Empathy and Environmental Concern: Examining the Mediating Role of Nature Relatedness

by

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Bachelor of Arts (Honours) in Psychology, University of Regina, 2008

A Thesis Submitted in Partial Fulfillment
of the Requirements for the Degree of

MASTER OF SCIENCE

in the Department of Psychology

Supervisory Committee

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Abstract

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This study explored the relation between dispositional empathy and environmental concern by examining the mediating role of nature relatedness. Undergraduate students (n = 125) from the University of Victoria completed a series of questionnaires measuring dispositional empathy, three types of environmental concern, nature relatedness, proenvironmental behaviour and social desirability. Bootstrapping procedures were used to evaluate the meditational model. Perspective taking (a cognitive facet of empathy) appears to relate to biospheric environmental concern indirectly through nature relatedness. Empathic concern (an affective facet of empathy) predicted altruistic environmental concern, but this effect was not mediated by nature relatedness. Proenvironmental behaviour was only related to biospheric concern. These results suggest that the relation between empathy and environmental concern is multifaceted and that proenvironmental behaviour is not consistently an outcome. Possible explanations for this pattern of results are explored. Implications for theory and practice are discussed, and suggestions are made to guide future research.

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Acknowledgments

I would first like to acknowledge my parents, Ross and Debbie McIntyre, for their unwavering support over the course of my entire education. Thank you for being my biggest fans.

Next I would like to thank my committee members - my supervisor Dr. Robert Gifford for his guidance and wisdom while completing my research, and Dr. Andrea Piccinin for her helpful feedback and questions.

I would like to thank my wonderful and supportive lab-mates and fellow students, from whom I have learnt so much over the course of my degree. Particular thanks to Leila Scannell, Lisa Reddoch and Christine Kormos for their feedback on various drafts of my work.

Also I must thank my friends for their encouragement and patience during this journey. Their emotional support has been invaluable. I would also like to acknowledge my four-legged friends who inspire me and make me smile.

Last, I would like to acknowledge the Social Sciences and Humanities Research Council and University of Victoria for providing me with funding over the course of my degree.

Dedication

To those who work towards conserving the environment for all creatures great and small.

Chapter 1: Introduction

Currently, the world faces a serious environmental crisis. Issues such as climate change, deforestation, water and air pollution are just a few of the many problems that are causing irreversible damages to our environment (Oskamp, 2000). Many of these problems are the result of human action or inaction and, as such, understanding the role played by human behaviour is an important part of mitigating future environmental damage (see Swim et al., 2011). Environmental concern, one aspect of environmental attitudes, is an important precursor to behaviour change (Stern & Dietz, 1994), thus, a greater understanding of individuals' environmental concern is essential. If psychologists can better understand the mechanisms through which environmental concern develops, and its relation to behaviour, then they may be better able to promote concern, and increase individuals' levels of proenvironmental behaviour.

Over the past few decades, a large body of literature on environmental attitudes and concern has accumulated, and links have been made between environmental concern and various constructs, including socio-demographic variables (e.g., age, gender, and race), individual variables (e.g., personal values, political orientation, and religious orientation), and situational variables (e.g., physical context and place of residence) (e.g., Berenguer, Corraliza, & Martin, 2005; Corraliza & Berenguer, 2000; Dietz, Stern & Guagnano, 1998; Fransson & Gärling, 1999; Samdhal & Robertson, 1989; Stern, Dietz & Kalof, 1993; Van Liere & Dunlap, 1980). Research has also begun to examine the role of affect in predicting environmental concern and behaviour. For example, research has examined the role of "emotional affinity" toward nature (Kals, Schumacher, & Montada, 1999), sympathy towards others (Allen & Ferrand, 1999), and empathy for natural beings and objects (Berenguer, 2007; Schultz, 2000; Sevillano, Aragonés & Schultz, 2007). Continuing this line of research, this study examines the role of dispositional

empathy in the development of different types of environmental concern and behaviour. Relatively little research has directly explored the link between these variables; however, some evidence suggests that there may be a connection between individuals' ability to respond to the emotional plight of another (human or otherwise) and their concern for the environment. However, the mechanism through which empathy influences environmental concern has yet to be examined. Therefore, this thesis will also explore whether empathy is related to an individuals' personal sense of connection with nature, which may then be linked to concern.

Environmental Concern

Given that environmental attitudes and concern have been discussed in a variety of ways within the field (see Dunlap & Jones, 2002), an examination of how environmental concern will be defined is necessary. One paradigm for understanding environmental concern is based on the work of Stern and Dietz (1994) who propose that concern – the affective component of attitudes – reflects an individual's underlying value system. According to the values-belief-norm (VBN) theory, the value one places on oneself, on others, and on the biosphere, provides the basis for individuals' environmental concern (Stern, 2000; Stern, Dietz, Abel, Guagnano, & Kalof, 1999; Stern, Dietz, & Kalof, 1993). Thus, the degree to which individuals value each of these objects results in differing levels of *egoistic concern*, *altruistic concern*, and *biospheric concern*, respectively.

To elaborate, egoistic concerns reflect the idea that the environment is valuable insofar as it benefits the individual (Schultz & Zelezny, 1999). For example, an individual may be concerned about air pollution given that poor air quality may be linked to adverse health effects, from which they themselves would suffer. Egoistic concern has been found to correlate positively with self-enhancement (i.e., the desire to advance personal interest) and negatively

correlated with self-transcendence (i.e., a desire to transcend the needs of the self and contribute to the well-being of others; Schultz & Zelezny, 1999). Altruistic concerns are those that are focused on environmental consequences that affect humankind, now and in the future. For example, an individual may be concerned about future generations' access to fresh water, and thus may be troubled by present day water pollution. Not surprisingly, altruistic concern has been found to be negatively correlated with self-enhancement and positively correlated with self-transcendence (Schultz & Zelezny, 1999). Biospheric concerns reflect the notion that nature holds intrinsic value, and that all living beings within the biosphere are valuable in their own right. For example, an individual may be concerned about the amount of plastic garbage in the ocean because it is killing the marine wildlife that ingests it. Biospheric concerns have been found to correlated positively with self-transcendence and correlate negatively with self enhancement (Schultz & Zelezny, 1999).

Research supports the existence of a tripartite model of environmental concern: a three factor model (with egoistic, altruistic and biospheric concern emerging) has been shown to fit the data better than unidimensional and two-factor models (Schultz, 2000), and this structure has been replicated in various samples (e.g., Schultz, 2001; Schultz, Gouveia, Cameron, Tankhur, Schmuck & Franek, 2005; Schultz, Shriver, Tabanico & Khazian, 2004; Snelgar, 2006). Differentiating among the egoistic, altruistic and biospheric concern is important because they each have a unique relation with proenvironmental action. For instance, biospheric concern is positively correlated with proenvironmental behaviour (Milfont, Duckitt, & Cameron, 2006; Schultz, 2001; Schultz, Shriver, Tabanico, & Khazian, 2004). However, the relation between egoistic concern and proenvironmental behaviour is not clear because some research reports a negative relation, whereas other research has found no relation (Milfont, Duckitt, & Cameron,

2006; Schultz, 2001; Schultz et al., 2004). The same is true for altruistic concern; some studies reporting no relationship between altruistic concern and behaviour, and others indicate that it positively predicts proenvironmental behaviour (Milfont, Duckitt, & Cameron, 2006; Schultz, 2001; Schultz et al., 2004).

Empathy

Empathy may be an important predictor in explaining the development of different types of environmental concern. According to Davis's (1996) model, empathy can be broadly defined as "a set of constructs having to do with the responses of one individual to the experience of another" (Davis, 1996, p. 12). Other approaches have defined empathy in more specific terms that highlight various affective and cognitive components (cf. Batson, Ahman & Lishner, 2009; Hoffman, 1984; Stotland, 1969), but many of these definitions are restrictive in that they only consider small portions of this conceptually broad construct. Debates as to whether the nature of empathy is primarily affective or cognitive exist (e.g., Allport, 1961; Barrett-Lennard, 1962), but contemporary theory and research suggests that empathy can be treated as a multidimensional construct which includes both affective and cognitive aspects, consisting of interrelated but distinct processes and outcomes (Davis, 1983; 1996; Duan & Hill, 1996). The affective component of empathy, or *affective reactivity*, refers to an individual's ability to respond to the emotional state of another person in a parallel and/or reactive manner. A parallel emotional response refers to one that may be considered identical to the original emotion (e.g., if an individual were to feel sorrow when he or she sees another individual who is crying). A reactive emotional response, however, is a response that is not necessarily identical to the original emotion, but is still congruent (e.g., if an individual were to express sympathy or concern when he or she sees another individual who is crying). The cognitive component of empathy, or

cognitive role taking, refers to an individual's ability to mentally assume the perspective of another individual. For example, an individual may come across a person who is upset in a particular situation and try to imagine the person's mental state from his or her point of view, suppressing their own outlook on the situation.

Under this more inclusive framework, Davis (1980) has proposed four dimensions of empathy: *empathic concern*, *personal distress*, *fantasy*, and *perspective-taking*. The first three represent affective dimensions of empathy. *Empathic concern* reflects individuals' responses of concern, warmth, and sympathy towards unfortunate others. *Personal distress* reflects feelings of "self-oriented" personal anxiety and discomfort which are the result of perceiving another individual in distress. The *fantasy* component of empathy reflects individuals' propensity to take on the feelings and thoughts of fictional characters in fictional situations. Although Davis introduced the fantasy component of empathy as an affective dimension, others have included it as a cognitive component of empathy (Beven, O'Brien-Malone & Hall, 2004; Birnie, Speca & Carlson, 2010). The fourth dimension of empathy, *perspective-taking*, reflects a cognitive component of empathy, specifically, an individual's ability to spontaneously adopt another individual's point of view. These dimensions do not exhaust all possible empathic reactions that may occur, but they nevertheless serve to outline some responses that can be considered to comprise an empathic response.

Despite Davis's inclusion of these four dimensions in his conceptualization of empathy, there has been debate among researchers as to whether they all truly reflect empathy. The fantasy component of empathy may not be exclusively reflective of the construct, and its subscale has shown poor concurrent validity with other measures of empathy (Baron-Cohen & Wheelwright, 2004; Lawrence, Shaw, Baker, Baron-Cohen, & David, 2004). The inclusion of personal distress

as a truly empathic response is also debated (Baron-Cohen & Wheelwright, 2004). It has even been depicted within the literature as non-empathic (Eisenger & Strayer, 1987; Lawrence, Shaw, Baker, Baron-Cohen, & David, 2004). For these reasons these two facets of empathy will not be used in this investigation. Instead, empathic concern and perspective taking which clearly reflect the affective and cognitive facets of empathy, respectively, will be considered the main components of empathy in this study.

Empathy has also been characterized as a personality trait or individual difference (e.g., Book, 1988; Buie, 1981) and as a situational phenomenon (e.g., Barrett-Lennard, 1962; Batson, Ahman & Lishner, 2009; Hoffman, 1984; Rogers, 1949). In general, some individuals may display more empathy than others, as a result of genetic or developmental influences (Duan & Hill, 1996). But in certain situations or under certain experimental conditions, empathic reactions can be elicited from individuals (Batson et al., 1991). In sum, all humans have the basic capacity to display empathy, but their tendency to do so varies. My research will focus on differences in the tendency to display empathy.

The measurement of dispositional empathy. Dispositional empathy has been measured in a variety of ways, the most common being through self-report measures, such as Davis's (1983, 1994) Interpersonal Reactivity Index (IRI). The IRI asks individuals a series of questions regarding how they tend to respond in various interpersonal situations. Multiple items tap into each of the four dimensions of empathy described earlier. Other self-report measures have been developed, but many of them only tap into either affective (e.g., Mehrabian & Epstein, 1972) or cognitive dimensions of empathy (e.g., Hogan, 1969), or fail to distinguish between the various dimensions (e.g., Bryant, 1982; Mehrabian, Epstein, 1972).

One weakness of self-report measures of empathy is that social desirability may influence participants' responses, given that empathy is seen as a desirable trait (Eisenberg, Fabes, Schaller, Miller et al., 1991), therefore it is useful to measure and control for social desirability when measuring empathy. Gender has also been thought to influence the self-report of empathy, therefore it is also useful to include this variable when examining empathy (Losoya & Eisenberg, 2001). Given the relative ease with which self-report measures are administered and interpreted, they are still widely accepted as a way to measure empathy (Losoya, & Eisenberg, 2001) and were used in the present study.

Empathy, environmental concern and proenvironmental behaviour. Research has primarily examined situational manipulations of empathy (e.g., Schultz, 2000; Berenguer, 2007) and their relation to environmental concern and proenvironmental behaviour. Schultz (2000) induced an empathic response in participants by asking them to take the perspective of either animals or humans in nature. Participants' responses in the empathy condition were compared those of participants who were asked to remain neutral and objective (low-empathy) while viewing the images. Participants reported higher levels of biospheric environmental concern when they took the perspective of animals being harmed (e.g., a bear eating garbage), but not when taking the perspective of animals existing peacefully in nature (e.g., a deer on a hill), or of humans engaging in recreational outdoor activities (e.g., a woman jogging in a forest). A subsequent study replicated this result, and illustrated not only that taking the perspective of a harmed animal can cause an increase in biospheric concern, but also resulted in lower levels of egoistic concern (Sevillano, Aragonés, & Schultz, 2007).

Situational empathy has also been linked to specific instances of proenvironmental behaviour. Participants manipulated to feel empathy are more likely than participants in a control

group to recommend the allocation of university student funds to a conservation group, than to other community service projects (Berenguer, 2007). Another study asked participants to view a slideshow about a human in the future who was being negatively affected by environmental change (Paul & Bauer, 2011). Participants who took the perspective of the individual in the scenario engaged in two environmental behaviours (i.e., looking at environmental brochures and collecting brochures) more frequently than did individuals who remained objective when viewing the scenario, or who watched without instruction.

Although research has primarily examined situational empathy, some evidence supports the link between dispositional empathy and environmental attitudes and behaviours. For example, positive correlations between the perspective-taking and empathic concern subscales with both altruistic and biospheric environmental concern have been reported (Schultz, 2001). This suggests that increases in individuals' ability to adopt the perspective others and to feel concern for the welfare of individuals in trouble is associated with higher levels of environmental concern for other human and non-human beings. In this study, empathy subscales were not correlated with egoistic environmental concern, suggesting that concern for the self may not be related to empathic tendencies. A later study reported a different pattern of results for empathy and environmental (Sevillano et al., 2007), however they suspected that this may have been due to differences in research procedures (e.g., the order in which the measures were presented) or due to cultural differences between samples. Thus, dispositional empathy appears to be related to environmental concern, but given the inconsistencies in past research the exact nature of this relation is not yet clear.

The existing research suggests that empathy towards the natural world may be an important predictor of both environmental concern and proenvironmental behaviour. This thesis

will aim to further explore this relationship among empathy and concern by examining the potential mediating variable of *nature relatedness*.

Nature Relatedness

Researchers in psychology have recently begun to examine the relationship between the self and the natural world (e.g., Clayton, 2003; Clayton & Opotow, 2003; Mayer & Frantz, 2004; Nisbet, Zelenski, & Murphy 2009; Schultz, 2001; Schultz, Shriver, Tabanico & Khazian, 2004). This notion has already been examined within environmental ethics. Philosophers have explored the idea of oneness between humans and nature and the importance of this overlap (e.g., Callicott, 1999; Leopold, 1949). Additionally, members of several non-western cultures often include other people and non-human natural beings in their self concept (e.g., Bragg, 1996).

Psychology has only just begun to explore this idea at the individual level. Throughout the literature, multiple conceptualizations of humans' connection to nature have emerged. Clayton (2003) suggests that individuals may experience "a sense of connection to some part of the non-human natural environment, based on history, emotional attachment, and/or similarity, that affects the ways in which we perceive and act toward the world" (pp. 45–46), which she terms *environmental identity*. Mayer and Frantz (2004) examined c*onnectedness to nature*, which reflects an individual's emotional connection to nature and the degree to which they feel they are a part of the natural world. Schultz and others (2001; 2004) examined the extent to which an individual includes nature within his or her cognitive representation of self. Dutcher et al., (2007) found evidence of *environmental connectivity*, which they describe as a perception of similarity between the self and others, including the natural world.

In recent research, Nisbet et al., (2009) have also discussed the construct. They highlight that nature relatedness is distinct from environmentalism in that it does not reflect activism, but

rather reflects a deeper connection to all aspects of nature, which goes beyond merely superficial appreciation of the beautiful or instrumental aspects of nature. They suggest that an individuals' connection to the environment can manifest in three ways: affectively, cognitively, and experientially. Nature relatedness reflects an individual's internal personal connection to nature; their perceptions regarding humans' interrelatedness with and impact on all livings things; as well as, a fascination, physical comfort with, and desire to be in nature. This conceptualization of relatedness is useful in that it touches on three facets of relatedness. It also aims to tap into nature relatedness on a dispositional level, suggesting that it is relatively stable over time and across situations (Nisbet et al., 2009).

Nature relatedness, environmental concern, and proenvironmental behaviour. The degree to which individuals feel a sense of connection to nature may be related to their environmental attitudes and behaviour. Some empirical evidence provides support for this connection. Schultz et al. (2004) suggest that the degree to which a person feels connected to nature is reflected in the type(s) of environmental concern they then display, with greater connection leading to more biospheric concern, and a lesser connection leading to egoistic concern. Also Schultz's Inclusion of Nature in Self scale (INS), which measures a person's cognitive representation of self in relation to nature, positively correlates with biospheric and altruistic concerns, as well as with self-reported environmental behaviour (Schultz, 2001). However, the INS is a single-item measure of nature-relatedness, and therefore not subject to tests of internal reliability. It also requires respondents to depict their relationship with nature by selecting the most representative set of overlapping circles, and thus they must be able to contemplate this relationship on an abstract level. Given the limitations of this measure, the literature would benefit from an examination of the relationship between nature relatedness and

environmental concern and behaviour, using a more reliable and comprehensive measure, such as Nisbet et al.'s (2009) Nature Relatedness measure.

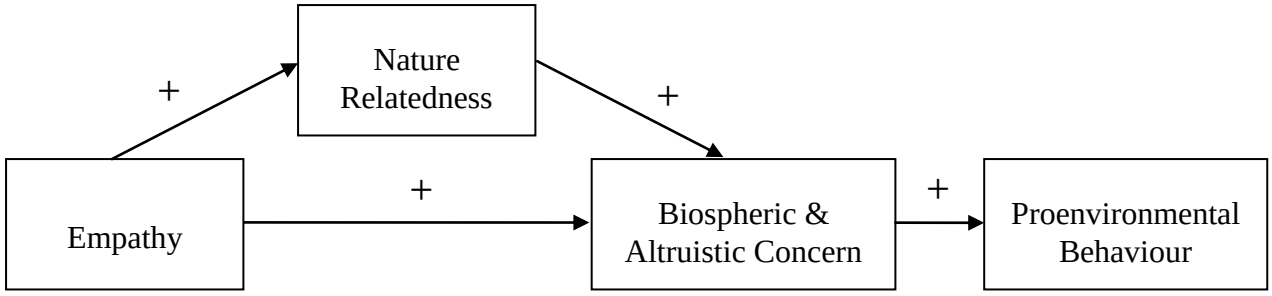
The mediating role of nature relatedness: A potential link between empathy and environmental concern. Research has suggested a link between dispositional empathy and environmental concern. The mechanism through which empathy influences concern may be nature relatedness, that is, how connected an individual feels they are to nature. Research from social psychology may be extended to lend support to this idea. Empathy has been shown to predict helping and other prosocial attitudes and behaviours, and some researchers have examined the role of "self-other" merging (analogous to a sense of connectedness) as one possible means of explaining this relationship (see Neuberg et al., 1997). "Empathy based merging" has also been demonstrated, wherein individuals who display empathy for a target are subsequently more likely to ascribe personal traits to that target, thereby increasing relatedness (Davis, Conklin, Smith, & Luce, 1996). If empathizing with another human can lead to a greater inclusion of that other in one's self-concept, then this idea may extend to members of future generations or the non-human world as well. Research has demonstrated that individuals are in fact able to empathize with fictional humans in the future, non-human animals, and even plants (Berenguer, 2007; Pahl & Bauer, 2011). Thus, individuals who are more empathic may possibly be more open to developing a heightened degree of relatedness with the natural world, and therefore display increased helping and caring which manifests as higher levels of environmental concern and proenvironmental behaviour. This thesis will aim to elucidate this relationship.

Present Study

The present study will endeavour to clarify the relationship between dispositional empathy and environmental concern, as well as consider nature relatedness as a potential

mediator between these two variables. I also plan to explore how concern is related to reported proenvironmental behaviour. Figure 1 demonstrates the expected direction of the relation among the key concepts I am interested in.

Figure 1. Expected Overall Relation among Variables of Interest



Furthermore, given that empathy is multidimensional in nature I will explore the relations among affective and cognitive components of empathy and the variables of interest, and seek to explain potential relations. Overall, I hypothesize that higher levels of both facets of empathy will predict increased levels of nature relatedness, which will lead to increased levels of biospheric and altruistic environmental concern. I expect that greater amounts of biospheric and potentially altruistic concern will lead to higher levels of reported proenvironmental behaviour.

Chapter 2: Method

Participants

One hundred and seventeen participants (92 females and 25 males) were recruited from the undergraduate participant pool at the University of Victoria. Because analyses on gender were to be included, nine more male participants were recruited from the participant pool so that there would be sufficient power. In total, 126 participants (92 females, 34 males) completed the study. The mean age of participants was 21 (*SD* = 3.05). Participants varied in education level (42.4% first year students, 21.6% second year, 18.3% third year, 16.9% fourth year or higher) and came from a variety of disciplines (57.6% psychology majors, 10.4% double majors with one degree in psychology, 6.5% natural sciences, 7.3% social sciences, 8.1% humanities, 5.6% business, and 14.5% other). The only restriction on participation was that participants must have a sufficient understanding of the English language. Participants were given compensation in the form of a bonus credit applied to a psychology course of their choice.

Measures

Empathy. The Interpersonal Reactivity Index (IRI) developed by Davis (1980) was used to measure dispositional empathy. It consists of four subscales reflecting the dimensions discussed earlier: empathic concern, personal distress, fantasy and perspective-taking. Each subscale consists of seven items, which are rated on a Likert scale ranging from 0 (*does not describe me well*) to 4 (*describes me very well*). The current investigation focused on the empathic concern and perspective taking subscales, however, all four subscales were measured.

This measure is ideal because it includes items that reflect both affective and cognitive dimensions of empathy, which allows for exploration of this construct in greater depth. This measure has been supported empirically (e.g., Davis, 1983; for a review see Davis, 1996). The

scale's validity has been assessed: Subscales of the IRI have been shown to correlate with one another, with related psychological measures, and with other measures of empathy (Davis, 1983).

Nature relatedness. The Nature Relatedness Scale (NR) developed by Nisbet, Zelenski, and Murphy (2009) was used to measure individuals' interconnectedness with nature. The measure includes 21 items, which, taken together, measure an individuals' overall sense of relatedness with nature, tapping into various affective, cognitive and experiential components. Items are rated on a 5-point Likert scale ranging from 1 (*agree strongly*) to 5 (*disagree strongly*). The NR scale was chosen because it is a reliable, valid and conceptually broad measure of relatedness.

Environmental concern. The Environmental Motives Scale (Schultz, 2000) was used as a measure of environmental concern. It consists of three subscales, each with four value items: (1) egoistic concern (myself, my health, my lifestyle, my future), (2) altruistic concern (children, my community, my children, future generations), and (3) biospheric concern (plants, animals, marine life, birds). Participants rated the above items from 1 (not important) to 7 (supreme importance) in response to the question "*I am concerned about environmental problems because of the consequences for* _____*."* This is a useful measure of concern because it distinguishes among different types of environmental concern, and therefore the measure helps to provide a clearer understanding of how different types of concern relate to each variable of interest.

Reported proenvironmental behaviour. To measure reported proenvironmental behaviour, a subset of items were used from the General Ecological Behaviour measure (GEB; Kaiser & Wilson, 2004). A range of difficult versus easy behaviours, and one-time versus

repeated proenvironmental behaviours, from a variety of domains (e.g., water and power conservation, recycling) were selected. Participants rated how often they are likely to engage in a particular behaviour on a 5-point Likert scale from 0 (*Never*) to 4 (*Always*). The adapted proenvironmental behaviour measure is included in Appendix A.

Social desirability. The Impression Management subscale from the Balanced Inventory of Desirable Responding (BIDR), developed by Paulhus (1988), was employed as a measure of social desirability. The subscale consists of 22 items and measures deliberate self-presentation to others. Participants rated their level of agreement with each item on a scale from 1 (Not True) to 7 (Very True).

Demographics. Participants were asked a series of demographic questions. These included: gender, age, level of education, degree sought, etc. The main demographic variable I am interested in, however, is gender because it is typically correlated with empathy and environmental concern and behaviour. A full list of demographic questions is listed in Appendix B.

Procedure

Participants were recruited from the undergraduate psychology student participant pool at the University of Victoria. The study was introduced, in writing, to the participants as a survey examining personality and environmental attitudes, so that the focus on empathy was not made obvious (See Appendix C for the Recruitment Posting). Additionally, a short measure of the Big Five personality traits (Ten Item Personality Inventory, TIPI; Gosling, Rentfrow, & Swann, 2003) was included to distract participants from the focus on empathy and to support the cover story.

The study session consisted of a series of computer administered questionnaires that participants completed in a computer lab on campus. Participants began by first reading a brief introduction and set of instructions (Appendix D), as well as an online consent form (Appendix E). Next, participants filled out a series of standardized questionnaires; the set of personality questionnaires (IRI & TIPI), the nature relatedness measure and the environmental concern measure were randomized to control for order effects. Participants then completed the self-report measure of proenvironmental behaviour. Next, participants completed a measure of social desirability and were asked a series of demographic questions. Two final questions sought feedback from the participants, and were used to determine whether participants had any suspicions regarding the true purpose of the study. Given the repetitive nature of online questionnaires, additional questions were included throughout each questionnaire, which asked participants to verify that they are in fact continuing to attend to each question. Last, participants were debriefed (Appendix F), had any remaining questions answered and were given a participation credit towards a psychology course of their choice. Participants took approximately 25 to 40 minutes to complete the study.

Chapter 3: Results

Data Cleaning

Prior to analysis, routine data-cleaning procedures were performed on all variables.

Univariate outliers. Box plots revealed two extreme outliers on the Altruistic Environmental Concern subscale. When standardized, the scores exceeded three standard deviations above the mean and therefore were transformed according to a recommendation made by Field (2005). Specifically, the scores were modified to one unit above the next highest score in the data set.

Missing data and data quality. No data were missing because the online survey did not allow for missing responses, except for the section containing demographic questions. One participant appeared to be answering at random, as indicated by responses made on questions inserted to ascertain attention, and so was removed from further analyses.

Normality. The assumption of normality was assessed for each variable by examining histograms as well as through an examination of skewness and kurtosis, as outlined by Field (2005). The histograms appeared to demonstrate that, for the most part, variables were normally distributed. However, upon examination of the standardized values calculated for skewness and kurtosis, the three environmental concern scales appeared to be somewhat positively skewed. Egoistic concern and biospheric concern where mildly skewed, whereas altruistic concern was considerably skewed. Given that the main hypotheses will be examined using non-parametric tests, and that transformation of variables results in loss of ease of interpretation (Tabachnick & Fidell, 2007), untransformed variables were retained.

Preliminary Analyses

Scale construction and reliability. Items were recoded and reverse-scored when appropriate. Next, items were totaled and averaged, creating total scores for each empathy dimension, overall nature relatedness, and each type of environmental concern. An additive measure of PEB was created, by recoding responses into either "yes" or "no" categorical variable and then summing the responses (cf. Kaiser & Wilson, 2004). The social desirability measure was scored as outlined by Paulhus (1988).

Next, reliability coefficients (Cronbach's α) were calculated. All measures had good-to-excellent internal consistency (Empathic Concern, α =.82, 7 items; Perspective Taking, α =.80, 7 items; Nature Relatedness, α =.87, 21 items; Egoistic Concern, α =.90, 4 items; Altruistic Concern, α =.85, 4 items; Biospheric Concern, α =.89, 4 items; proenvironmental behaviour, α =.75, 23 items; social desirability, α =.76, 20 items).

Descriptives. Means and standard deviations were calculated for all variables (Table 1). Levels of empathy were moderately high for both empathic concern and perspective taking. The level of nature relatedness was high. In general, participants reported quite strong degrees of environmental concern across the three measures, with altruistic concern being the highest. On average, participants appeared to participate in a moderate amount of pro environmental behaviour. Social desirability, on average, was low.

Table 1.

Descriptive Statistics for all Variables

Variable	Mean	Std. Deviation	Potential Score Range
Empathic Concern	3.87	.65	1 to 5
Perspective Taking	3.68	.62	1 to 5
Egoistic Concern	5.51	1.21	1 to 7
Altruistic Concern	6.07	.98	1 to 7
Biospheric Concern	5.27	1.26	1 to 7
Nature Relatedness	3.5	.61	1 to 5
Proenvironmental Behaviour	10.62	3.94	0 to 23
Social Desirability	5.43	3.13	0 to 20

Note. Higher scores indicate higher levels of each construct.

Preliminary correlations. Bivariate correlations were computed among the variables of interest. They are reported in Table 2.

Social desirability was significantly positively correlated with many of the study variables (empathic concern, perspective taking, biospheric concern, nature relatedness and proenvironmental behaviour) which is consistent with past research. Therefore, this variable needed to be controlled for before further analyses were conducted. Because social desirability was correlated with both predictor and outcome variables, it was partialed out of all variables, and residuals were then saved for use in subsequent analyses.

Gender was also correlated with many of the outcome variables; females displayed higher levels empathic concern, nature relatedness, and proenvironmental behaviour, which is also

consistent with past research. Based on this finding, a further evaluation of gender's role was necessary before testing the main hypotheses.

Table 2.

Correlations Among All Variables

Variables	1	2	3	4	5	6	7	8	9
1. Empathic Concern	-								
2. Perspective Taking	.34**	-							
3. Egoistic Concern	.06	-.02	-						
4. Altruistic Concern	.27*	.14	.47**	-					
5. Biospheric Concern	.14	.20*	.09	.39**	-				
6. Nature Relatedness	.23*	.38**	-.08	.12	.60**	-			
7. Proenvironmental Behaviour	.29**	.33**	-.02	.14	.45**	.63**	-		
8. Social Desirability	.32**	.31**	-.05	.14	.24**	.26**	.27**	-	
9. Gender †	.39**	.11	.13	.12	.13	.30**	.34**	.28**	-

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

† Males were coded as 0 and females as 1.

Gender as a potential moderator. Given that gender might moderate the effect of empathy, a moderated regression analysis was conducted for each variable of interest: egoistic concern, altruistic concern, biospheric concern and nature relatedness. Specifically, the goal was to determine whether the relation between each of the two facets of empathy and each type of environmental concern as well as between empathy and nature relatedness, differs for males and females.

The procedure recommended by Aiken and West (1991) to test a continuous variable at levels of a categorical variable was used. This involved a two-step hierarchical regression analysis for each variable. Specifically, interaction terms were created by centering empathic concern and perspective taking and then multiplying each of them gender (Aiken & West, 1991). Egoistic concern was regressed on empathic concern and gender in the first step, and the two-way interaction term (empathic concern × gender) was added in the second step. The same analysis was also conducted using perspective taking in place of empathic concern. Altruistic concern, biospheric concern, and nature relatedness were also regressed onto empathy, gender, and their interaction term. The results of these analyses are summarised in Table 3.

A moderator effect would be evident if any of the interaction regression coefficients were significant when entered into the model, that is, if they explained a significant amount of variance in the outcome measures. In the present case, the interaction terms did not significantly increase the predictive power of any overall model, indicating that gender does not appear to moderate the effect of empathy on the outcome variables. Therefore, gender was not included as a moderator in my mediation analyses. Instead it was controlled for by partialing it out of each variable, as was done for social desirability.

Table 3.

Summary of Regression Analysis for All Variables Including Gender as a Moderator (N = 125)

Outcome Variable	Variable	B		R^2	Adjusted R^2	F	R^2 change	F change
		Step 1	Step 2					
Egoistic Concern								
Step 1	Empathic Concern	.04	.13	.02	.01	1.36		
	Gender	.13	.03					
Step 2	Empathic Concern × Gender		.01	.02	.00	.91	<.01	.01
Step 1	Perspective Taking	-.01	.02	.02	.01	1.29		
	Gender	.11	.14					
Step2	Perspective Taking × Gender		-.03	.02	.00	.86	<.01	.03
Altruistic Concern								
Step 1	Empathic Concern	.23*	.01	.06	.04	3.56*		
	Gender	.01	.23					
Step 2	Empathic Concern × Gender		.01	.06	.03	2.35+	<.01	<.01
Step 1	Perspective Taking	.10	.21	.02	.00	1.07		
	Gender	.08	.08					
Step2	Perspective Taking × Gender		-.12	.02	.00	.88	<.01	.51

Table 3. (continued)

Outcome Variable	Variable	β Step 1	β Step 2	R^2	Adjusted R^2	F	R^2 change	F change
Biospheric Concern								
Step 1	Empathic Concern	.05	-.07	.01	-.01	.47		
	Gender	.05	.08					
Step 2	Empathic Concern × Gender		.14	.01	-.01	.54	.01	.68
Step 1	Perspective Taking	.14	.38	.02	.01	1.48		
	Gender	.07	.06					
Step2	Perspective Taking × Gender		-.28	.05	.02	1.94	.02	2.81
Nature Relatedness								
Step 1	Empathic Concern	.20	-.07	.06	.05	3.93*		
	Gender	.09*	.23**					
Step 2	Empathic Concern × Gender		.18	.07	.05	3.05*	.01	1.28
Step 1	Perspective Taking	.32***	.31+	.16	.14	11.32**		
	Gender	.22**	.22**					
Step2	Perspective Taking × Gender		.01	.16	.14	7.49**	<.01	.01

Note. + p < .10, * p < .05, ** p < .01, *** p < .001.

Primary Analyses

Correlations. Correlations among all of the variable residuals are displayed in Table 4. The two subscales of empathy, empathic concern, and perspective taking were moderately positively correlated, which is to be expected given that they both represent the same broader construct. However, they were significantly correlated with different outcome measures, suggesting that they are in fact distinct from one another.

Empathic concern was moderately correlated with altruistic concern,[1] but not egoistic concern or biospheric concern. Perspective taking was not significantly correlated with any form of environmental concern. Empathic concern was not significantly correlated with nature relatedness, but a moderate positive correlation was found between perspective taking and nature relatedness. Also, a moderately large positive correlation was found between nature relatedness and biospheric concern, but nature relatedness did not correlate with the other two forms of environmental concern.

[1] Some readers may wonder if *empathic concern* and *altruistic concern* are in fact the same thing given the similarities between them. However, the literature tends to examine them as distinct constructs, and there are important distinctions to be made. Empathic concern reflects the tendency to engage in an emotional response of warmth or sympathy, etc., when faced with a distressed target. On the other hand, altruistic concern is an affectively driven, value based belief about the consequences of environmental damage for people beyond the self (i.e., children, the community). One is considered an emotional state, and the other an attitude or belief. However, research may wish to further examine individuals' experiences of them to determine if they do in fact overlap to some degree.

Table 4.

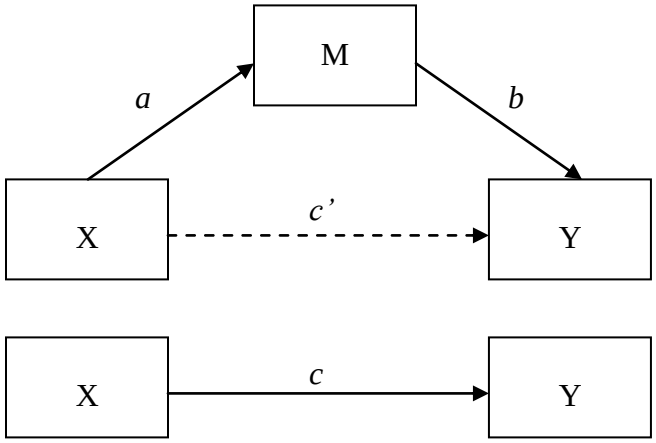
Correlations Among Variables After Controlling for Social Desirability and Gender

Variables	1	2	3	4	5	6	7
1. Empathic Concern	-						
2. Perspective Taking	.28**	-					
3. Egoistic Concern	.04	-.01	-				
4. Altruistic Concern	.22*	.10	.47**	-			
5. Biospheric Concern	.05	.14	.10	.37**	-		
6. Nature Relatedness	.08	.33**	-.10	.07	.57**	-	
7. Proenvironmental Behaviour	.14	.28**	-.06	.09	.41**	.57**	-

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

Testing the Mediation Model. The classic procedure for testing a mediation model is based on the work of Baron and Kenny (1986). However, methodologists and researchers have offered critiques and updates to this approach (e.g., Preacher & Hayes, 2004; Zhao, Lynch, & Chen, 2010).

Figure 2. Mediation model as outlined by Baron and Kenny (1986).



Consider Figure 2. The *causal step model* (Baron & Kenny, 1986) outlines four steps for testing the meditational model as follows: (1) demonstrate that the independent variable (X) predicts the outcome variable (Y) indicated by path *c*, (2) demonstrate that the independent variable (X) predicts the mediator (M) indicated by path *a*, (3) demonstrate that the mediator (M) predicts the outcome variable (Y), indicated by path *b*, and (4) if the requirements of steps 1 to 3 are met, then one needs to establish that the effect of the independent variable on the outcome variable is zero (or at least significantly less) when the controlling for the mediator (path *c'*). Full mediation occurs when the effect is zero, whereas partial mediation occurs if the relation does not reach zero, but is still significantly less than the effect in step 1.

A test of the indirect effect (*ab*) is now recommended in addition to, or even in place of, the causal step model. The *Sobel test* (Sobel, 1982) has been a standard choice, but estimating

the indirect effect using *bootstrapping* has become increasingly popular (see Bollen & Stine, 1990; Shrout & Bolger, 2002).

The Sobel test is used to determine whether step 4 proposed by Baron and Kenny is significant, that is it determines whether the relation between the independent variable (X) and the dependent variable (Y) is significantly reduced once the mediator (M) has been included in the model (i.e., $c - c'$). To do this, the ratio of the indirect effect to its estimated standard error (SE) is calculated and compared to the normal distribution to determine its significance. However, this test is only appropriate in large samples with a normal distribution, therefore bootstrapping is be preferred (Preacher & Hayes, 2004; Shrout & Bolger, 2002).

Bootstrapping (Preacher & Hayes, 2008) is a non-parametric resampling procedure, and therefore does not require the data be normally distributed. When employed for mediation analyses, bootstrapping is used repeatedly (e.g., 5000 times) to generate sampling distributions, drawing on replacement data from the original sample. For each resample, the indirect effect (ab) is estimated. These estimated values are then sorted from high to low, and upper and lower bounds of the confidence interval (CI) are defined as the percentile values (e.g., 2.5 and 97.5 percentiles) associated with the desired CI (e.g., 95%). The test of significance of the indirect effect is whether or not zero falls within the resulting CI. If the CI does not include zero, then one can conclude that the indirect effect does in fact significantly differ from zero, with a probability of error consistent with the selected CI (e.g., 5% with a selected CI of 95%). This procedure is reported to have high power and sufficient control over Type I error rates (MacKinnon et al., 2002).

To test whether nature relatedness mediates the relation between empathy and environmental concern, the indirect effect of each type of empathy on each type of

environmental concern (excluding egoistic concern because it does not correlate with any other variables) through nature relatedness was estimated using the SPSS macro designed by Preacher and Hayes (2008). To conduct the analyses, 5000 bias-corrected and accelerated bootstrap samples were used to obtain a 95% confidence interval for the indirect path in each analysis. Bias correction and acceleration were used to adjust for both bias and skewness in generated distribution (Efron, 1987). The results for each combination of variables are described below.

Table 5.

Summary of Path Coefficient Estimates from Bootstrapping Mediation Model for Empathic Concern and Altruistic Concern

Path	Unstandardized Coefficient	S.E.	*t*	*p* (two-tail)
c	.36	.15	2.5	.03
a	.08	.09	.91	.36
b	.08	.15	.56	.58
c’	.36	.15	2.44	.02

Note: Path designations refer to figure 2. Model summary for DV model R^2 = .05, Adj R^2 = .04, $F(2, 122) = 3.26$, $p < .05$.

***Empathic concern and altruistic concern*.** Path coefficients are reported in Table 5. To interpret these results, empathic concern apparently does directly influence altruistic concern, such that greater empathic concern predicts greater altruistic environmental concern, as indicated by path *c*. However, empathic concern was not related to nature relatedness, as indicated by path *a*. Nature relatedness did not significantly predict altruistic concern, as indicated by path *b*. The test of the direct effect of empathic concern on altruistic concern after nature relatedness was controlled for was significant, as indicated by path *c’*. Overall, the model accounted for 4% of the variance in altruistic concern.

The test of the indirect effect of empathic concern on altruistic concern was not significant, 95% CIs [-.02, .08]. Because the CI did span zero, one can infer that the indirect effect is non-significant with a 5% chance of error.

Taken together, these findings suggest that there is a direct-only effect of empathic concern on altruistic concern, and that nature relatedness does not mediate this relation.

Table 6.

Summary of Path Coefficient Estimates from Bootstrapping Mediation Model for Perspective Taking and Altruistic Concern

Path	Unstandardized Coefficient	S.E.	*T*	*p* (two-tail)
c	.17	.15	1.16	.25
a	.32	.08	3.89	< .01
b	.06	.16	.38	.70
c’	.15	.16	.96	.34

Note: Path designations refer to figure 2. Model summary for DV model R^2 = .01, Adj R^2 = .00, $F(1, 122) = 0.74$, p = .48.

***Perspective taking and altruistic concern*.** Path coefficients are reported in Table 6. To interpret these results, perspective taking apparently does not directly influence altruistic concern, as shown by path *c*. Perspective taking does however, seem to predict nature relatedness, such that an increase in perspective taking was related to an increase in nature relatedness, as indicated by path *a*. Nature relatedness did not significantly predict altruistic concern, as indicated by path *b*. The test of the direct effect of perspective taking on altruistic concern after controlling for nature relatedness was non-significant, as indicated by path *c’*.

The test of the indirect effect of perspective taking on altruistic concern was not significant, 95% CIs [-.11, .12]. Because the CI spanned zero, one can infer that the indirect effect is non-significant with a 5% chance of error.

Taken together, these findings suggest that although perspective taking is related to the proposed mediator (nature relatedness), the mediator does not influence altruistic concern, and therefore, mediation does not exist.

Table 7.

Summary of Path Coefficient Estimates from Bootstrapping Mediation Model for Empathic Concern and Biospheric Concern

Path	Unstandardized Coefficient	S.E.	*t*	*p* (two-tail)
c	.10	.19	.54	.59
a	.08	.09	.91	.36
b	1.23	.19	7.69	< .01
c’	.00	.16	.03	.98

Note: Path designations refer to figure 2. Model summary for DV model R^2= .33, Adj R^2= .32, $F(2, 122) = 29.81$, $p < .001$.

***Empathic concern and biospheric concern*.** Path coefficients are reported in Table 7. To interpret these results, empathic concern does not appear to directly influence biospheric concern, as shown by path *c*. Empathic concern did not relate to nature relatedness, as indicated by path *a*. Nature relatedness, however, did significantly predict biospheric concern, such that increases in nature relatedness were related to increases in biospheric concern, as indicated by path *b*. The test of the direct effect of empathic concern on biospheric concern after controlling

for nature relatedness was also non-significant, as indicated by path *c'*. Overall, the model significantly accounted for 33% of the variance in biospheric concern.

The test of the indirect effect of empathic concern on biospheric concern was not significant, 95% CIs [-.13, .37]. Because the CI did span zero, one can infer that the indirect effect is non-significant with a 5% chance of error.

Taken together, this suggests that although the proposed mediator (nature relatedness) predicts level of biospheric environmental concern, the mediator is not influenced by empathic concern, and therefore mediation does not exist.

Table 8.

Summary of Path Coefficient Estimates from Bootstrapping Mediation Model for Perspective Taking and Biospheric Concern

Path	Unstandardized Coefficient	S.E.	*t*	*p* (two-tail)
c	.28	.19	1.53	.13
a	.32	.08	3.89	< .001
b	1.27	.17	7.55	< .001
c'	-.12	.16	-.75	.45

Note: Path designations refer to figure 2. Model summary for DV model R^2= .33, Adj R^2= .32, $F(2, 122) = 30.24$, $p < .000$.

Perspective taking and biospheric concern. Path coefficients are reported in Table 8. To interpret these results, perspective taking does not appear to directly influence biospheric concern, as shown by path *c*. However, perspective taking does seem to relate to nature relatedness, because increases in perspective taking did predict biospheric environmental concern, as indicated by path *a*. Nature relatedness did significantly predict biospheric concern, such that increases in nature relatedness were related to increases in biospheric concern, as

indicated by path *b*. The test of the direct effect of perspective taking on biospheric concern after controlling for nature relatedness was also non-significant, as indicated by path *c'*. Overall, the model significantly accounted for 33% of the variance in biospheric concern.

The test of the indirect effect of perspective taking on biospheric concern was significant, 95% CIs [.18, .70]. Because the CI did not span zero, one can infer that the indirect effect is non-zero with a 5% chance of error.

Taken together, this suggests that although perspective taking does not *directly* influence biospheric concern, it does so *indirectly* through nature relatedness. This pattern of results does not satisfy the criteria for mediation outlined by Baron and Kenny (1986), but it is sufficient according to more recent standards outlined in the literature (e.g., Zhao, Lynch, & Chen, 2010). Specifically, this pattern of findings reflects the model of mediation categorized as *indirect only mediation* (Zhao, Lynch, & Chen, 2010). These authors and others (e.g., Collins et al., 1998; MacKinnon et al., 2000; Shrout & Bolger, 2002) suggest that the test of X's effect on Y is not relevant to establishing mediation, and thus an "effect to be mediated" does not necessarily need to be established prior to the further examination of a mediation effect. This is because it is possible to establish an indirect effect, even if no total effect is found. Instead Zhao, Lynch and Chen (2010) suggest that the only requirement for demonstrating mediation is a significant indirect effect using a Sobel test or bootstrapping, the latter of which was conducted here.

Proenvironmental Behaviour.

Environmental concern and proenvironmental behaviour. To examine the relation between environmental concern and proenvironmental behaviour, a linear regression analysis was conducted. Proenvironmental behaviour was regressed onto the three types of environmental concern. The results are reported in Table 9. Biospheric concern emerged as the only significant

unique predictor of behaviour. Increases in biospheric concern predicted increases in proenvironmental behaviour.

Table 9.

Regression Analysis Examining influence of Environmental Concern on Proenvironmental Behaviour

Variable	*B*	*SE B*	β	*p*
Egoistic Concern	-0.25	0.28	-0.08	.38
Altruistic Concern	-0.12	0.38	-0.03	.75
Biospheric Concern	1.29	0.27	0.43	< .001

Note. R^2= .18, Adj R^2= .16, $F(3, 121) = 8.92$, $p < .000$.

Empathy and proenvironmental behaviour. Additional exploratory analyses were conducted to examine the relation between empathy and proenvironmental behaviour. Moderation analyses were conducted to determine whether gender moderated the effect of empathy on proenvironmental behaviour. The results are reported in Table 10. Empathic concern did not predict proenvironmental behaviour, but a main effect of gender emerged. For perspective taking, main effects of both gender and perspective taking on proenvironmental behaviour were found, as well as an interaction between gender and perspective taking. Females reported more proenvironmental behaviour than males. Increased levels of perspective taking predict increased levels of proenvironmental behaviour. Gender also moderated the effect of perspective taking on proenvironmental behaviour, as indicated by the interaction. Specifically, as males' reported perspective taking increased, the amount of proenvironmental behaviour they reported engaging in also greatly increased, whereas for females, as perspective taking increased, their increase in reported proenvironmental behaviour was only slight (See Figure 3).

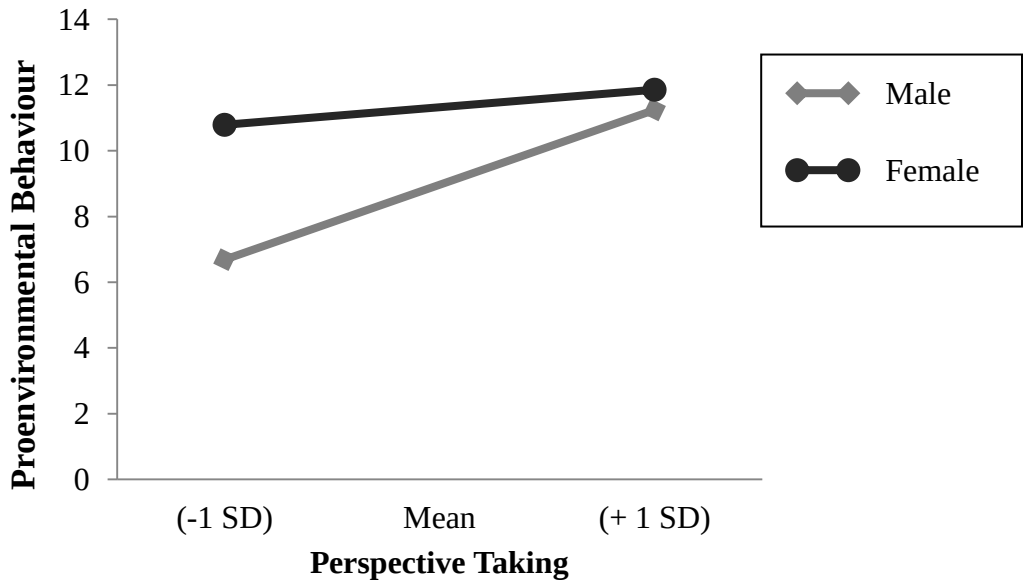
Table 10.

Regression Analysis for Empathy as a Predictor of Proenvironmental Behaviour, including Gender as a Moderator (N = 125)

	Variables Entered	β Step 1	β Step 2	R^2	Adjusted R^2	F	R^2change	F change
Proenvironmental Behaviour								
Step 1	Empathic Concern	.15	.04	.10	.08	6.37**		
	Gender	0.23*	0.25*					
Step 2	Empathic Concern X Gender		.12	.10	.08	.91	<.01	.58
Step 1	Perspective Taking	0.27**	0.61**	.15	.13	10.35***		
	Gender	0.27**	0.26**					
Step2	Perspective Taking X Gender		-.40*	.19	.17	9.44***	.05	6.67*

note: +$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Figure 3. Interaction between Gender and Perspective Taking Predicting Proenvironmental Behaviour



Support for the hypotheses.

Taken together, the results did not wholly support all the hypothesized relations among variables as outlined in Figure 1. However, significant paths did emerge among some variables that are meaningful and help to clarify the relation among empathy and environmental concern, as well as the role of nature relatedness as a mediator. The findings will now be discussed in greater detail with reference to the original hypothesis.

Chapter 4: Discussion

The main purpose of the present research was to investigate whether or not nature relatedness mediates the relation between dispositional empathy and environmental concern. To this end, nature relatedness, various facets of dispositional empathy, and three types of environmental concern were measured. In addition, because one of environmental psychology's ultimate goals is to predict and encourage proenvironmental action, self-report proenvironmental behaviour was measured and examined in relation to the other variables. This study adds to existing literature by exploring a potential psychological process through which empathy may influence environmental concern. A more reliable and comprehensive measure of nature relatedness was used and multiple facets of dispositional empathy, rather than purely situational empathy, were explored. Also, the importance of controlling for gender and social desirability when measuring empathy and environmental traits, attitudes, and behaviours is highlighted. The results offer some potentially important insights about the possible use of developing empathy when trying to increase individuals' concern for the environment and their subsequent proenvironmental action. The findings also serve to stimulate future research questions.

Nature Relatedness as a Mediator between Empathy and Environmental Concern

In reference to the main meditational hypothesis, the findings demonstrate that dispositional empathy influences environmental concern through the mechanism of nature relatedness. However, this relation exists *only* between the cognitive component of empathy, perspective taking, and the broadest form of environmental concern, namely biospheric concern. Specifically, as an individual's tendency to engage in perspective taking (i.e., spontaneously adopt another's mental state or point of view) increases, so does the degree to which he or she feel related to nature, which then is related to an increase in an individual's environmental

concern for the overall biosphere. Also, this mediation is classified as *indirect only*, given the lack of a significant direct effect of perspective taking on biospheric concern (Zhao, Lynch, & Chen, 2010).

In the case of empathic concern, an affective component of empathy, it appears to only directly relate to altruistic concern. This relation is *not* mediated by nature relatedness. Specifically, as an individual's tendency to feel compassion and warmth towards others in need increases, so does his or her concern for humankind in the face of environmental consequences. The relation between these two variables is not explained by nature relatedness.

In light of these findings, an examination of each path in the proposed meditational model helps to elucidate this pattern of results.

Empathy and nature relatedness. Why might perspective taking predict nature relatedness but empathic concern does not? Although both are important and related components of empathy, they are quite distinct, with perspective taking reflecting advanced cognitive processes, and empathic concern reflecting an intrapersonal affective outcome (Davis, 1994). Additionally, research has reported that perspective taking and empathic concern are related to distinct psychological outcomes; perspective taking is related to elements of social functioning and social competence, and empathic concern is related to emotionality and sensitivity to others (see, Davis, 1983). Therefore, it is not surprising that they are also predicts different environmental traits and attitudes.

One difference that may shed light on the current question is the mechanism through which perspective taking operates on a variety of social outcomes. Evidence suggests that perspective taking exerts its influence by increasing self-other merging (i.e., an increase in the overlap between oneself and another in one's cognitive representation of self; Davis et al., 1996).

This process has been found to mediate perspective taking's influence on various prosocial outcomes (e.g., increased helping behavior, decreased stereotyping, horizontal collectivism; Cialdini, Brown, Lewis, Luce, & Neuberg, 1997; Galinsky & Moskowitz, 2000; Vorauer & Cameron, 2002). Evidence from neuropsychology has also indicated that areas of the brain consistently linked with dispositional empathy and perspective taking are also activated when assuming the mental state of others that are perceived as similar to oneself (Masten, Morelli, Eisenberger, 2011). Given that nature relatedness, in part, reflects the inclusion of nature within one's self concept and the perception that humans and nature are inherently connected, it can be considered a manifestation of the merging of the self and natural other(s). This interpretation of nature relatedness would explain its relation to perspective taking. Empathic concern does not appear to operate in the same way, which may account for its lack of relationship with nature relatedness.

Nature Relatedness and Environmental Concern. The findings suggest increases in nature relatedness predict increases in biospheric concern, but not altruistic concern. Theoretically, biospheric environmental concern emerges as the result of a motivation to protect the biosphere as a whole and includes concern for value objects such as plants and animals. Altruistic environmental concern, on the other hand, emerges as the result of a general concern for humans (e.g., future generations and one's community) and so does not include the motive to protect non-human elements of nature in their own right. Given that nature relatedness reflects a sense of connection to elements of the natural world and not other humans faced with environmental problems, is perhaps why nature relatedness predicts biospheric concern and not altruistic concern. Initially, in line with previous findings, I hypothesized that nature relatedness would predict both types of environmental concern, given that they are both related to self-

transcendence, which according to Schultz and Zelezny (1999) reflects a broadened self-concept. Although nature relatedness can too be seen as a form of self-transcendence, it appears to focus only on non-human elements of nature, and not a more general transcendence, and thus does not extend to other humans. Thus, transcendence beyond the self may not necessarily lead one to consider all entities that are non-self, but rather specific groups of entities.

Empathy and Environmental Concern. The initial model suggested that both perspective taking and empathic concern would predict both altruistic and biospheric environmental concern. Moderate positive correlations among these variables have been previously reported (Schultz, 2001); however, the current findings were not wholly consistent with past results. Only empathic concern significantly predicted altruistic concern, such that as an individual's tendency to display compassion and concern for less fortunate others increased, so too did their concern for the environment in relation to the consequences for all humans.

One potential explanation for the difference between these results and previous findings is that the current study controlled for the effects of gender and social desirability. Both of these variables have been previously reported as indicative of levels of empathy and environmental concern, such that females often report more empathy (e.g., Davis, 1996) and environmental concern (e.g., Zelezny, Chua, & Aldrich, 2000). Also, individuals with higher social desirability may report having higher levels of empathy (e.g., Eisenberg, Fabes, Schaller, Miller et al., 1991) as well as more positive environmental attitudes (e.g., Kaiser, Wölfing, & Fuhler, 1999), given that these are both highly normative. In the current study, preliminary analyses revealed a significant positive correlation between perspective taking and biospheric concern, but, once gender and social desirability were partialed out, this correlation became non-significant (r = .20, p =.03 to r = .14, p = .13). This pattern was consistent for all correlations among both

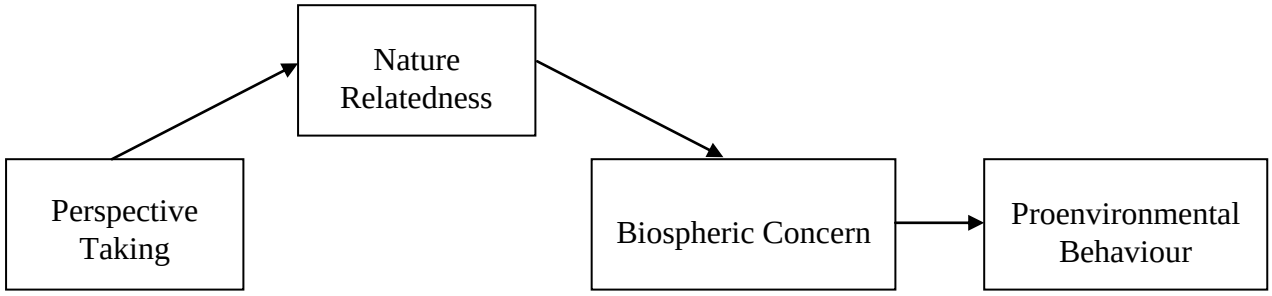
components of empathy and types of environmental concern in that the magnitude of each correlation (significant or not) decreased (compare Table 2 and Table 4). Previous research did not control for gender or socially desirable responding, and therefore, reported correlations may, in fact, be spurious, given the demonstrated potential for these variables to confound the results.

Despite a drop in magnitude, the correlation between empathic concern and altruistic concern did remain statistically significant. As the only significant relation that emerged, it warrants further consideration. The relation between these variables may reflect a possible causal chain between empathic concern and altruistic concern. Batson's e*mpathy-altruism hypothesis*, posits that eliciting empathic concern for a target in need triggers a purely altruistic (i.e., self-less) motivation to help that target (see Batson et al., 1991, 1995). In light of this theory, perhaps individuals who experience empathic concern more frequently or readily feel a heightened sense of altruism, which leads them to develop attitudes consistent with these motivations, such as a general concern for human welfare. This self-less concern for human welfare may then explain why such individuals also score higher on a measure of altruistic environmental concern. Thus, altruistic environmental concern may be more readily experienced by individuals who also display empathic concern, due to a general compassion for humans, rather than an awareness of environmental problems *per se*.

Egoistic Concern. Beyond biospheric and altruistic concern, egoistic concern was also measured. As hypothesized, neither empathy nor nature relatedness predicted egoistic environmental concern. Egoistic concern arises out of a self-focused motivation to protect one's own interests with regards to the environment and correlates with self-enhancing values (Schultz & Zelezny, 1999). Therefore, not surprisingly, egoistic concern does not appear to be related to self-transcendent constructs such as empathy and nature-relatedness.

Revising the Model. Taken together, the current pattern of results suggests a more specified model when attempting to explain the mechanism through which empathy relates to environmental concern. The new model is depicted in Figure 4. The relation to proenvironmental behaviour will be discussed in the following section.

Figure 4. Revised Meditational Model Depicting an Indirect Only Effect



This revised path makes sense in light of the explanations put forth in the previous sections. Also, the model is consistent with previous research on situational empathy and environmental concern. Situationally manipulated perspective taking for an animal in harm results in different levels of biospheric concern (Schulz, 2001; Sellviano et al., 2007). Specifically, taking the perspective of an animal in harm leads to higher biospheric concern, compared to just objectively viewing the same target. To explain this finding, Schultz suggested that participants may have temporarily felt an increased sense of connection to nature. The current findings offer support for this explanation. Although situational and dispositional empathy are different, they appear to lead to similar outcomes, and an examination of both situational and individual differences when developing a unified theory of psychological phenomenon is warranted (Cronbach, 1957).

Predicting Proenvironmental Behaviour

Consistent with previous research, biospheric concern predicted proenvironmental behaviour, whereas altruistic concern and egoistic concern did not. That is, as an individual's concern for the overall biosphere increases, so do the number of proenvironmental behaviours that he or she reports engaging in. Level of concern for humans or for the self in relation to the environment does not appear to be related to the amount of reported proenvironmental behaviour. This may be because in certain situations acting in a way that benefits (or reduces costs for) oneself or other humans may not always be the proenvironmental choice. For example, an egoistically motivated is likely to engage in some behaviours that provide benefits to the self, but harms the environment (e.g., driving to work) as well as some behaviours that benefit the self as well as the environment (e.g., recycling bottles for money). Individuals whose primary concern is the biospheric however will likely in accordance with their attitudes and be motivated to engage in more proenvironmental behaviours. These differences may lead to the current pattern of results.

These findings suggest that one cannot assume that increasing environmental concern in general will increase proenvironmental behaviour, but that we should specifically target biospheric concern when aiming to get individuals to take part in more proenvironmental action. However, as this research suggests, an increase in biospheric concern can be achieved by increasing state perspective taking of needy targets or through trait perspective taking by way of increased nature relatedness.

Limitations and Future Directions

The present study used a cross-sectional mediation design to test the current hypothesis. Although this may be a sufficient first step in exploring nature relatedness as a potential mediator, it is not sufficient to draw causal conclusions, which limits the findings. To overcome

this limitation and provide further support for the proposed model, future studies should employ different methods, such as an experimental-design approach or a longitudinal mediation, to further validate mediation.

For example, an experimental-design approach to mediation would help assess causation. In this approach, participants are randomly assigned to different levels of the independent variable and/or the mediating variable and then the results are analyzed to determine whether they follow the anticipated pattern of results. Manipulation of the independent and mediating variables allows researchers to make strong inferences about any causal pathways that exist. However, one difficulty that arises is that often mediating variables are not easily or ethically manipulated. Although trait nature relatedness may be difficult to manipulate, state nature relatedness has been manipulated experimentally using immersion in nature techniques (e.g., having people imagine themselves in natural versus build environments depicted in a slide show or relaxing in a lab room with plants versus without; Weinstein, Przybylski, & Ryan, 2009). Alternatively, individuals' perceptions of their level of nature relatedness could be manipulated through false feedback. Future research should explore whether manipulating nature relatedness in these ways results in increased levels of environmental concern.

Longitudinal mediation models are also useful when examining causation. The assumption of temporal-precedence is important when assessing mediation, and this design allows one to quantify the degree of mediation over time and determine whether the emergence of one construct leads to the emergence of the next and so on. The current cross-sectional design did not provide evidence for temporal-precedence, and instead must rely on assumptions made based on previous theory and evidence regarding the variables of interest. Given that a capacity for empathy is evident in infancy, and dispositional empathy develops from childhood onwards,

empathy is thought to precede the development of other constructs (see Davis, 1994). Nature relatedness is also considered to reflect a stable trait and the development of personality and individuals differences may be assumed to precede attitudes and behaviour. However, the current research assumes that the development of nature-relatedness occurs after the development of empathy. Although psychologists have examined the development of empathy, nature relatedness has yet to be fully examined in this way. Wilson and others (1984; Kellert & Wilson, 1993) have proposed the *biophilia hypothesis*, which suggests that humans are genetically predisposed to possess a basic desire to affiliate with other living things. Despite this innate drive, the level at which such relatedness is felt varies considerably, which may be the results of social, emotional and cultural influences (see Kahn, 1997; Nisbet et al., 2009). However, more research should be conducted to confirm the temporal order in which these variables develop, and the use of a longitudinal design would aid this effort.

Beyond the limits of the current meditational design, another avenue to be explored in future research is other potential paths among the variables. Although the proposed conceptual model depicts a clear path of effect, reflexive relations may exist among the variables. For example, the relation between empathy and nature relatedness may be bi-directional, such that the more experience one has with and more connected one feels with non-human beings, the more empathic you become. In addition to other potential paths of effect, other mediating or moderating variables likely exist that have not been proposed in the current study. Future research should theorize about, examine, and rule out the potential reflexive, alternative, and non-hypothesized paths that may exist in relation to the current model.

The current research used a self-report measure to gauge proenvironmental behaviour. Although self-report measures of behaviour are often used in this type of research, one cannot

assume that such reports fully reflect actual proenvironmental behaviour (Kormos & Gifford, unpublished manuscript). Therefore, future studies should try to include a measure of observed proenvironmental behaviour.

Researchers should note that because gender and social desirability influence reported levels of empathy as well as various environmental variables, these two variables should be included in future research that strives to examine the relationship between dispositional empathy and environmental outcomes. This would allow researchers to be increasingly sure that their results reflect an actual relation and not a potentially spurious one and would help clarify the relation among these variables.

Finally, still missing from the literature on empathy, environmental concern and proenvironmental behaviour is an examination of possible individual differences in empathy with nature. This study examined differences in levels of interpersonal empathy, but individuals may also differ in the degree to which they experience empathy for animals and nature. The ability to feel empathy for humans and empathy for nature are likely positively associated, however they would probably have different explanatory power when it comes to predicting proenvironmental outcomes. Thus, future research should explore whether different dimensions of empathy with nature extend to individual's relationships with nature and how the different dimensions relate to the development of nature relatedness, environmental concern, and proenvironmental behaviour.

Implications and Contributions

The current research findings offer a number of implications for both theory and practice. The current findings add to the small body of literature in environmental psychology that exists on empathy and environmental concern. Some findings complement existing theory and others

highlight aspects that need to be clarified. The study also adds to the overall literature on individual differences and emotional factors that predict environmental attitudes and behaviour, but also points to the importance of cognitive processes, such as perspective taking.

This research also helps further extend and integrate previous social and interpersonal theory with environmental psychology. Empathy has been treated predominantly as an interpersonal phenomenon and research has shown that it is linked to many positive prosocial and interpersonal outcomes (Davis, 1996). However, this research suggests that the benefits of empathy may extend beyond humans and lead to positive outcomes for the environment as well. Interestingly, the process through which perspective taking exerts influence on social outcomes (i.e., self-other merging) may be true for non-human entities as well.

Practically speaking, environmental education programs should incorporate activities that involve increasing individuals' empathy, which arguably would have both positive prosocial and environmental outcomes. Encouraging individuals to practice taking the perspective of natural entities and those suffering from environmental degradation, might be a more pragmatic way to increase environmental attitudes and behaviour than relying on information-based programs that focus on increasing knowledge of the issue. Empathy-based training programs for school-aged children already exist, such as the Roots of Empathy project, which works to increase empathy and emotional intelligence in children (Gordon, 2007). Based on the current research, interventions such as these should include activities that increase both cognitive and affective components of empathy, given that they uniquely predict different environmental outcomes. Findings that levels of empathy have been declining in young adult populations since the year 2000 suggest that interventions such as these may be needed now more than ever (Konrath, O'Brien, & Courtney Hsing, 2011).

Conclusion

Dispositional empathy is positively related to environmental concern, but the exact nature of the relation depends on which facet of empathy one you consider. Perspective taking, a cognitive facet of empathy, appears to relate indirectly to biospheric concern, exerting its influence through nature relatedness. Empathic concern, an affective component of empathy, is related directly to altruistic concern. Although both dimensions of empathy appear to predict various types of environmental concern, only biospheric environmental concern predicts an increase in proenvironmental behaviour. Thus, research should further investigate perspective taking as the most relevant facet of empathy when the goal is to increase individuals' concern and subsequent proenvironmental action.

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Appendices

Appendix A: Self-report Proenvironmental Behaviour Measure

Please indicate how often you engage in each of these particular behaviors.

Never	Seldom	Occasionally	Often	Always
0	1	2	3	4

1. In winter, I turn down the heat when I leave my residence for more than 4 hours
2. I buy energy efficient household devices
3. I prefer to shower rather than to take a bath
4. I wait until I have a full load before doing my laundry
5. I take part in a carpool
6. For longer journeys (more than 6 hours away), I take an airplane
7. I ride a bicycle or take public transportation to work or school
8. I buy products in refillable packages
9. If I am offered a plastic bag in a store, I take it
10. I reuse my shopping bags
11. I buy products with eco-labels
12. I buy domestically produced products
13. I buy seasonal produce
14. I buy organic produce
15. I buy products made from recycled materials
16. I buy used items instead of new, as a way to help reuse
17. I put dead batteries in the garbage
18. I bring empty bottles to a recycling bin/depot

19. I collect and recycle used paper
20. I point out unecological behaviors to those around me
21. I contribute financially to environmental organizations
22. I attend meetings held by an environmental organization
23. After a picnic outdoors, I leave the site as clean as it was originally

Appendix B: Demographic Questions

1. What is your gender?
2. What YEAR were you born?
3. What is your probable/current major at UVic?: Psychology
4. What year of your degree are you currently in? Pick the best answer: 1st, 2nd, 3rd, 4th, 5th, Other: _____
5. How many years have you been living in North America?
6. What is your current household income? (If you are unable to answer, type "N/A")
7. What is your mother's highest level of education?
8. What is your father's highest level of education?
9. How many pets or domesticated animals do you have living in your household with you now?
10. Did you have pets when you were a child/adolescent (i.e., from age 3 to age 14)?
11. Do you have potted plants in your household?
12. Growing up (i.e. birth to grade 12) what type of location did you live in most? Pick the BEST answer or specify another: Urban - Large city (e.g. Vancouver & Area), Urban - Small or midsized city (e.g. Naniamo), Suburban, Rural, Other: _____.
13. What diet best describes your current eating habits: I eat meat (e.g., poultry, red meat, fish) at most meals, I eat meat (e.g., poultry, red meat, fish) a few times a week, Vegetarian, Vegan, Pescetarian (eat fish/seafood, but no other meats), Other: _____.
14. What political orientation do you identify with?
15. Please indicate your ethnic background. If you identify with more than one ethnic heritage, please enter the one with which you most strongly identify.

Appendix C: Participant Recruitment Posting

Personality and the Environment

This study is about personality differences and your attitudes towards environmental degradation. If you decide to participate in this study we will ask you to complete a number of psychology questionnaires including some that are measures of individual differences in personality, and your attitudes towards environmental issues, whatever they may be. You will also be asked about the degree to which you engage in proenvironmental behaviours. Participation should take approximately 20-30 minutes and all responses are recorded on a computer. Participants will be given the chance to ask questions about the study and further information will be made available once the study is complete, if desired. Compensation will be provided to those who participate. Feel free to contact the researcher prior to participating if you have any questions or seek further clarification.

Contact: 250-472-4876 or mcintyam@uvic.ca

Appendix D: Study Introduction and Instructions for Participants

Introduction (before informed consent)

Welcome to the Personality and the Environment survey. You will find the consent form for this study on the next page. It will describe what you will be doing as part of this survey. Please go ahead and read the form over and then you may continue on with the study if you have given your consent. Feel free to ask questions at any time. While completing this survey, please do not open any other internet browser windows because it may affect the program's data collection. Also, please do not hit "back" in your browser as this may also affect data collection. Thank you.

Instructions (after informed consent)

We will now ask you to fill out a number of surveys on a variety of topics, including personality and your thoughts on the environment. We want to know how these two things are related, and therefore it is important that you answer the questions as honestly as you can. All answers are anonymous, which means the researchers will not be able to link any responses you make with your identity once you have submitted the survey. Please carefully read over the instructions for each survey and complete each survey as best as you can. However, do not spend too much time thinking too much about any one question. To begin, enter your participant number provided by the researcher in the space below, and then click next.

Appendix E: Letter of Information for Implied Consent

Personality and the Environment

You are invited to participate in a research study conducted by Amanda McIntyre, a graduate student in psychology. You may contact Amanda (mcintyam@uvic.ca, 250-472-4876), or her supervisor, Dr. Gifford (rgifford@uvic.ca, 250-721-7532), if you have any questions or concerns. In addition, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Human Research Ethics Office at the University of Victoria (250-472-4545 or ethics@uvic.ca)

Purpose and Objectives: The purpose of this research project is to examine the relation between individual differences in personality and attitudes about the environment.

Participation: You are being asked to participate in this study because you are a part of society which is currently dealing with environmental issues. If you choose to voluntarily participate, we will ask you to use a computer to fill out a number of questionnaires. Demographic information will also be asked. The time involved in participation is approximately 20-30 minutes.

Confidentiality: Your responses will not be linked to your name or any other identifying information. Rather, all data will be identified numerically. Your confidentiality and the confidentiality of your data will be protected. All reports will be based on averages across participants. Electronic data will be stored on researchers' computers. If you wish to remove your data at a later date, please contact us with your participant number and we will remove and destroy your data. Data will be destroyed 5 years after the results have been published.

Potential Risks and Benefits: Completing the 20-30 minute experiment may inconvenience you; however, it is *unlikely* that you will experience any long-term emotional distress, or any other risks, as a result of participation. To minimize this possibility, feel free to take a break while participating, or terminate your participation at any point. Participation in this research also holds potential benefits. You will have the opportunity to learn about some of the research currently being carried-out at the University of Victoria. In addition results may be used to better the current state of our environment.

Compensation: As compensation for your participation, you will receive a grade percentage credit for an undergraduate psychology course.

Voluntary Participation: Your participation in this research must be completely voluntary. If you decide to participate, you may withdraw at any time without any consequences or explanation. To withdraw, simply inform the researcher you wish to leave the study. You may still receive compensation even if you withdraw from the study.

Researcher's Relationship with Participants: The researcher may have a relationship to potential participants as a Teaching Assistant, in present or future psychology courses. The decision to participate in this study or not, nor the decision to withdraw at any time, nor your performance in this study will have NO effect on the researchers evaluation of coursework as your teaching assistant.

Dissemination of Results: The principle investigator or other researchers may use submitted data for analyses in future studies of a similar nature. Results of this study will be shared in published articles, and presented at scholarly meetings.

By completing and submitting the questionnaire, YOUR FREE AND INFORMED CONSENT IS IMPLIED and indicates that you understand the above conditions of participation in this study and that you have had the opportunity to have your questions answered by the researchers.

Appendix F: Debriefing Form

Debriefing Form: Personality and the Environment
Researchers: Amanda McIntyre and Dr. Robert Gifford

Thank-you very much for your participation in this study! Now that you have completed it, we can provide you with a more detailed description of our research.

The purpose of this study was to investigate whether the level of dispositional empathy (a personality trait) is predictive of their environmental concern and proenvironmental behaviour. Also we want to know what role "nature relatedness" (one's connection to nature) has within this relationship. Previous research has suggested that these constructs may be related and we are building on this research. We expect that higher levels of empathy will be linked to higher levels of relatedness which then increases concern and subsequently behaviour. Your answers to our survey will help us determine if this relationship exists. Everyone in the study completed the same questionnaires, which were all previously published standardized questionnaires measuring personality, attitudes and behaviour. We also measured some other personality traits that are not part of the hypothesis, but simply served as filler questions. The last measure we used was a measure of social desirability (see Paulhus, 1991). This is because it is possible that a few individuals may have high levels of social-desirability and thus may often answer in more socially acceptable ways then they actually feel when it comes to various social issues, such as attitudes towards the environment.

If you experienced any emotional duress thinking about environmental issues, please feel free to learn more about these issues and how to help the environment through any of the following organisations:

U Vic Office of Campus Planning & Sustainability	http://web.uvic.ca/sustainability
World Wildlife Fund Canada	http://wwf.ca/
Sierra Club of BC Foundation	www.sierraclub.bc.ca
Greenpeace Canada	www.greenpeace.ca/

Or if you would like to talk to someone please seek the university's counselling services at http://www.coun.uvic.ca/ or by calling (250) 721-8341.

If you would like to know more about this study or similar research or have any questions or comments, please feel free to contact either myself, Amanda McIntyre (mcintyam@uvic.ca) or Dr. Robert Gifford (rgifford@uvic.ca, 721-7532).

If you would like to read more research on the topic here are some sample references:

Schultz, W. P. (2000). Empathizing With Nature: The Effects of Perspective Taking on Concern for Environmental Issues. *Journal of Social Issues, 56(3),* 391–406.

Schultz, W. P. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. *Journal of Environmental Psychology, 21,* 327-339.

Davis, M. H. (1980). A multidimensional approach to individual differences in empathy. JSAS Catalog of Selected Documents in Psychology, 10, 85.

Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. Journal of Personality and Social Psychology, 44, 113-126.

Paulhus, D. L. (1991). Measurement and control of response bias. In J. P. Robinson, P. R. Shaver, & L. S. Wrightsman (Eds.), Measures of personality and social psychological attitudes (pp.17-59). New York: Academic Press.