three of these variables (environmental awareness, nature experiences, and household’s pro-environmental behaviour) were summative scales, meaning that the number of positive (i.e. ‘agree’) answers were summed together to represent the target construct. Items were coded as 0 = ‘disagree’ or 1 = ‘agree’.

Reliability and validity of the instrument scales were measured by computing Cronbach’s alpha coefficients. Cronbach’s alpha was not conducted on the summative scales. An alpha coefficient of .60 was considered adequate in this study (Vaske, 2008). Four constructs were reported as having low reliability scores and for this reason principal component analysis was conducted to test whether new constructs would be extracted from the 14 items. Reliability analysis and principal component analysis will be presented in this chapter.

Descriptive statistics and frequency analysis were used to summarise the socio-demographic data. Pearson’s $r$ correlation analysis and multiple linear regression analysis, presented in the findings chapter, were then conducted to determine if relationships existed between the socio-demographic factors and variables of interest, and CTN.
Reliability Analysis

Reliability and validity analysis found that the constructs of self-efficacy, perceived family values, willingness to act, and home’s distance to nature were not reliable measurements. It was assumed that the constructs had too few items, for instance self-efficacy, with two items, had a Cronbach’s alpha of .37 and perceived family values, with three items, had a Cronbach’s alpha of .51. These construct’s items (except for home’s distance to nature items) were entered into principal component analysis to examine whether they could be grouped differently. Principal component analysis amalgamated four items from the willingness to act construct with one item from the perceived family values construct. The construct retained its original title of ‘willingness to act’ albeit the slight modification. All other items were removed from the study, i.e. the perceived family value construct and the sense of self-efficacy construct (Table 3.10). The measurement design, results from the reliability analysis, and results from the principal component analysis is presented next.

Connection to Nature

Connection to nature was measured with an adapted version of Cheng and Monroe’s (2010) CTN index. Seven of the items were slightly changed to more accurately represent Aotearoa New Zealand ecology and Sustainable Coastlines’ objectives (Table 3.5). For example, New Zealand’s only native land mammals are seals and two species of bat (DOC, n.d.-a). These bats are critically endangered and thus difficult to find in the wild and seals are common only in particular coastal areas and during specific seasons. In addition, it appears to be common knowledge among school children that many wild mammals in Aotearoa New Zealand, such as the possum, are considered to be pests and threats to native animals (DOC, n.d.-b). Therefore the item; “I like to see wild animals living in a clean environment” (Cheng & Monroe, 2010, p. 41) was changed to; ‘I like seeing native eels, fish and birds living in a clean environment’, with the aim of making it more relevant to Aotearoa New Zealand.

Similarly to the original index, a higher score on the measurement illustrates a higher CTN. Mean scores of 1 or 2 indicate the lowest CTN score (i.e. disconnect), scores of 3 indicate a neutral CTN (i.e. neither high nor low), and scores of 4 or 5 indicate the highest level of CTN (Bragg et al., 2013; Cheng & Monroe, 2010).
Four dimensions (enjoyment of nature, empathy for creatures, sense of oneness, and sense of responsibility) form CTN (Cheng & Monroe, 2010). To test these dimensions, principal component analysis was conducted on the index to determine how the items load on the proposed constructs. This analysis ensures that the questions asked relate to the construct intended to be measured (Field, 2000). Emergent factors with eigenvalues greater than 1 resulted in three constructs instead of four, which were labelled: enjoyment of nature, empathy for nature, and oneness with nature. Oneness with nature explained 33% (eigenvalue of 5.28) of the variance in scores on the index, whereas enjoyment of nature explained 9% (eigenvalue of 1.48) and empathy for nature explained 6% (eigenvalue of 1.00) of the variance. Empathy for nature, rather than empathy for creatures or sense of responsibility, was chosen as a more general title.

All items but one (I feel sad when I see trees being cut down = .38) had factor loadings above 0.4. However, despite the item’s low loading, Field (2000) states that an item can be included in the analysis if the sample size is good, i.e. more than 300 participants which this study had. Cronbach's alpha was calculated for the three constructs to determine internal consistency. Their independent reliabilities were $\alpha = 0.74$ (enjoyment of nature), $\alpha = 0.71$ (empathy for nature), and $\alpha = 0.75$ (oneness with nature), and they are therefore considered to be reliable measurements. Overall the CTN index exhibited good reliability ($\alpha = 0.86$, n = 449). This score is only marginally different from Cheng and Monroe’s original score of $\alpha = 0.87$. The study sample’s cumulative CTN score will be reported in the findings chapter. Table 3. 5 provides a summary of the exploratory factory analysis and Cronbach’s alpha findings for the different dimensions of CTN.
### Table 3.5 Connection to Nature Constructs

<table>
<thead>
<tr>
<th>Variable</th>
<th>Item&lt;sup&gt;a&lt;/sup&gt;</th>
<th>M ± SD</th>
<th>Explained Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Construct: Enjoyment of Nature (α = 0.74, n = 437)</strong></td>
<td></td>
<td>9%</td>
</tr>
<tr>
<td>1</td>
<td>Collecting rocks and shells is fun</td>
<td>4.02 ± 1.17</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I enjoy looking at birds, bugs, lizards and plants&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.02 ± 1.10</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>I like to hear different sounds in nature</td>
<td>4.08 ± 1.03</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>I like seeing native eels, fish and birds living in a clean environment&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.45 ± .92</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I enjoy touching animals and plants</td>
<td>4.36 ± .92</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Construct: Empathy for Nature (α = 0.71, n = 437)</strong></td>
<td></td>
<td>6%</td>
</tr>
<tr>
<td>6</td>
<td>I feel sad when I see trees being cut down&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.90 ± 1.13</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>It is important that our animals and plants don’t go extinct&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.61 ± .74</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>People cannot live without plants and animals</td>
<td>4.66 ± .77</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>My actions will make the natural world different</td>
<td>3.83 ± 1.08</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Picking up trash on the ground can help the environment</td>
<td>4.81 ± .49</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Clean water is everybody’s responsibility, including mine&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.42 ± .90</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Construct: Oneness with Nature (α = 0.75, n = 436)</strong></td>
<td></td>
<td>33%</td>
</tr>
<tr>
<td>12</td>
<td>Being in the natural environment makes me feel peaceful</td>
<td>4.21 ± .95</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>I like to garden and plant trees&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.92 ± 1.11</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Being outdoors makes me happy</td>
<td>4.33 ± .91</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>When I feel sad, I like to go outside and enjoy nature</td>
<td>3.65 ± 1.22</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>I feel like I am part of the natural world just like a tree in a forest&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.76 ± 1.17</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Construct Connection to Nature (α = 0.86, n = 449)</strong></td>
<td></td>
<td>48%</td>
</tr>
</tbody>
</table>

**Notes:**

<sup>a</sup> Scaled items

<sup>b</sup> Items that have been changed from the original index (Cheng & Monroe, 2010)
Although children’s household pro-environmental behaviour and nature experiences are two individual constructs, they are discussed side-by-side because the responses are derived from the same section of the questionnaire and formatted as multiple-choice rather than scaled items. These constructs also include behaviours that are out of children’s independent control. For instance, children are often too young to make their own environmental decisions or experience certain activities in nature alone (e.g. fishing). For this reason the three multiple-choice items, pertaining to nature experiences and to household pro-environmental behaviour, include adult behaviours as well as children’s, or behaviours that would most likely be accompanied by the presence of an adult. These questions were: what do you do at home to help keep water clean, what do you do at your local stream or park to help keep water clean, and what do you like to do at your local stream or river. Each was followed with the statement, “tick all the things you do” (Appendix A). Household pro-environmental behaviour contained four items and nature experiences contained six items.

Both constructs were computed as summative scales. If an item was skipped then it was entered as a ‘0’ and if it was ticked, then it was entered as a ‘1’ (i.e. ‘agree’ to engaging in the activity). The number of ticked responses out of four in the household’s pro-environmental behaviour construct represented each respondent’s household environmental behaviour. The number of ticked (i.e. “agree to engaging in this activity”) responses out of six in the nature experience construct represented the respondent’s time spent in nature, specifically at their local stream or river. A higher score on the measurements illustrated a higher rate of frequency for the behavioural themes.

Children’s household pro-environmental behaviour’s mean score was 1.93 ± 1.19 (n = 436), meaning that on average the respondents and their families engage in approximately two of the four pro-environmental behaviours. Participants reported engaging in nine ‘other’ pro-environmental behaviours4 not included in the options provided. Due to lack of commonality (i.e. none were reported twice), these answers

4 Examples of these responses are: “look after my worm farm”, “use renewable bees’ wax wrap”, “conserve water”, “use less power”, “don’t clean your car in the driveway”, “clean your local beach”, and “grow my own animals to eat”.

46
were not included in the analysis. Note data is presented as mean ± standard deviation unless otherwise stated.

Nature experiences’ mean score was $3.56 \pm 1.66$ (n = 441), meaning that on average, respondents engage in approximately three to four of the six outdoor activities. Participants reported experiencing nature in 18 ‘other’ ways not included in the options provided. Due to lack of commonality, these answers were not included in the analysis. Below is a summary of the response findings for household’s pro-environmental behaviour and nature experiences (Table 3.6).

---

5 Examples of these responses are: “go out on a boat”, “conduct studies of streams”, “shoot my brother’s bow and arrow”, “climb strong trees”, “have a picnic with my family”, “look at bugs”, and “skip stones”.

47
Table 3.6 Responses to Household’s Pro-environmental Behaviour and Nature Experiences

<table>
<thead>
<tr>
<th>Variable</th>
<th>Item a</th>
<th>% Engage in Behaviour</th>
<th>% Do Not Engage in Behaviour</th>
<th>% Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construct: Household Pro-environmental Behaviour (1.93 ± 1.19, n = 436)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Pick up rubbish?</td>
<td>69</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>2</td>
<td>Pick up your dog’s poo?</td>
<td>27</td>
<td>69</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Eat organic (or spray free) food?</td>
<td>47</td>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Use cleaning products that are non-toxic?</td>
<td>44</td>
<td>53</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>‘Other’ b</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construct: Nature Experiences (3.56 ± 1.66, n = 441)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Play and explore?</td>
<td>79</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Swim?</td>
<td>60</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Fish or collect food from the water?</td>
<td>34</td>
<td>56</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>Plant trees or shrubs?</td>
<td>39</td>
<td>57</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Bike, scooter, or walk to the places you love?</td>
<td>70</td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Help to grow food in the garden?</td>
<td>67</td>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>‘Other’ b</td>
<td>18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:

a All items are nominal ‘agree or disagree’ (i.e. “please tick all that you do”)

b Items not included in the analysis due to lack of commonality

Environmental Awareness

The construct of environmental awareness contained items pertaining to Aotearoa New Zealand waterway awareness and conservation. The seven items were formatted as a five-point Likert scale (strongly disagree – strongly agree). Item options ‘strongly agree’ and ‘agree’ were recoded to express ‘true’ (entered as 1), and item options ‘strongly disagree’ and ‘disagree’ were recoded to express ‘false’ (entered as 0). The item option ‘neither’ was recoded as ‘missing’. This construct was also computed as a summative scale. The number of ‘true’ answers out of seven represented each
respondent’s environmental awareness. A higher score on the measurement illustrated a higher level awareness.

Environmental awareness mean score was 3.82 ± 1.43 (n = 449), meaning that on average, respondents answered ‘true’ to approximately four of the seven environmental awareness questions. Below is a summary of the responses to the environmental awareness construct (Table 3.7).

Table 3.7 Responses to Environmental Awareness

<table>
<thead>
<tr>
<th>Variable</th>
<th>Item a</th>
<th>% Responded ‘True’</th>
<th>% Responded ‘False’</th>
<th>% Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construct: Environmental Awareness (3.82 ± 1.43, n = 449)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Trees breathe in what we humans breathe out</td>
<td>73</td>
<td>7</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Trees and plants near rivers can stop too many nutrients (plant food) from getting in the water</td>
<td>37</td>
<td>16</td>
<td>46</td>
</tr>
<tr>
<td>3</td>
<td>Trees make river banks stronger, stopping dirt from going into the water</td>
<td>66</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Most of New Zealand’s rivers are safe to swim in or collect food from after it has rained a lot</td>
<td>38</td>
<td>33</td>
<td>28</td>
</tr>
<tr>
<td>5</td>
<td>Animals like cows, dogs, and ducks do not make the river water dirty</td>
<td>55</td>
<td>23</td>
<td>78</td>
</tr>
<tr>
<td>6</td>
<td>I can help clean up the water by planting trees besides rivers and streams</td>
<td>69</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td>7</td>
<td>Cleaning products and chemicals used at home could end up in our rivers</td>
<td>80</td>
<td>8</td>
<td>12</td>
</tr>
</tbody>
</table>

Note:

a All items were recoded to represent ‘true’ or ‘false’

Principal Component Analysis

Based on the percentage of explained variance and an eigenvalue greater than 1, principal component analysis extracted four themes, however, only two themes were strong enough (i.e. $\alpha > .60$) to be form new study constructs. These two constructs were: ‘willingness to act’ ($\alpha = .76$) and ‘attitude towards outdoor play’ ($\alpha = .62$). A third
construct represented the influence of home on nature experiences but had a Cronbach’s alpha of .53 and therefore was not included. Two of the items in this construct were included in the socio-demographic characteristics as mentioned earlier. The fourth construct was only one item and thus omitted.

All items in the two constructs had factor loadings above 0.4, which is considered good (Field, 2000). Willingness to act explained the highest percentage of variance at 27% (eigenvalue of 3.37), while attitude towards outdoor play explained 10% of the variance (eigenvalue of 1.33). All items were measured on a five-point Likert scale. Table 3.8 provides a summary of the results from the extraction method with varimax rotation, followed by a description of the constructs.
### Table 3.8 Results from the Exploratory Factor Analysis (principal component analysis)

<table>
<thead>
<tr>
<th>Item</th>
<th>Component Explained Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Willingness to Act for the Environment (α = .76, n = 450)</strong></td>
<td></td>
</tr>
<tr>
<td>I want to talk to my family and friends about how to help keep water clean</td>
<td>27%</td>
</tr>
<tr>
<td>I am excited about planting trees</td>
<td></td>
</tr>
<tr>
<td>I want to volunteer to help keep water clean</td>
<td></td>
</tr>
<tr>
<td>My family and friends will be excited to hear that I planted trees</td>
<td></td>
</tr>
<tr>
<td>I want to pick up rubbish that is not mine</td>
<td></td>
</tr>
<tr>
<td><strong>Attitude Towards Outdoor Play (α = .62, n = 448)</strong></td>
<td></td>
</tr>
<tr>
<td>I would rather play outside than inside</td>
<td>10%</td>
</tr>
<tr>
<td>I would rather watch TV or play video/computer games than be outside</td>
<td></td>
</tr>
<tr>
<td>I know that I can play outside instead of inside</td>
<td></td>
</tr>
<tr>
<td>I want to bike, scooter, or walk places instead of having someone drive me</td>
<td>9%</td>
</tr>
<tr>
<td><strong>Influence of Home (α = .53)</strong></td>
<td></td>
</tr>
<tr>
<td>My family encourages me to bike, scooter, or walk to natural places where I play</td>
<td>9%</td>
</tr>
<tr>
<td>My family spends times together in nature</td>
<td></td>
</tr>
<tr>
<td>I live close enough to a stream or a river that I can bike, scooter, or walk there</td>
<td>8%</td>
</tr>
<tr>
<td>I live close enough to a park or a forest that I can bike, scooter, or walk there</td>
<td>8%</td>
</tr>
<tr>
<td>I know what to do with rubbish when I find it</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- a Scaled items
- b Removed from the study
- c Removed from the construct and included in the socio-demographic characteristics
- d Reversed word

**Willingness to Act for the Environment**

Three of the five items in the construct of willingness to act asked the participants to indicate how much they ‘want to’ act environmentally. These items were measured with
a five-point Likert scale (strongly disagree – strongly agree) and were adapted from Kals, et al.’s (1999) willingness for pro-environmental commitment scale and from research by Collado, et al. (2013) which examined children’s willingness to act for the environment. Similarly to these studies, the items were initially intended to be phrased ‘I am willing to pick up rubbish that is not mine’. However, Sustainable Coastlines thought the word willing might confuse children, so the items were reworded to ‘I want to pick up rubbish that is not mine’.

These items, and the item ‘I am excited about planting trees’, came from the original pro-environmental attitude construct. The fifth item, ‘my family and friends will be excited to hear that I planted trees’, inspired by Chawla’s (1988, 1999) findings and Ajzen’s (1991) theory of planned behaviour, was formerly in the perceived family values construct. All five items were measured with a five-point Likert scale. In general, the participants scored moderately high, 3.90 ± .81 (n = 450), suggesting that on average respondents hold positive attitudes about engaging in environment activism.

*Attitude towards Outdoor Play*

The items in the construct of attitude towards outdoor play were measured with a five-point scale (strongly disagree – strongly agree) and adapted from an evaluation in residential environmental education (Stern, Powell, & Ardoin, 2010). Analysis reported that on average respondents would rather play outside than inside, 3.58 ± 1.09 (n = 448). Table 3.9 provides a summary of the responses to the willingness to act and attitude towards outdoor play constructs, as well as a summary of the construct’s reliability coefficients.
### Table 3.9 Responses to Willingness to Act and Attitude Towards Outdoor Play

<table>
<thead>
<tr>
<th>Variable</th>
<th>Item&lt;sup&gt;a&lt;/sup&gt;</th>
<th>M ± SD</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construct: Willingness to Act for the Environment (3.91 ± .81, n = 450)</strong></td>
<td></td>
<td></td>
<td>.76</td>
</tr>
<tr>
<td>1</td>
<td>I want to talk to my family and friends about how to help keep water clean</td>
<td>3.76 ± 1.17</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I am excited about planting trees</td>
<td>3.98 ± 1.20</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>I want to volunteer to help keep water clean</td>
<td>4.16 ± .97</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>My family and friends will be excited to hear that I planted trees</td>
<td>3.74 ± 1.10</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>I want to pick up rubbish that is not mine</td>
<td>3.90 ± 1.19</td>
<td></td>
</tr>
<tr>
<td><strong>Construct: Attitude Towards Outdoor Play (3.58 ± 1.09, n = 448)</strong></td>
<td></td>
<td></td>
<td>.62</td>
</tr>
<tr>
<td>1</td>
<td>I would rather watch TV or play video/computer games than be outside&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.36 ± 1.37</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>I would rather play outside than inside</td>
<td>3.82 ± 1.18</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

<sup>a</sup> Scaled items

<sup>b</sup> Reverse word

### 3.4.2 Summary

In summary, CTN was a reliable scaled measurement consisting of three underlying dimensions. Three nominal measurements were formed by summing the number of positive answers (i.e. “true” or “agree”) and placing this number on a summative scale against the total number of questions. Two scaled measurements were the result of principal component analysis. Table 3.10 illustrates these study constructs; before and after the reliability analysis and principal component analysis.
Table 3.10 Reliability Coefficients of the Study Measures

<table>
<thead>
<tr>
<th>Original Measures (before initial analysis)</th>
<th>Study Measures (after initial analysis)</th>
<th># of Items</th>
<th>Internal Consistency Cronbach’s α</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection to nature</td>
<td>No changes</td>
<td>16</td>
<td>.86</td>
<td>449</td>
</tr>
<tr>
<td>Household’s pro-environmental behaviour</td>
<td>No changes</td>
<td>4</td>
<td>nominal</td>
<td>436</td>
</tr>
<tr>
<td>Nature experiences</td>
<td>No changes</td>
<td>6</td>
<td>nominal</td>
<td>441</td>
</tr>
<tr>
<td>Environmental awareness</td>
<td>No changes</td>
<td>7</td>
<td>nominal</td>
<td>449</td>
</tr>
<tr>
<td>Willingness to act</td>
<td>Willingness to act (4 items) and Perceived Family Values (1 item)</td>
<td>5</td>
<td>.76</td>
<td>450</td>
</tr>
<tr>
<td>Attitude towards outdoor play</td>
<td>No changes</td>
<td>2</td>
<td>.62</td>
<td>448</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>Removed</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Perceived family values</td>
<td>Removed</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Home’s distance to nature</td>
<td>Included in socio-demographic characteristics</td>
<td>2</td>
<td>nominal</td>
<td>447</td>
</tr>
</tbody>
</table>

3.5 Ethical Considerations

This study complied with the ethical guidelines set out by Victoria University of Wellington. Approval was granted on the 9 June 2015 and research began on 22 June 2015 (ethics approval number 21945 (see Appendix C)). Ethical considerations are a critical part of scientific research, especially when the research involves child participants. Discussing ethical considerations with the participant’s school contributed to the development of a constructive relationship between the researcher and the school, particularly the teacher of the class. Building this relationship was an essential first step in the research process.

The Ethics Committee required five documents to be distributed to the teacher of the class which were to be read and signed and collected prior to conducting the research. These papers were: 1) Information Sheet for the participant; 2) Information Sheet for the parent; 3) Consent Form for the parent; 4) Consent Form for the Principal of the
school; and 5) Consent Form for the teacher of the class (see Appendix B). Names of the participants were not collected; student consent to participate in the study was implicit in their completion of the questionnaire. The questionnaire stated: ‘I am happy to participate in this research as shown by completing this survey’. In most cases, participants are given a right to later withdrawal from the research, however, due to the confidential and anonymous nature of the questionnaire this was not possible as the researcher could not link a questionnaire with a specific student once the questionnaires were collected.

Assuming that parents provided the participants with their Information Sheet, all participants \(n = 501\) were informed about the research, told that it was optional to participate, and then invited to complete the questionnaire. No individual participants opted out of the study; however, two teachers did decide their class would opt out of the study due to lack of time.

3.6 Summary

This chapter covered the quantitative research design and methodology used in the analysis of the questionnaire instrument reported in the following chapter. Background information pertaining to Sustainable Coastlines’ programme objectives was summarized, as was information about the study sample, study sites, and study instrument. This chapter reported the results of the reliability and principal component analysis, which formed the study constructs. Ethical considerations were also discussed. The researcher’s positionality, methodology, and reliability results will inform the examination of the study measurement. In the following findings chapter, each result section will be accompanied by a summary of the appropriate statistical methods used to explore the research questions set out in Chapter Two, and the interpretation of the results is addressed in the discussion chapter.
Chapter 3
Chapter IV: Results

“Um...beauty and that you can play in it and that is helps the environment and makes fun for you....you can climb in the trees and things.”

- 8-year-old boy, Ridgway School, Wellington

4.1 Introduction

This chapter examines results of the statistical analysis of the questionnaire measurements in order to address the associations between children’s CTN and a number of other variables. To do so, the chapter is broken into four research questions.

4.2 Research Question 1

How do children in Aotearoa New Zealand score on connection to nature and what are the underlying dimensions of their connection to nature? What are the relationships between socio-demographics and connection to nature?

Hypothesis 1a: Females will score higher on connection to nature than males.

Hypothesis 1b: Home’s proximity to nature is positively related to connection to nature.

Hypothesis 1c: Age is negatively related to connection to nature.

4.2.1 Connection to Nature

Connection to nature descriptive statistics indicated that children in Aotearoa New Zealand are highly connected to nature, with a mean score of 4.16 ± .58, where 5 is the highest possible score. The mean scores for the underlying dimensions were 4.35 ± .58 (oneness with nature), 4.16 ± .76 (empathy for nature), and 3.93 ± .78 (enjoyment of nature). Participants scored highest on the construct oneness with nature. Pearson’s r
correlation analysis was conducted to examine CTN in relation to the participant’s gender, school year, and the proximity of the home to nature, to ascertain if any associations existed between the variables. The mean CTN scores were also compared between groups. These will be explained below.

4.2.2 Gender

Being female positively correlated with CTN ($r = .27, p < .01$); supporting the hypothesis that females will score higher on CTN ($4.31 \pm .51, n=233$) than males ($4.01 \pm .62, n=216$). The difference was significant between groups (95% CI, 0.56 to 0.47, $p = <.001$), $t (450) = 21.93, p = <.001$).

The three underlying dimensions of CTN, enjoyment of nature ($r = .26, p < .01$), empathy for nature ($r = .24, p < .01$), and oneness with nature ($r = .16, p < .01$) are all positively correlated with gender. Furthermore, there is a statistically significant difference between how males and females scored on the underlying dimensions of CTN as determined by one-way ANOVA; $F (450) = 34.20, p <.001$ (enjoyment of nature), $F (450) = 28.26, p < .001$ (empathy for nature), and $F (446) = 12.77, p < .001$ (oneness with nature).

Oneness with nature exhibited the smallest difference between males ($4.27 \pm .61$) and females ($4.45 \pm .53$), while enjoyment of nature exhibited the largest difference between males ($3.37 \pm .84$) and females ($4.14 \pm .67$). These findings indicate that females are more likely to feel one with nature, to enjoy nature, and to have empathy for nature, and thus are more prone to feel connected to nature. Figure 4.1 summarizes the differences between male’s and female’s scores for CTN.
4.2.3 School Year

School year (i.e. age) and CTN negatively correlated with one another (r = -.10, p < .05); supporting the hypothesis that age will negatively correlate with CTN. This finding suggests that younger children have higher CTN scores than older children. Children in school year 5 (age 9) showed the highest CTN score (4.25 ± .61, n = 92) while children in year 8 (age 12) showed the lowest CTN score (3.97 ± .55, n = 58). The significant difference between age groups was reconfirmed by one-way ANOVA (F(4,444) = 2.54, p < .05). The association between school year and CTN was not linear. Children in school year 6 had the second lowest CTN score (4.13 ± .60, n = 87) while children in year 4, the youngest children in the study, exhibited the third highest CTN score (4.19 ± .59, n = 168).

Of the three underlying dimensions of CTN, enjoyment of nature (r = -.07, p = .13), empathy for nature (r = -.12, p < .01), and oneness with nature (r = -.08, p = .11), only the correlation between empathy for nature and age was statistically significant (F
(4,445) = 2.65, p < .05). Based on these findings, younger children have a higher CTN and, more distinctively, a higher empathy for nature than older children do. Figure 4.2 summarizes the difference in CTN score for the five school year groups.

![Figure 4.2 School Year (age) and Connection to Nature](image.png)

**Figure 4.2 School Year (age) and Connection to Nature**

### 4.2.4 Home’s Proximity to Nature

Children’s home proximity to nature and CTN positively correlated with one another (r = .23, p < .01); supporting the hypothesis that home’s proximity to nature will positively correlate with CTN. Children who live close to nature (4.21 ± .59, n = 369) had a higher CTN than those who did not live close to nature (4.04 ± .60, n = 200). As determined by one-way ANOVA (F (8, 427) = 3.92, p < .01) the difference between these two groups was statistically significant, meaning that children who live close to a stream, river, park or a forest have a higher chance of feeling connected with nature than those who do not. Alternatively, families who chose to live close to nature may do so because they feel a bond with nature.

Children’s home proximity to nature positively correlated with the three underlying dimensions of CTN: enjoyment of nature (r = .22, p < .01), empathy for nature (r = .21, p < .01), and oneness with nature (r = .13, p < .01), suggesting that those who live close to nature enjoy being in nature, have empathy for the natural world, and feel a sense of oneness with nature.
Table 4.1 Socio-demographic Factors and Connection to Nature

<table>
<thead>
<tr>
<th>Variable</th>
<th>Connection to Nature</th>
<th>$r$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>4.01 ± .62</td>
<td>.27**</td>
</tr>
<tr>
<td>Female</td>
<td>4.31 ± .51</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4.16 ± .58</td>
<td></td>
</tr>
<tr>
<td><strong>School Year (Age)</strong></td>
<td></td>
<td>- .10*</td>
</tr>
<tr>
<td>4 (8)</td>
<td>4.19 ± .59</td>
<td></td>
</tr>
<tr>
<td>5 (9)</td>
<td>4.25 ± .61</td>
<td></td>
</tr>
<tr>
<td>6 (10)</td>
<td>4.13 ± .60</td>
<td></td>
</tr>
<tr>
<td>7 (11)</td>
<td>4.22 ± .48</td>
<td></td>
</tr>
<tr>
<td>8 (12-13)</td>
<td>3.97 ± .55</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4.16 ± .58</td>
<td></td>
</tr>
<tr>
<td><strong>Proximity to nature</strong></td>
<td></td>
<td>.23**</td>
</tr>
<tr>
<td>Live close to a stream or a river</td>
<td>3.32 ± 1.70</td>
<td></td>
</tr>
<tr>
<td>Live close to a park or a forest</td>
<td>4.17 ± 1.33</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3.59 ± 1.09</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2 tailed)

4.3 Research Question 2

Are children’s attitude towards outdoor play, experiences in nature, environmental awareness, willingness to act for the environment, and household’s pro-environmental behaviour related to their connection to nature?

Which variable best predicts connection to nature: attitude towards outdoor play, experiences in nature, environmental awareness, or significant socio-demographic factors?

Hypothesis 2a: Attitude towards outdoor play, nature experiences, environmental awareness, willingness to act for the environment, household’s pro-environmental behaviour are positively related to connection to nature.

Hypothesis 2b: Experiences in nature will best predict CTN.
Pearson’s $r$ correlation analysis and linear regression was performed to test the hypotheses and explore the research questions. Firstly, all variables in the study, excluding socio-demographic factors, which were examined in the previous section, were entered into a correlation analysis to test for relationships with CTN. Secondly, multiple linear regression, with 95% confidence intervals for respective $R^2$ values, was used to determine the slope and strength of the statistical associations between CTN and the variables of interest which have been shown to influence CTN in past literature. Attitude towards outdoor play, nature experiences, environmental awareness, and socio-demographic factors were entered into the multiple linear regression as independent variables and CTN was entered as the dependent variable. The results to the multiple linear regression are as follows.

### 4.3.1 Attitude towards Outdoor Play

Children’s attitude towards outdoor play and CTN were positively correlated ($r = .44, p < .01$); supporting the hypothesis that attitude towards outdoor play will positively correlate with CTN. This finding suggests that as children’s attitude towards playing outside increases (i.e. the more they want to play outside) so will their connection with the natural world.

### 4.3.2 Nature Experiences

Children’s nature experiences and CTN were positively correlated ($r = .34, p < .01$); supporting the hypothesis that nature experiences will positively correlate with CTN. This finding implies that as children’s experiences in nature (e.g. play and explore in nature) increase, so will their CTN.

### 4.3.3 Environmental Awareness

Children’s environmental awareness and CTN were positively correlated ($r = .29, p < .01$); supporting the hypothesis that environmental awareness will positively correlate with CTN. This finding signifies that as a child’s awareness of the environment (e.g. trees breathe in what we humans breathe out) increases so will their CTN.
4.3.4 Willingness to Act for the Environment

Children’s willingness to act for the environment and CTN were positively correlated ($r = .68$, $p < .01$); supporting the hypothesis that willingness to act will positively correlate with CTN. This finding suggests that as a child’s willingness to act for an environmental cause (e.g. pick up rubbish that is not theirs) increases so will their CTN.

4.3.5 Household’s Pro-environmental Behaviour

Children’s household pro-environmental behaviour and CTN were positively correlated ($r = .37$, $p < .01$); supporting the hypothesis that household pro-environmental behaviour will positively correlate with CTN. This findings implies that as a family’s pro-environmental behaviour (e.g. eat organic food) increases so will the child’s CTN, or vice versa.

4.3.6 Summary

All of the variables correlated with CTN, suggesting that increases in any one variable corresponds to increases in the others. The strongest correlation was between willingness to act for the environment and CTN ($r = .68$, $p < .01$) and the weakest correlation was between environmental awareness and CTN ($r = .29$, $p < .01$). The correlations are summarized in Table 4.2 below.

<table>
<thead>
<tr>
<th>Connection to Nature</th>
<th>Willingness to Act</th>
<th>Attitude towards Outdoor Play</th>
<th>Environmental Awareness</th>
<th>Nature Experiences</th>
<th>Household’s Pro-environmental Behaviour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Willingness to Act</td>
<td>.68**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude towards Outdoor Play</td>
<td></td>
<td>.43**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Awareness</td>
<td></td>
<td></td>
<td>.29**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature Experiences</td>
<td></td>
<td></td>
<td></td>
<td>.34**</td>
<td></td>
</tr>
<tr>
<td>Household’s Pro-environmental Behaviour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.37**</td>
</tr>
</tbody>
</table>

Notes:

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2 tailed)
4.3.6 Regression – Predictors of Connection to Nature

Connection to nature was entered as the dependent (outcome) variable and attitude towards outdoor play, environmental awareness, nature experiences, and the socio-demographic were entered as independent (predictor) variables. Attitude towards outdoor play, nature experiences, and environmental awareness were entered into the regression model first. The additional explanatory power of the socio-demographic variables were included in the regression model in the second step. β coefficients and $R^2$ values were examined to determine which independent variable best predicted CTN.

All variables except for age predicted CTN (Table 4.3). The variation of the first three variables (i.e. attitude towards outdoor play, nature experiences, and environmental awareness) accounted for 32% ($R^2 = .32$) of the variance in CTN. When home’s proximity to nature, gender, and age (i.e. socio-demographic factors) were entered in step two, an additional 5% ($R^2 = .37$) of the variance in CTN was explained. When all other variables were controlled for, attitude towards outdoor play ($β = .32, t = 7.80, p < .01$) was the strongest predictor of CTN which is unsupportive of the hypothesis that nature experiences will be the strongest predictor of CTN. Home’s proximity to nature ($β = .11, t = 2.71, p < .01$) and gender (i.e. being female) ($β = .20, t = 4.84, p < .01$) were weaker predictors of CTN, while age did not significantly predict CTN in the multivariate model. These results are presented in Table 4.3 below.
### Table 4.3 Regression Results for Research Question 2

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Constant</th>
<th>Attitude Towards Outdoor Play</th>
<th>Nature Experiences</th>
<th>Environmental Awareness</th>
<th>( \beta )</th>
<th>( t )</th>
<th>( R^2 )</th>
<th>( \Delta R^2 )</th>
<th>( \Delta F )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27.12**</td>
<td>.38</td>
<td>.27</td>
<td>.21</td>
<td>.32</td>
<td>9.18**</td>
<td>.32</td>
<td>66.76</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Attitude towards Outdoor Play</td>
<td>Nature Experiences</td>
<td>Environmental Awareness</td>
<td>.32</td>
<td>7.80**</td>
<td>.36</td>
<td>40.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>.22</td>
<td>.22</td>
<td>.22</td>
<td>.22</td>
<td>5.49**</td>
<td>.36</td>
<td>40.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Home to Nature</td>
<td>Gender</td>
<td>Age</td>
<td>.11</td>
<td>2.71**</td>
<td>.36</td>
<td>40.75</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>.11</td>
<td>.20</td>
<td>-.07</td>
<td>-1.87</td>
<td></td>
<td>.36</td>
<td>40.75</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2 tailed)

### 4.4 Research Question 3

Which variable best predicts children’s willingness to act for the environment: connection to nature, attitude towards outdoor play, nature experiences, environmental awareness, or significant socio-demographic factors?

**Hypothesis 3:** Connection to nature will best predict willingness to act for the environment.

Multiple linear regressions, with 95% confidence intervals for respective \( R^2 \) values, were used to determine the slope and strength of the statistical associations between the
dependent variable (i.e. willingness to act for the environment) and the independent variables (i.e. CTN, attitude towards outdoor play, nature experiences, environmental awareness, and socio-demographic factors). Connection to nature was entered into the regression model first, followed by attitude towards outdoor play, nature experiences, and environmental awareness in step two. Lastly, in the third step, the additional explanatory power of socio-demographic variables was included in the regression model. \( \beta \) coefficients and \( R^2 \) values were examined to determine which independent variable best predicted the dependant variable.

The variation in CTN accounted for 46% \( (R^2 = .46) \) of the variance in willingness to act for the environment. When attitude towards outdoor play, nature experiences, and environmental awareness were included in the model, an additional 1% \( (R^2 = .47) \) of the variance in willingness to act was explained. In the last step, when the socio-demographic variables (i.e. home’s proximity to nature, gender, and age) were included the model, an additional 1% \( (R^2 = .48) \) of the variance in willingness to act for the environment was accounted for (Table 4.4).

Connection to nature, gender, and age significantly predicted willingness to act for the environment. Connection to nature was a positive predictor \( (\beta = .59, t = 13.24, p < .01) \) of willingness to act for the environment when all other variables were controlled for; supporting the hypothesis that CTN will be the strongest predictor of willingness to act for the environment. Being female \( (\beta = .08, t = 2.21, p < .05) \) and age \( (\beta = -.09, t = 2.36, p < .05) \) were less reliable predictors of willingness to act for the environment. The association between age and willingness to act for the environmental was negative, implying that younger children have a slightly higher willingness to act than do older children. Conversely, the association between being female and willingness to act for the environment was positive, implying that girls are slightly more willing to act for the environment than boys are.
### Table 4.4 Regression Results for Research Question 3

Willingness to Act for the Environment (n = 450)

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable</th>
<th>β</th>
<th>t</th>
<th>( R^2 )</th>
<th>Δ ( R^2 )</th>
<th>ΔF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1.</td>
<td>Constant</td>
<td>-.29</td>
<td>.46</td>
<td>.46</td>
<td>359.15</td>
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</tr>
<tr>
<td></td>
<td>Connection to Nature</td>
<td>.68</td>
<td>18.95**</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Step 2.</td>
<td>Constant</td>
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<td>.47</td>
<td>.46</td>
<td>92.15</td>
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</tr>
<tr>
<td></td>
<td>Connection to Nature</td>
<td>.62</td>
<td>14.29**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attitude towards Outdoor Play</td>
<td>.08</td>
<td>2.11*</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Nature Experiences</td>
<td>.03</td>
<td>.73</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Environmental Awareness</td>
<td>.05</td>
<td>1.22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 3.</td>
<td>Constant</td>
<td>1.08</td>
<td>.48</td>
<td>.47</td>
<td>54.73</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connection to Nature</td>
<td>.59</td>
<td>13.24**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Attitude towards Outdoor Play</td>
<td>.07</td>
<td>1.80</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Nature Experiences</td>
<td>.02</td>
<td>.51</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Environmental Awareness</td>
<td>.06</td>
<td>1.48</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Home to Nature</td>
<td>.01</td>
<td>.35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>.08</td>
<td>2.21*</td>
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</tr>
<tr>
<td></td>
<td>Age</td>
<td>-.09</td>
<td>-2.36*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

** Correlation is significant at the 0.01 level (2-tailed)
Correlation is significant at the 0.05 level (2-tailed)

### 4.5 Research Question 4

Which variable best predicts children’s household pro-environmental behaviour: connection to nature, attitude towards outdoor play, nature experiences, environmental
awareness, willingness to act for the environment, or significant socio-demographic factors?

**Hypothesis 4: Willingness to act will best predict household pro-environmental behaviour.**

Multiple linear regressions, with 95% confidence intervals for respective $R^2$ values, were used to determine the slope and strength of the statistical associations between the dependent variable (i.e. household’s pro-environmental behaviour) and the independent variables (i.e. CTN, attitude towards outdoor play, nature experiences, environmental awareness, willingness to act, and socio-demographic factors). Connection to nature was entered into the regression model first, followed in step two by attitude towards outdoor play, nature experiences, environmental awareness, and willingness to act for the environment. Lastly, in the third step, the additional explanatory power of socio-demographic variables were included in the regression model. $\beta$ coefficients and $R^2$ values were examined to determine which model best predicted the dependent variable.

The variation in CTN accounted for 15% ($R^2 = .15$) of the variance in children’s household pro-environmental behaviour. When attitude towards outdoor play, nature experiences, environmental awareness, and willingness to act were included in the model, an additional 15% ($R^2 = .30$) of the variance in children’s household pro-environmental behaviour was explained. In the last step, when the socio-demographic variables (i.e. home’s proximity to nature, gender, and age) were included the model, the variance ($R^2 = .30$) did not increase. The socio-demographic variables, therefore, did not account for any additional variance in the model (Table 4.5).

Willingness to act for the environment and nature experiences significantly and positively predicted household’s pro-environmental behaviour. Nature experiences was the stronger predictor of the two variables ($\beta = .37$, $t = 8.17$, $p < .01$) which is unsupportive of the hypothesis that CTN will be the strongest predictor of household pro-environmental behaviour. For instance, when all independent (predictor) variables were held fixed, CTN ($\beta = .11$, $t = 1.75$, $p = .08$) did not significantly predict household’s pro-environmental behaviour. Such findings imply that children who experience nature (e.g. swim in the local stream/river) and are willing to act for the
environment (e.g. are excited to plant trees) are likely to have families who engage in pro-environmental behaviour (e.g. use non-toxic cleaning product).

Table 4.5 Regression Results for Research Question 4

<table>
<thead>
<tr>
<th>Household Pro-environmental Behaviour (n = 436)</th>
<th>β</th>
<th>t</th>
<th>( R^2 )</th>
<th>( \Delta R^2 )</th>
<th>( \Delta F )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1. Constant</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection to Nature</td>
<td>.39</td>
<td>8.55**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Step 2. Constant</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connection to Nature</td>
<td>.11</td>
<td>1.86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude towards Outdoor Play</td>
<td>-.00</td>
<td>-.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature Experiences</td>
<td>.37</td>
<td>8.35**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Environmental Awareness</td>
<td>-.01</td>
<td>-.26</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Willingness to Act for the Environment</td>
<td>.21</td>
<td>3.62**</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Step 3. Constant</td>
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<td></td>
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<td></td>
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<tr>
<td>Constant</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Connection to Nature</td>
<td>.11</td>
<td>1.75</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Attitude towards Outdoor Play</td>
<td>-.01</td>
<td>-.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature Experiences</td>
<td>.37</td>
<td>8.17**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Environmental Awareness</td>
<td>-.01</td>
<td>-.14</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Willingness to Act for the Environment</td>
<td>.20</td>
<td>3.44**</td>
<td></td>
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</tr>
<tr>
<td>Home to Nature</td>
<td>-.00</td>
<td>-.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>.04</td>
<td>.77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.03</td>
<td>-.64</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2 tailed)
4.6 Summary

This chapter reported the results of the SPSS analysis pertaining to the four research questions and the seven hypotheses of the study. The research findings were the result of correlation analysis and multiple linear regressions which examined the relationships between dependent and independent variables. To summarize, all the variables correlated with CTN; the strongest correlation being between CTN and willingness to act for the environment. The strongest predictor of CTN was attitude towards outdoor play. The strongest predictor of willingness to act was CTN and the strongest predictor of household pro-environmental behaviour was nature experiences. With insight from the literature on CTN and pro-environmental behaviour the following chapter discusses the researcher’s interpretations of the results and illustrates limitations to the research, recommendations for future research, and suggestions for Aotearoa New Zealand policy makers and environmental educators.
Chapter V: Discussion

“Alive and you get freedom...I feel calm, happy and free. It’s more fun outside than inside cuz inside you just do nothing, all you do is look at stuff, and it’s like boring...”

- 11-year-old boy, Karitane School, Dunedin

5.1 Introduction

Chapter Four outlined the key findings from the survey. These are now discussed with insight from the literature on CTN and pro-environmental behaviour. This discussion contributes to determining the ways in which children’s emotional CTN relates to their attitude towards outdoor play, experiences in nature, environmental awareness, willingness to act for the environment, household’s environmental behaviour, together with their gender, age, and home’s proximity to nature. This chapter posits that human environmental behaviour is occasioned by underlying motives as discussed in the literature. Explanations as to what predicts CTN, willingness to act for the environment, and household pro-environmental behaviour forms the first half of this chapter. The second half of the chapter highlights limitations to the research, recommendations for future research, and concludes with suggestions for Aotearoa New Zealand policy makers and environmental educators. The chapter contributes to the emerging line of inquiry into children’s CTN and children’s willingness to engage in environmental stewardship.

5.2 Connection to Nature in Aotearoa New Zealand

The main goal of this thesis was to explore the factors (i.e. attitude towards outdoor play, nature experiences, environmental knowledge, and socio-demographic factors) which are related to children’s CTN, the underlying dimensions of CTN, and how CTN relates to children’s household environmental behaviour and children’s willingness to act for environmental causes.
The results of this study provide new empirical evidence that children in Aotearoa New Zealand are emotionally connected to nature and that the bond between children and nature is strong. Comparing those results with earlier research which also used Cheng and Monroe’s index (2010) to measure children’s CTN, it can be seen children in Aotearoa New Zealand have similar levels of CTN to children in the UK (Bragg et al., 2013), Canada (Gilbertson, 2012), and the US (Ernst & Theimer, 2011).

High CTN scores within this study sample are perhaps not surprising considering that Aotearoa New Zealand’s total land mass is 30 percent conservation land (McIntyre, Jenkins, & Booth, 2001). According to some, access to the natural environment in Aotearoa New Zealand is progressive by international standards, especially in areas close to city margins (Higgins & Freeman, 2013; McIntyre et al., 2001; Yale University, 2015). Given this ready access, children are able to develop relationships with the natural world, assuming there are no other major barriers.

In addition to access to green space, Aotearoa New Zealand’s education system may also have some influence on children’s CTN. Although environmental education is not mandatory in the national curriculum, Eames, et al. (2008) state, “activity outside the classroom is an important aspect of schooling in New Zealand and most students get outdoor experiences such as forest walks, water activities and overnight camps as part of their school education” (p.41). This implies that children may be encouraged, and/or have opportunities, to access the natural environment to an extent that influences their emotional connections to that environment. Furthermore, it should be noted that the role of teachers can also be important in shaping student’s CTN (Chawla, 1988, 1999).

Interpreting the underlying dimensions of CTN provides further insight into children’s CTN scores. Inconsistently with what Cheng and Monroe (2010) and Bragg, et al. (2013) found, this study finds that there are three underlying dimensions to CTN rather than four; suggesting that children in Aotearoa New Zealand perceive their CTN to be 1) enjoyment of nature, 2) empathy for nature, 3) a sense of oneness with the natural world. It is presumed that the changes to the CTN constructs are the result of differences within the study sample or perhaps the result of the changed wording of the items.
Despite these possible explanations for high CTN scores, emotional connections with nature can be influenced by a multitude of variables not examined in this study. For instance, family values (Chawla, 1988, 1999), sense of self-efficacy (Cheng & Monroe, 2010), and social and cultural determinants (Cheng & Monroe, 2010; Louv, 2005) such as family income (Kellert, 1985; Liefländer et al., 2013). This thesis recognizes that CTN is complex and does not claim to have found a cause. Instead it looks to the analysis results in an attempt to understand children’s CTN in Aotearoa New Zealand.

5.3 Unearthing Connected to Nature

5.3.1 Who is most connected to nature?

The socio-demographic factors examined in this study were found to be related to CTN, lending additional support to previous findings. Being female and the proximity of the home to nature were positively related to CTN, while age was negatively related to CTN. Hence, the first hypotheses were supported. These findings will be presented with insight from past literature with the aim of answering the question, ‘Who is most connected to nature’?

Girls or Boys?

The positive correlation between being female and CTN has been observed in similar studies. Being female has correlated with ecocentrism (i.e. NEP) and environmentalism (Zelezny et al., 2000), and implicit CTN (Bruni & Schultz, 2010; Schultz & Tabanico, 2007). As was mentioned in Chapter Two, of the three studies that operationalized the CTN index, only one examined gender and found it to be an insignificant predictor of CTN, i.e. the variables did not correlate (Bragg, et al., 2013). This study is therefore unique in this regard. Nevertheless it should be noted that, as in the Bragg, et al. (2013) study, approximately 50 percent of participants were female and approximately 50 percent were male. Thus genders were equally represented in both studies.

Despite a lack of research from Aotearoa New Zealand with which to compare the finding that females score higher on CTN than males, it is interesting that a Christchurch study observed that parents gave boys considerably more freedom to independently access their ‘local environments’ than girls were; implying that boys may
spend more time outdoors alone in their neighbourhood than girls do (Tranter & Pawson, 2001). Local environments are not necessarily natural environments, however. For instance, children’s exposure to nature may be minimal when “taking the bus to school alone” in an urban setting (Tranter & Pawson, 2001, p. 33) and for this reason Tranter and Pawson’s (2001) observations provide limited insight into the impact that gender may have on children’s time outdoors in Aotearoa New Zealand.

Another explanation for the difference in male and female scores may be that girls are more comfortable expressing and discussing their emotions (e.g. sadness, peacefulness, etc.) than boys are; this is implied in past literature (Chawla, 1988; Kollmuss & Agyeman, 2002). A mixed methods approach with additional data from interviews might have contributed to a deeper look into how girls and boys felt about nature.

More specifically, females scored statistically higher than males on the construct enjoyment of nature. This is an interesting finding, considering that three of the five items in the construct were about contact with animals such as ‘native eels’, ‘bugs’, and ‘lizards’, which according to Zhang, et al. (2014) would imply that girls have a higher sense of biophilia than males, and is inconsistent with their Chinese study. Although girls have been shown to fear certain animals more than boys do (Kellert, 1985; Zhang et al., 2014), they have also shown higher levels of humanistic (i.e. strong affection for individual animals like pets), moralistic (i.e. concern for the right and wrong treatment of animals), and naturalistic (i.e. interest and affection for wildlife and the outdoors) attitudes towards animals than have boys. That could imply higher levels of loving affection towards animals (Kellert, 1985). Such findings may help explain why females scored significantly higher on the empathy items in this study.

**Younger or Older?**

Age was also examined with CTN and the relationship was found to be negative, meaning that younger exhibited significantly higher connections to nature than older children. This finding is supported by past studies. For instance, younger children had a higher inclusion of nature in self (Liefländer et al., 2013) and level of pastoralism (Bunting & Cousins, 1985) than older children. These concepts have somewhat comparable meanings to Cheng and Monroe’s (2010) CTN. Inclusion of nature in self represents an individual’s cognitive CTN and a strong CTN implies that one’s sense of self and nature overlap, creating a sense of oneness with the natural world. Furthermore,
pastoralism represents one’s positive responsiveness to natural environments, outdoors, and open spaces. Conversely, the study by Bragg, et al. (2013), who used the CTN index, is the work most comparable to this study, and found age to be unrelated to children’s CTN.

More specifically, the construct empathy for nature exhibited the largest difference in responses. This implies that younger children hold a higher sense of empathy for natural life than older children do, a view proposed by influential authors such as Kellert (1985) and Kahn (1997). Bunting and Cousins (1985) refer to the lowered empathy of children as “growing away” from nature as the result of sociocultural influences or increases in cognitive and intellectual skills pertaining to the environment. This notion implies that as children grow up they grow out of affective attitudes and into more cognitive and rational attitudes towards the natural world. It should be noted that in this study, the significant difference between how students in school year 5 and year 8 (ages 9-12) scored on CTN was not found to be significant for any other age, meaning the association was not linear (Figure 4.2).

Those who live close to nature?

Influenced by Cheng and Monroe (2010) who asked their participants about the environment near their home to decipher if children’s homes’ proximity to nature correlated with their CTN, this study also examined the proximity of children’s home to nature. Parallel with Cheng and Monroe’s (2010) findings, this study also observed that children who live in close proximity to nature are more connected to nature than those who do not. The relationship between home’s proximity to nature and CTN was positive and significant. This finding is consistent with a study which found that children’s biophilia related to their school’s degree of urbanization (Zhang et al., 2014) and also with a study which observed children’s home proximity to nature was associated with their level of pastoralism (Bunting & Cousins, 1985).

The link between exposure to nature and CTN is that individuals tend to develop affective attitudes towards people, places, and things that they are most comfortable and familiar with. The more time one spends in nature the more familiar one will be with it (Wilson, 1996, 1997). Moreover, exposure to nature positively impacts children’s well-being (Wells, 2000; Wells & Evans, 2003), so living close to nature may indirectly
influence CTN through creating a sense of peacefulness, calm, or relaxation in children, in turn increasing their willingness to return to those natural places that initially invoked these positive feelings (Cheng & Monroe, 2010; Louv, 2005; Orr, 1993). Another interpretation of the findings, as implied by Cheng and Monroe (2010), is that families who choose to live near natural places may be emotionally drawn to nature themselves, in turn influencing children’s affective attitudes towards nature.

5.3.2 Explaining Connection to Nature

Attitude towards Outdoor Play

As expected, children’s attitude towards playing outdoors was positively related to their CTN and also significantly predicted their CTN when all other variables were controlled for. Attitude towards outdoor play exhibited the strongest influence on CTN of all variables. This finding suggests that children’s CTN is influenced by their positive attitudes towards playing outside rather than inside. The more children want to play outside the more likely they are to feel an emotional attachment to nature.

Research with which to compare these findings is lacking. Previous CTN studies, most importantly Cheng and Monroe’s (2010) study, do not investigate the relationship between attitudes to outdoor play and CTN, presumably because if children play outside it is assumed that it is because they want to. However, certain outdoor activities such as camping, hiking, and fishing (Bunting & Cousins, 1985; Cheng, 2008; Wells & Lekies, 2006), which are commonly investigated in CTN research, are the result of family preferences, as children cannot go camping of their own accord. This finding therefore strengthens other arguments that nature experiences predict CTN by suggesting that children engage in outdoor activity because they themselves want to and not because their family makes them (Cheng & Monroe, 2010; Kahn, 1997; Orr, 1993).

There are many reasons for including the outdoor play items in the study. The main reason is that one’s time spent outdoors significantly relates to one’s emotional CTN (Cheng & Monroe, 2010; Mayer & Frantz, 2004). Furthermore, attitude towards a behaviour predicts intentions to perform the behaviour itself (Ajzen, 1985, 1991). This theory implies that if children want to play outside, they are likely to do so in the absence of barriers; ultimately helping to strengthen the child-nature bond. Furthermore,
in an environmental education evaluation study, Stern and colleagues (2010) observed that children’s positive attitude towards outdoor play increased after involvement in an outdoor environmental education programme, suggesting that the more children play outdoors, the more positive their attitudes are about playing outside.

**Nature Experiences**

Consistent with Cheng and Monroe’s (2010) findings, children’s experiences in nature significantly positively related to their CTN and also significantly predicted their CTN when all other variables were controlled for. Similar results have been observed in regard to children’s time spent in nature and their sense of biophilia (Zhang et al., 2014) and pastoralism (Bunting & Cousins, 1985), their ecological worldviews (Evans et al., 2007), and primitive beliefs about their relationship with the natural environment (i.e. New Ecological Paradigm scale) (Collado et al., 2013). This study’s outcome is congruent with the literature which suggests that children who spend time in nature develop emotional ties to it. According to Chawla (1988, 1999), such ties can last into adulthood.

Nature experiences were measured similarly to Cheng and Monroe (2010) in that participants were asked if they engaged in six outdoor activities. The difference between the items was that Cheng and Monroe asked how often the participants went swimming, played in the woods, etc. as opposed to this study which asked if the participants ever went swimming, played and explored, etc. (Cheng, 2008; Cheng & Monroe, 2010). Consequently, Cheng and Monroe’s items were Likert scaled (never – always), while this study’s items were phrased as ‘agree’ or ‘disagree’, thus creating a summative scale. Multiple-choice formatting was chosen in order to save space on the questionnaire, but was not an ideal method for comparison.

**Environmental Awareness**

Environmental awareness was positively and significantly related to CTN. Furthermore, environmental awareness significantly predicted CTN when all other variables were controlled for. It should be noted however that environmental awareness and CTN had the smallest r value in the correlation matrix. Nonetheless, the finding implies that the more children know about the environment the more likely it is they will feel connected to it.
The positive correlation between CTN and environmental knowledge found in this study is consistent with Cheng and Monroe’s (2010) study, however, there were two differences between the instruments used in the two studies. Cheng and Monroe’s environmental knowledge test contained 18 items, while this study contained seven (Cheng, 2008). In addition, this study asked questions specific to Aotearoa New Zealand water quality, i.e. Sustainable Coastline’s programme objective, while Cheng and Monroe asked quite diverse questions more common to a general environmental education programme (e.g. questions about photosynthesis, food chains, geography, the water cycle, etc.) (Cheng, 2008; Cheng & Monroe, 2010). Other studies have found similar relationships (Meinhold & Malkus, 2005; Nisbet et al., 2008). Most notably, Lieflander, et al. (2013) observed that children with a higher level of academic achievement seemed to exhibit a higher inclusion of nature in self.

Lieflander, et al. (2013) have two thoughts as to why higher academic achievement accompanied a higher CTN. Firstly, children with high academic achievement tend to have higher cognitive abilities and consequently tend to be more open minded. This broader perspective on the world may explain higher concern for others’ and nature’s values, inherently increasing one’s CTN. Secondly, children from highly educated families may watch less television and be more physically active, contributing to their CTN. It should be noted however that the Lieflander, et al. (2013) study was conducted in Germany, where, according to the authors, family income predicts the intermediate school that the child attends. Children from high-income families normally attend university-track schools, whilst children from low-income families will normally attend less competitive schools. Conversely, the students in this study attended public schools in Aotearoa New Zealand, where tuition is free. Furthermore, the schools in this study were classified as being eight different socio-economic decile rankings (Table 3.3) out of ten total, implying a variety of socio-economic backgrounds, thus Lieflander, et al.’s (2013) second explanation does not appear to be entirely relevant to the Aotearoa New Zealand context.

Willingness to Act for the Environment

Of all the variables examined in this study, children’s willingness to act for the environment and CTN had the strongest positive significant relationship (Table 4.2).
Willingness to act was not included in the study’s first regression model because the literature suggests that willingness to act pro-environmentally predicts CTN and not the other way around. This finding therefore implies that children’s level of CTN will simultaneously increase or decrease with children’s level of willingness to act for the environment, or vice versa.

This result is not surprising, considering that Cheng and Monroe (2010) determined that children’s interest in environmentally friendly practices was correlated with their CTN. Collado, et al. (2013) established that children’s affective attitudes towards nature correlated with their willingness to carry out daily conservation actions and willingness to show environmental care and a study with adults confirmed a similar hypothesis (Kals et al., 1999). More insight into children’s willingness to act for the environment is provided later in section 5.4.

*Household's Pro-environmental Behaviour*

Children’s household environmental behaviour and CTN had a positive significant relationship similar to Cheng and Monroe’s (2010) study, which measured family environmental values. Household’s pro-environmental behaviour was not included in the study’s first regression model as the literature suggests that environmental behaviour predicts CTN and not the other way around. Therefore, this finding implies that children’s level of CTN simultaneously increases or decreases with children’s household environmental behaviour, or vice versa.

The positive correlation between CTN and household pro-environmental behaviour was expected, based on findings from Cheng and Monroe (2010) who determined that children’s family values and children’s interest in acting pro-environmentally relate to their CTN. The comparison between findings is justifiable considering that this study’s construct of household pro-environmental behaviour combines both themes: perceived behaviour of the family and the behaviour of the child. Most other research that has examined similar variables has not questioned children’s actual behaviours because children are too young to make many environmental decisions on their own. Instead, researchers have examined children’s family values and behaviours (Cheng & Monroe, 2010) or children’s willingness and intent to behave pro-environmentally (Collado et al., 2013; Zhang et al., 2014).
5.4 Explaining Willingness to Act for the Environment

When all relevant variables (i.e. CTN, attitude towards outdoor play, environmental awareness, nature experiences, household’s pro-environmental behaviour, home’s distance to nature, gender, and age) were controlled for, children’s willingness to act for the environment was predicted by their CTN, gender, and age. When entered into the regression model alone, CTN accounted for 46 percent of the variance in willingness to act for the environment. After all other variables were entered in steps two and three the variables collectively accounted for 48 percent of the variance in willingness to act for the environment. It is proposed that CTN is a strong predictor of children’s willingness to act for the environment, thus supporting hypothesis 3.

This finding suggests that children who are connected to nature, and more specifically, children who enjoy being in nature and feel a sense of oneness with nature, as well as a sense of empathy for it, are more likely to express a willingness to engage in behaviours such as ‘picking up rubbish’ or ‘volunteering to help keep the water clean’. This finding is supported by international authors who observed similar relationships. Cheng and Monroe (2010), for instance, found that CTN increased American children’s interest in engaging in environmentally friendly practices such as “picking up trash”, “collecting broken fishing line”, and “biking instead of riding in the car” (Cheng, 2008, p. 104). Spanish children’s emotional affinity towards nature predicted their willingness to “turn off water while they wash their hands” and other environmental citizenship behaviour (Collado et al., 2013, p. 39) A Chinese study found that children’s emotional affinity towards nature explained 20 percent of the variance in their willingness to conserve animals (Zhang et al., 2014).

In addition to CTN, gender and age also predicted willingness to act. Being female and willingness to act had a positive relationship while age and willingness to act for the environment had a negative relationship. The findings related to gender and age imply girls are more willing to act for the environment than are boys and younger children are more willing to act similarly than are older children. It must be noted that age and gender (in addition to home’s proximity to nature which was not a significant predictor) accounted for an increase of only 1 percent in variance for willingness to act. Therefore
gender and age appear to be moderate to weak predictors of willingness to act for the environment.

Past studies have found conflicting results in terms of gender and willingness to act. Although Collado, et al. (2013) did not directly investigate this relationship one can see from their results section that gender did not have any relationship to children’s willingness to engage in conservation actions or their willingness to engage in environmental citizenship behaviours. The results to this study are more congruent with the findings of Zhang, et al. (2014), who observed that gender was a relatively minor yet significant factor in predicting children’s behaviour intentions. They found that females were more willing to “donate money to protect animals” and “protect earthworms” despite having lower biophilia than males (p.112). Conversely, this study found that females were slightly more willing to act for the environment than males, in line with their higher CTN scores. It should be noted that Zhang, et al. (2014) measured biophilia/biophobia very differently to how CTN was measured in this study. They asked the participants if they liked or disliked certain animals which were dead and mounted in transparent plastic cases. As the authors state, this method may have had “depressed emotional attachments” that girls are more sensitive to, contributing to their biophobia (Zhang et al., 2014, p. 115).

The relationship between age and willingness to act for the environment was not commonly examined in the literature reviewed for this thesis. Presumably two of the referenced CTN studies, which also examined willingness, could not examine age because their age groups were too narrow to find comparisons between, for instance ages 8 to 9 years (Cheng & Monroe, 2010) and ages 9 to 10 years (Zhang et al., 2014). Furthermore, Collado, et al. (2013) did not specify an age group, reporting instead the mean age of the study sample was 10.88 years. For this reason the discussion moves to research into children’s behaviour which implies that children’s comprehension and evaluation of their role in environmental action develops by age 11, suggesting that younger children are more anthropogenic and less aware of negative human impacts on the environment than older children are (Kahn, 1997; Kahn & Kellert, 2002).

The results to this study observed that younger children were moderately more willing to act for the environment than were older children; age range being 8-12 years old. Thus, this study suggests that younger children are more optimistic about the
differences they can make environmentally, since according to Kahn and Kellert (2002), they may be less aware of the damage that has already been done.

5.5 Explaining Household’s Pro-environmental Behaviour

When all relevant variables (i.e. CTN, attitude towards outdoor play, environmental awareness, nature experiences, household’s pro-environmental behaviour, willingness to act, home’s distance to nature, gender, and age) were controlled for, a child’s household pro-environmental behaviour was predicted by their experiences in nature and their willingness to act for the environment. When entered into the model alone, CTN accounted for 15 percent of the variance in household pro-environmental behaviour. However, CTN did not statistically predict that behaviour when all other relevant variables were controlled for. Collectively, CTN, attitude towards outdoor play, nature experiences, environmental awareness, and willingness to act accounted for 15 percent of the variance in household pro-environmental behaviour. Socio-demographic factors did not account for any variance when added to the model in step three. Therefore, willingness to act and natural experiences together moderately to weakly predicted household pro-environmental behaviour.

Of the two predictive variables, nature experiences was the strongest (unsupportive of the hypothesis that willingness to act would be the strongest predictor of household pro-environmental behaviour), suggesting that children who participate in outdoor activities (e.g. ‘swim’ or ‘play and explore’) are more likely to engage in environmentally friendly behaviours such as ‘pick up rubbish’ than are others. These children are also more likely to have families who engage in pro-environmental behaviour such as ‘eating organic’. Cheng and Monroe (2010) found similar results; but instead of measuring household environmental behaviour they measured interest in environmentally friendly practices and perceived family values towards nature. Similar studies observed that experiences in nature predicted children’s willingness to carry out daily conservation actions and environmentally friendly behaviours (Collado et al., 2013), and their willingness to conserve animals (Zhang et al., 2014). Despite these encouraging findings, the studies above did not examine children’s household environmental behaviour, so this study is unique in that regard.
An explanation for this finding may be that both constructs (nature experiences and household behaviour) ask about family behaviours as well as the child’s behaviours. Nature experience items asked participants if they ever ‘fish’ or ‘swim’ at the local stream/river, or ‘help to grow food in the garden’ and, presumably, these activities take place with adult supervision from a parent or family member. Hence, families who engage in outdoor activities might have a higher propensity to act pro-environmentally.

In addition to nature experiences, willingness to act for the environment also predicted household pro-environmental behaviour, suggesting that children who are willing to act for the environment are more likely to engage in pro-environmental behaviours or to have families who engage in pro-environmental behaviours. This finding complements a collection of behaviour research which illustrates that one’s intent to behave is a strong predictor of acting on the behaviour itself (Hinds & Sparks, 2008; Montada & Kals, 2007; Sparks & Shepherd, 1992; Stern, 2000; Stern & Dietz, 1994). Such studies focus their research on the widely used theory of planned behaviour, which states that an individual’s positive or negative attitudes towards the behaviour, subjective norms (i.e. perception of social pressures), and perceived behaviour control predict their intention to behave in a certain way (Ajzen, 1985). Furthermore, Kaiser, et al. (1999) defined willingness to act as a behaviour intention and reported that behaviour intention predicts the performance of the target behaviour.

The answers to this study’s research questions are encouraging for environmental educators, as they demonstrate the impact that household values and attitudes may have on children, as reported in past literature (Chawla, 1988, 1999; Chawla & Cushing, 2007). According to Kahn and Kellert (2002), and Kahn (1997), children’s attitudes towards wildlife tend to be well formed by age 14. Many authors therefore suggest the importance of early opportunities to spend time in nature before the age of 11 for having the greatest potential in fostering emotional bonds with the natural world (Chawla, 1988; Sobel, 1996; Wells & Lekies, 2006). If children regularly experience nature with positive environmental role models at a young age it will have longer lasting consequences on their environmental behaviour as an adult (Chawla, 1999).

5.6 Limitations to the Study
The questionnaire recruitment process was considered successful. Of the 17 schools with children of appropriate age that participated in the Love Your Water Programme, and that were consequently invited to take part in the study, only two were unable to complete the required paper work and questionnaires (Appendix A & B). The teacher’s reason for this inability was “lack of time”. Three other teachers expressed concern about completing the ethics paper work in time but nonetheless finished it. These experiences led the researcher to believe that the ethics paper work may have acted as a limitation for teachers. Fortunately, no parent or legal guardian expressed concern regarding the research and, furthermore, children have shown enthusiasm for taking the CTN survey in the past (Bragg et al., 2013). Therefore, the amount of paperwork was the issue, rather than the research itself. The ethics paper work was unavoidable, although if the researcher had more time to conduct this study then the teachers would have had more time to complete the required paper work – possibly resulting in a larger study sample, while also reducing teacher’s anxiety about completing the ethics paperwork. Nonetheless, 501 valid completed questionnaires resulted from the recruitment process, which is considered good for statistical analysis (Field, 2000).

The questionnaire itself was subject to several limitations. Firstly, The Love Your Water programme aims to convey these specific messages;

“We all need water to survive. Aotearoa New Zealand waterways need our help. What goes down the drain can enter the waterways, including rubbish on the street, oil and gasoline from cars, chemicals used at home, and pesticides applied on food. We can make a difference by preventing these things from going down the drain by driving less and reducing the use of chemicals. We can also help the waterways by planting trees, especially along streams, rivers, and estuaries.”

Given that the topics of the measurement items had to be aligned with these core messages; the individual behaviours that could be investigated in the study were limited. This limitation might also have affected responses, as some of the behaviours in question were not very common. For instance, an environmental behaviour survey item asked participants if they ‘pick up their dogs poo and put it in the bin’, although many children do not own dogs.
Further, pro-environmental behaviours related to freshwater management are often beyond children’s control, e.g. ‘buying organic food’ and ‘using non-toxic cleaning products’. For this reason the pro-environmental behaviour construct included parental behaviours as well as those of children, creating the construct household pro-environmental behaviour. It would have been interesting to ask questions about strictly child-appropriate environmental behaviours, such as, ‘Do you turn off the lights when you leave the room?’ This, however, was not possible. These criteria limited the activities in the nature experience construct as well. For instance, it would have been ideal to ask the participants if they camped, hiked, or played in the woods, similarly to Cheng and Monroe (2010), but these were not considered to be related to water quality and thus were not included.

Ideally, the questionnaire would have included fewer factors with more items. In this case, each construct could have been five-point Likert scaled. Presumably, it would have benefited the construct of attitude towards outdoor play to have more items, as the reliability of the scale was only marginally acceptable ($\alpha = .62$) (Field, 2000; Vaske, 2008). Nonetheless, this study contained six reliable constructs in addition to socio-demographic factors.

In terms of the CTN instrument, the reliability (0.86) of the index fell into the preferred range as determined by other studies (i.e. Cheng and Monroe = 0.87, Bragg et.al. = 0.82, and Ernst & Theimer = 0.84). This was encouraging, considering that seven items were changed from the original instrument to more accurately represent New Zealand ecology and Sustainable Coastlines’ objectives. This finding implies that the CTN measure was valid and age appropriate for children in Aotearoa New Zealand to read and understand and is a good indicator of CTN that might be used in other studies as well.

A possible limitation to the study design might have been that children were not randomly assigned to the Sustainable Coastlines programme as schools were given the choice to participate in the Love Your Water programme and hence the study. To that extent, self-selection bias might have occurred. Presumably, teachers who have positive attitudes towards nature have a stronger preference to participate in the Love Your Water programme than other schools have. This potential limitation appears
unavoidable, as schools will always be given a choice to participate in a programme such as Love Your Water.

5.7 Recommendations for Future Research

Human behaviour is complex and a strictly quantitative study approach may not be able to take into account individuality and the personal experiences of the individual (Silverman, 2000). For instance, on three occasions during the tree planting events children expressed that being outside made them feel “free”, yet this emotion was not included in Cheng and Monroe’s (2010) index. Hence, a recommendation for future research would be to conduct a qualitative enquiry into children’s environmental attitudes and CTN; filling potential research gaps. In addition, although the questionnaire began with the statement “this is not a test” (Appendix A), a questionnaire can still feel like an assessment since participants are asked to complete them without the help of their classmates. For this reason interviews might have provided a more diverse look into children’s environmental attitudes.

Another suggestion would be to conduct a longitudinal study to evaluate whether Sustainable Coastlines’ tree planting event influences children’s CTN over a period of time. Longitudinal research might provide deeper insight into what extent environmental attitudes or a student’s inclination to engage in outdoor nature activities change with age. A longitudinal study might also identify whether children’s willingness to engage in outdoor activities is more strongly associated with internal or external factors: for instance, how much do seasonal changes impact children’s time spent in nature?

There are additional variables that, if examined in Aotearoa New Zealand, might strengthen this study’s analysis. For instance, children’s involvement in environmental education programmes (Collado et al., 2013), their environmental role models (Chawla, 1988, 1999), socio-cultural determinants such as family income (Liefländer et al., 2013; Louv, 2005), and their sense of self-efficacy (Cheng & Monroe, 2010) have been observed to influence children’s bond with the natural world. Furthermore, addressing how children’s sense of personal wellbeing and physical wellbeing relates to their CTN, and time spent in nature, would add another dimension to understanding the bond
between child and nature while also being greatly beneficial to children’s psychology research in Aotearoa New Zealand.

5.8 Suggestions for Policy and Environmental Educators

This study provides Aotearoa New Zealand policy makers and environmental educators with local and relevant empirical evidence that emotional CTN is related to willingness to engage in environmental stewardship, strengthening the arguments made by influential past scholars (Leopold, 1949; Orr, 1993; Roszak, 1992; Wilson, 1984).

Those that guide and make policy are probably aware that children in Aotearoa New Zealand are living more car-dependent lives (Freeman & Quigg, 2009; Tranter & Pawson, 2001), engaging in less unsupervised outdoor play (Witten et al., 2013), and watching more television (Bell & Farmer, 2013) than past generations have. What is less understood are the indirect impacts these lifestyle choices may have on the environment. Having fewer children spending time outdoors may produce future generations who do not ‘feel like they are part of the natural world’, ‘enjoy looking at birds, bugs, and lizards’, or ‘feel happy’ when outdoors. Such a scenario may result in individual’s who do not ‘want to volunteer to help keep the water clean’ or are ‘excited about planting trees’. This might be problematic, considering that over half the recreational freshwater beaches in Aotearoa New Zealand are classified as fair to very poor in water quality and require attention (MfE, 2013 -a).

Policy makers may want to introduce projects that strengthen the child-nature bond. Based on this research potential projects could include: 1) Creation of new policies aimed at dismantling barriers which inhibit children from regularly accessing natural places (e.g. improve bike paths to neighbourhood parks). 2) Encouraging neighbourhoods to spend more time at their local stream by providing trees, shrubs, and tools for restoration work. 3) Make information readily available to the neighbourhood about their local stream’s water quality to decrease unnecessary concern. 4) Create incentives for families to garden together at home. 5) Support environmental education programmes that connect children with nature in any way possible. For instance, local councils can donate their time and skills (e.g. accounting, computer programming, or business management training) to environmental educators and community groups in
lieu of funding, or in addition to funding. Such skills can often go farther for the programme than funding alone.

Moreover, there are many aspects of this field still unexplored. Approximately 47 percent of children in this study reported that they would rather play inside than outside, but the reason is unknown. Is this attitude dependant on the weather, lack of outdoor play space, or are children fearful of playing outside? Are children’s attitudes towards outdoor play affected by the attitudes of children in their neighbourhood? How does time spent in front of a digital screen correlate with CTN? For the child-nature bond to endure, such barriers need to be identified and understood before they can be reduced.

This study is also beneficial for environmental education. Despite its best intentions, environmental education often teaches about the environment more so than it educates in the environment (Eames et al., 2008). This study provides evidence that emotional connections to nature, influenced by proximity to nature, experiences in nature, and environmental awareness, are related to willingness to care for the environment, and consequently, to environmental behaviour. This study increases understanding of the importance of time spent in nature for young children if strengthening pro-environmental attitudes is the core objective.

More specifically, it may also be advantageous for environmental educators to know that time spent in nature should be frequent and positive (Chawla, 1999; Wells & Lekies, 2006). The Love Your Water programme takes place once a year and each school that commits to the programme is given the opportunity to participate in the tree-planting event for that area. Based on past research, Sustainable Coastlines may want to develop a curriculum aimed to encourage the class to monitor the trees that they planted monthly. During this visit students could measure the tree’s growth, pull out encroaching weeds, identify and record other plant species and animals, or even have their maths class or art class take place in the outdoor area.

In the hope of cultivating deeper and more robust connections to nature in their students, educators might want to develop a system of recording their programme outcomes in terms of CTN. It may be just as beneficial to measure children’s connections to nature at the end of an environmental programme as it is to measure student’s increased knowledge. To do so, educators could document the circumstances in which children’s emotional connections to nature thrive most. What kind of places
and experiences foster love and empathy for nature in their students? Can student’s CTN be restored once strong barriers are dismantled, and at what ages? Do students feel a sense of place at their local stream, beach, or forest, and if so, is their personal identity tied to it? How does cultural identity, specifically Maori culture, tie into this sense of place? Based on this enquiry, educators may want to consider ‘place-based education’ as a means of strengthening the child-nature bond, so that student’s local community (e.g. their biotic community) acts as the primary resource for learning (Penetito, 2009).

Furthermore, it is advised that educational institutions consider how they themselves model pro-environmental behaviours, especially in front of boys, age 11 and older, who may be less connected to nature. Educators should consider everything from what type of cleaning products they use and the waste they produce in the classroom to the lesson plans they create. These decisions should be centred on ecological consciousness since children’s environmental attitudes and behaviours shaped by their experiences and positive role modelling at home, in school, and in the media greatly influence their worldviews and environmental values (Chawla, 1999; Chawla & Cushing, 2007). If children develop affective attitudes towards nature at a young age, and then continue to engage with positive environmental role models, they are more likely to consider a sustainable lifestyle into adulthood (Chawla, 1999; Chawla & Cushing, 2007).

5.9 Summary

This chapter discussed the study’s findings with insight from the literature on CTN and pro-environmental behaviour. The regression model reported that six independent variables accounted for 37 percent of the variance in CTN, indicating that there are other variables not included in this study which predict children’s CTN. Such findings contribute to the belief that human environmental behaviour is complex. Findings from the research questions are encouraging for policy makers and environmental educators, as they demonstrate that time spent in nature is related to CTN, which is itself related to a willingness to act for the environment. However, there is a need for continuing the exploration of children’s CTN. More comprehensive investigation of these relationships could include qualitative data, a longitudinal study design, measurement of additional variables, and possibly an Aotearoa New Zealand specific CTN measurement tool. These findings have implications for application, theory, and future research. The following chapter will conclude the study with closing thoughts.
Chapter VI: Conclusion

“Amazing and fresh!”
- 9-year-old girl, Cotswold School, Christchurch

Emotion is personal and evokes passion that “is lifted from the earth itself by the muddy hands of the young; it travels along grass-stained sleeves to the heart” (Louv, 2005, p. 159). This quote conjures an image of child and nature as one, yet children and nature are increasingly growing apart, both physically and emotionally (Louv, 2005). The root of this thesis is that such a disconnect between child and nature may have negative consequences on the environment yet research also implies that it has negative implications for children’s wellbeing as well (Louv, 2005). For these reasons, the topic of children’s CTN is important, especially for children, policy makers, and educators in Aotearoa New Zealand, as explorations of CTN appear to be lacking.

The motivation behind this exploration stems from the positive attention that government departments such as the Department of Conservation have placed on CTN without there being local evidence to support their argument. This research also contributes to local environmental organizations who aim to “inspire, educate and enable people to look after the places we all love”, making the assumption that people love the flora, fauna, or places that the organization aims to protect (Coastlines, n.d.). This research provides empirical evidence that time spent in nature and positive attitudes towards outdoor play might help strengthen a child’s affective attitudes towards nature, potentially more than environmental knowledge alone.

Ensuring that the upcoming generations are versed, devoted, and passionate about the natural world may be an essential element in indirectly alleviating environmental degradation, such as poor water quality. To investigate these relationships this research set out to answer four primary questions:
1) How do children in Aotearoa New Zealand score on connection to nature and what are the underlying dimensions of their connection to nature? What is the relationship between socio-demographics and connection to nature?

2) Are children’s attitude towards outdoor play, experiences in nature, environmental awareness, and household’s pro-environmental attitudes related to their connection to nature? Which of the four factors, including significant socio-demographic factors, best predicts connection to nature?

3) Does a child’s connection to nature, attitude towards outdoor play, nature experiences, environmental awareness, and significant socio-demographic factors predict their willingness to act for the environment?

4) Does a child’s connection to nature, attitude towards outdoor play, nature experiences, environmental awareness, willingness to act for the environment, and significant socio-demographic factors predict their household’s pro-environmental behaviour?

To conclude, the results of the quantitative statistical analysis were congruent with most other CTN research in that CTN does indeed predict a willingness to act for the environment. Subsequently, this study suggests that improving connectedness to nature should be a high priority in all environmental education programmes and environmental government sectors where the goal is to promote pro-environmental behaviour. These organizations should first and foremost encourage frequent exposure to the natural world on a national scale, in addition to increasing student’s knowledge about their local environment. Such organizations may also want to consider utilizing Cheng and Monroe’s (2010) CTN index tool to help evaluate their interventions. Despite the index proving to be a reliable instrument an Aotearoa New Zealand specific scale would be ideal.
References


Sociocultural, and Evolutionary Investigations (pp. 117-151). Cambridge, Massachusetts: MIT Press.


Leopold, A. (1949). A New Sand County Almanac. USA: Oxford University Press.


Appendices

Appendix A: Study Questionnaire

This survey is to help Sustainable Coastlines improve its charity work and will be used for research. This is not a test and you will not be marked for your answers so please answer all the questions honestly and as best you can.

I am happy to participate in this research as shown by completing this survey.

School name: 

Year group: _______________ I am a: BOY  GIRL  (Circle one answer)

<table>
<thead>
<tr>
<th>How much do you agree or disagree with each sentence below?</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Trees breathe in what we humans breathe out.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2 Trees and plants near rivers can stop too many nutrients (plant food) from getting in the water.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3 Trees make river banks stronger, stopping dirt from going into the water.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4 Most of New Zealand’s rivers are safe to swim in or collect food from after it has rained a lot.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5 Animals like cows, dogs and ducks do not make river water dirty.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6 I can help clean up water by planting trees beside rivers and streams</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7 Cleaning products and chemicals used at home could end up in our rivers.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8 I want to pick up rubbish that is not mine.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9 I want to volunteer to help keep water clean.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10 I want to bike, scooter or walk places instead of having someone drive me</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11 I want to talk to my family and friends about how to help keep water clean.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>How much do you agree or disagree with each sentence below? (Circle one number for each line)</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither agree nor disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>12</td>
<td>I know what to do with rubbish when I find it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>I know that I can play outside instead of inside.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>I know how to talk to my family and friends about how to keep water clean.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td>I live close enough to a stream or river that I can bike, scooter or walk there.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16</td>
<td>I live close enough to a park or forest that I can bike, scooter or walk there.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17</td>
<td>My family encourages me to bike, scooter or walk to natural places where I play.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18</td>
<td>My family spends time together in nature.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19</td>
<td>I am excited about planting trees.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20</td>
<td>My family and friends will be excited to hear that I planted trees.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21</td>
<td>Collecting rocks and shells is fun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22</td>
<td>Being in the natural environment makes me feel peaceful.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23</td>
<td>I like to garden and plant trees.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24</td>
<td>I enjoy looking at birds, bugs, lizards and plants.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25</td>
<td>Being outdoors makes me happy.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>26</td>
<td>When I feel sad, I like to go outside and enjoy nature.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27</td>
<td>I like to hear different sounds in nature.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>28</td>
<td>I would rather watch TV or play video/computer games than be outside.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
### How much do you agree or disagree with each sentence below? (Circle one number for each line)

<table>
<thead>
<tr>
<th>Sentence</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither agree nor disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would rather play outside than inside.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I like seeing native eels, fish and birds living in a clean environment.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I feel sad when I see trees being cut down.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>It is important to me that our animals and plants don’t go extinct.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I enjoy touching animals and plants.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I feel like I am part of the natural world just like a tree in a forest.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>People cannot live without plants and animals.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>My actions will make the natural world different.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Picking rubbish off the ground can help the environment.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Clean water is everybody’s responsibility, including mine.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

39. What do you do at home to help keep water clean? (Tick all the things you do)

- Eat organic (or spray free) food
- Use cleaning products that are not toxic
- Help to grow food in the garden
- Other ________________________________
- Talk to my family about keeping water clean
- Nothing

40. What do you do at your local stream or park to help keep water clean (Tick all the things you do)

- Pick up rubbish
- Bike, scooter or walk to the places I love
- Pick up my dog’s poo and put it in the bin
- Plant trees or shrubs
- Remove plants that are weeds
- Nothing
- Other ________________________________
41. What do you like to do at your local stream or river? *(Tick all the things you do)*

- Play and explore
- Swim
- Fish and/or collect food from the water *(mahinga kai)*
- Other
- Plant trees or shrubs
- Remove plants that are weeds
- Nothing

**Appendix**

<table>
<thead>
<tr>
<th>Q</th>
<th>How often do you... <em>(Circle one number for each line)</em></th>
<th>Almost Everyday</th>
<th>2-3 Times a Week</th>
<th>0-1 Times a Week</th>
<th>Hardly Ever</th>
<th>I Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>Talk to family and friends about keeping water in our streams and rivers clean?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>43</td>
<td>Talk to family and friends about the cleaning products in your house?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>44</td>
<td>Talk to family and friends about how and where your food was grown?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>45</td>
<td>Walk, bike or scooter to places instead of going in the car?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>46</td>
<td>Plant trees or shrubs?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>47</td>
<td>Visit trees or shrubs that you have planted?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>48</td>
<td>Eat food from a garden or a shop that is organic <em>(spray free)</em>?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>49</td>
<td>Play outside even when the weather is bad?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>50</td>
<td>Fish and/or collect food from the water <em>(mahinga kai)</em>?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>51</td>
<td>Swim at the local stream, river or in the ocean?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>52</td>
<td>Help in the garden <em>(If you don’t have a garden, don’t circle anything)</em>?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Appendix B: Participant Information and Consent Form

1. Student Information Sheet

Participant (Child’s) Information Sheet for a Study on Children’s Connection to Nature and Pro-Environmental Behaviour

Hello!

I would like to tell you about my University study that’s about children like you and their feelings and relationship around nature. I am curious to hear your opinion because programmes like Sustainable Coastlines would like to know if children like you enjoy outdoor activities like planting trees and if not then why.

I am asking New Zealand children (age 8-12) to be a part of this research. Surveys, (about 10-15 minutes), and interviews (about 5 minutes) will form this study. You will be asked to do a survey during class time and then, if your class is planting trees with Sustainable Coastlines, I may ask you a few questions about your experience. It is completely your choice to be a part of this research. All you have to do is tell me or your teacher on the day of the Sustainable Coastline’s programme that you don’t want to be a part of it and we won’t ask you any questions and you can still plant trees!

Your survey and interview answers will be kept private, even from your teachers! I won’t even ask your name. For these reasons it will not be possible to connect you with this study.

This study may be published and may be presented at conferences or by Sustainable Coastlines on their website.

If you would like to ask me any questions at all then please have your parents call me or email me anytime. Also, there is more detailed information about this study on Sustainable Coastlines’ Research page; www.sustainablecoastlines.org/education.research. If you do not have access to the Internet or your parents would prefer a paper copy of the ‘Parent’s Information Sheet’ then please ask your teacher for a paper copy or contact me directly and I will happily send you one in the mail.

Kia Ora and thank you so much for reading this. I look forward to seeing you soon at school.

Sara Stuart-Currier - Victoria University of Wellington
Phone: 027 342 7963
Email: stuart.sara@vuw.ac.nz
2. Student Consent Form

Hello,

Can you please read this and let me know if you agree or disagree with what it has to say. Thank you!

Sara - Victoria University of Wellington student researcher

I have been given information about this study and understand what it is about.

I have been able to ask questions about this study to my parents, or to my teacher or to Sara.

I understand that by answering the questions below that I agree to be interviewed by Sara. I understand that this interview will be used for research on children’s feelings about nature.

I also understand that Sara is not asking me for my name, so this study can never be directly connected to me. I understand that this interview is about 5 minutes long, will be tape-recorded, and then erased in approximately one and a half years.

I understand that by answering the questions below that I am agreeing to participate in Sara’s interview. I understand that I do not have to participate in this interview if I do not want to.

- I am a: BOY    GIRL    (please circle one answer)

- School Name ________________________________

- Year Group
3. Parent Information Sheet

Parent or legal guardian of a child participant Information Sheet for a Study on Children’s Connection to Nature and Pro-Environmental Behaviour

Researcher: Sava Stuart-Currier, School of Geography, Environment and Earth Sciences, Victoria University of Wellington

About this project
I am a Masters student in Environmental Studies at Victoria University of Wellington. As part of this degree I am undertaking a research project leading to a thesis. The project I am undertaking is examining how New Zealand children perceive connection to nature and how this correlates with pro-environmental behaviour. I am also looking at how environmental education programmes, such as Sustainable Coastlines, can foster a connection to nature within their programme. In summary, this study aims to understand if Kiwi children enjoy nature and if there is room for improvement. This research project has received approval from the Victoria University Human Ethics Committee.

What is involved?
I am inviting children participants, ages 8-12 who are involved in Sustainable Coastlines’ ‘Love Your Water’ environmental education programme, to take part in this research. Surveys, designed to take approximately 10 minutes to complete, and randomly conducted interviews of approximately 5 minutes will form the basis of my research project.

- As part of a class exercise your child’s teacher will administer the surveys in the classroom and your child’s teacher will collect the surveys upon completion. Your child will be asked if they would like to participate in a survey. Examples of the survey questions are:
  1. Being outdoors makes me happy (Agree–Disagree)
  2. Even when the weather is bad I like to play outside (Agree–Disagree)

- I will conduct the interviews during the tree planting event and 1-2 students in the class will be asked to participate. Students will first be asked if they would like to participate and if they agree then they will be asked to check “I agree to participate in this interview” on their own Consent Form. The interview will be voice recorded. Examples of the interview questions are:
  1. Do you want to show your family and friends the trees that you’re planting?
  2. How do you feel about planting trees?
Appendix

4. Parent Consent Form

**Parent or legal guardian of a child participant Consent Form** for a Study on Children’s Connection to Nature and Pro-Environmental Behaviour

Researcher: **Sara Stuart-Currier**, School of Geography, Environment and Earth Sciences, Victoria University of Wellington

My child and I have been given and have understood the explanation of this research project. We have had an opportunity to ask questions and have them answered to our satisfaction via the contact information provided on the Information Sheet. I understand that by signing this consent form I am giving my child permission to participate in this research under the condition that on the day of the programme they too agree with participating in the research.

My child and I understand that any information they provide will be kept confidential to the researcher, the supervisor, and Sustainable Coastlines’ programme managers. We understand the published results will not use their name, and that no results of the study will be attributed to them in any way that will identify them. I understand that the primary material such as the original survey will be kept safe, locked in a filing drawer and the tape recording of interview will be wiped within one year following the submission of the project.

☐ Please tick this box if you do NOT want your child to be interviewed; **approximately 5 minutes long.**

☐ Your child’s teacher will be provided with a copy of the class results of the research when it is completed, however, please tick this box if you would like to receive a personal summary of the class results.

If you have indicated that you would like to be sent this document, please provide your contact details below. If you do not have an email address or would prefer a posted copy please input your postal address instead.

Email Address: __________________________

I fully understand the information presented on this document. I agree to my child’s participation in this research consisting of a survey and possible interview on the condition that on the day of the programme they too give their consent to participating in this research.

**Signature of parent or legal guardian:** ______________________  **Date:** ______________________
Dear Sir / Madam,

My name is Sara Stuart-Currier and I am an Environmental Studies Masters student from Victoria University of Wellington. As part of my Master’s degree I am undertaking a research project examining children’s connection to nature. I will be trying to identify ways in which environmental education programmes can foster stronger connections to nature in children.

Results from the Sustainable Coastlines’ class survey as well as one or two interviews (conducted by me) during the tree planting event will be the foundation of this study. Any information that the students provide will be kept confidential. Student’s names will never be obtained and therefore no results of the study can be attributed to the student in any way that will identify them.

In accordance with Victoria University Human Ethics Committee I request confirmation from you, the Principal or acting Director, that the school is willing to participate in this study.

More information about this study is included in Sustainable Coastlines’ packet of class surveys as well as on Sustainable Coastlines’ website (www.sustainablecoastlines.org/education/research).

With kind regards, Sara Stuart-Currier

PLEASE SIGN HERE
As Principal of this school I consent for Miss Sara Stuart-Currier to conduct her research with the willing participants of the students of this school.

School Name________________________________________ Date________________

Principal Name_____________________________________

Principal Signature__________________________________
Dear Sir / Madam,

My name is Sara Stuart-Currier and I am an Environmental Studies Masters student from Victoria University of Wellington. As part of my Master’s degree I am undertaking a research project examining children’s connection to nature. I will be trying to identify ways in which environmental education programmes can foster stronger connections to nature in children.

Results from the Sustainable Coastlines’ class survey as well as one or two interviews (conducted by me) during the tree planting event will be the foundation of this study. Any information that the students provide will be kept confidential. Student’s names will never be obtained and therefore no results of the study can be attributed to the student in any way that will identify them.

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More information about this study is included in Sustainable Coastlines’ packet of class surveys as well as on Sustainable Coastlines’ website (www.sustainablecoastlines.org/education/research).

With kind regards, Sara Stuart-Currier

PLEASE SIGN HERE
As Principal of this school I consent for Miss Sara Stuart-Currier to conduct her research with the willing participants of the students of this school.

School Name_________________________ Date__________________

Principal Name________________________

Principal Signature________________________
Appendix C: Human Ethics Approval

MEMORANDUM

TO
Sara Stuart-Cuirer

COPY TO
Wolje Abrahamse

FROM
APof Susan Corbett, Convener, Human Ethics Committee

DATE
9 June 2015

PAGES
1

SUBJECT
Ethics Approval: 21945
Children's Connection to Nature and Pro-environmental Behaviour: New Zealand Environmental Education

Thank you for your application for ethical approval, which has now been considered by the Standing Committee of the Human Ethics Committee.

Your application has been approved from the above date and this approval continues until 18 March 2016. If your data collection is not completed by this date you should apply to the Human Ethics Committee for an extension to this approval.

Best wishes with the research.

Kind regards

Susan Corbett
Convener, Victoria University Human Ethics Committee