

DISSERTATION

MEASURING AN EMOTIONAL CONNECTION TO NATURE
AMONG CHILDREN

Submitted by

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ABSTRACT

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There is a growing concern from scientists and others that children today are losing their connection with nature. The degree of connectedness to nature (CN) has been hypothesized to influence a person's willingness to protect it. Unfortunately, tools used to measure CN are in their infancy and have mostly been developed for adult populations instead of children where most environmental education efforts are targeted. The purpose of this dissertation was to create a reliable and valid measure of a child's emotional connection with nature and study its influence on pro-environmental behaviors.

This dissertation includes three studies presented as journal articles (chapters 2-4) and begins with presentation of the theory and frameworks used as the basis for the rest of the manuscript (chapter 1). Chapter two presents the development of a reliable and valid measure of an emotional connection to nature for children. Chapter three validates the structure of the emotional connection to nature scale (ECNS) and demonstrates its predictive potential on attitudes to protect nature (ATPN) and willingness to protect nature (WTPN). Chapter four presents findings from analyses of focus groups among children describing their connection to nature. Chapter five connects these studies by discussing the significance of this work, how this work can be applied and concludes with recommendations for future research.

Keywords: connection to nature, emotional dispositions, emotional connection to nature, attitudes toward nature, willingness to protect nature

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Chapter I: Emotional Connection To Nature Among Children

Introduction

Aldo Leopold wrote in the classic *Sand County Almanac* “We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect” (Leopold, 1949, p. VIII). This recognition that having a connection with nature will foster a better land ethic is a powerful tenant that has guided the resource conservation field for many years. In fact, studies have shown affinity for nature as being positively correlated with environmental attitudes (Schultz, Shriver, Tabanico, & Khazian, 2004) and eco-friendly actions (Mayer & Frantz, 2004). Unfortunately, it seems that more youth are disconnected from the natural world today. This strained relationship with nature has led some to argue that we are psychologically “sick” and this results in us destroying our natural world (Shepard, 1982). Addressing the environmental problems we face today hinges on connecting the next generation with nature, thus inspiring care and action to help earth (Kareiva, 2008).

Although connecting people with nature has been a goal of many environmental education (EE) programs it has rarely been studied. Past research has focused on how EE has affected attitudes and environmental responsible behaviors (ERBs). Instead of focusing solely on knowledge transfer, many scientists have realized the importance of connecting kids to nature, but few have tried to define and measure this (Nisbet, Zelenski, & Murphy, 2009). Academic research in this area is lacking. A few studies have focused on the cognitive piece and fewer on the emotional aspect of this concept. Out of these studies only one has studied it in a population under 18 years old (specifically 11th and 12th graders in Europe; Muller, Kals, & Pansa, 2009). Overall, the power of emotions, such as those which might constitute a connection

to nature, to influence behavior is still overlooked today (Manfredo, 2008). This paper is intended to begin to address this gap in the current literature through the development of an emotional connection to nature scale.

While many scientists have argued for the importance of connection to nature among children, few have measured it. One objective of this paper is to address the following research question: *Can a semantic differential scale be used to measure an emotional connection to nature among kids and can it be used to explain pro-environmental behaviors?* To measure this effort, quantitative statistical techniques were employed using a deductive reasoning approach. A second objective is to better understand what it means to be *connected to nature* among children utilizing qualitative research methods to identify how children articulate their relationship with nature. *Is there description more emotional, more cognitive, or some hybrid of both?*

This dissertation is an attempt to develop a reliable and valid emotional connection to nature scale to be used among children and to understand this phenomenon from a child's point of view. This initial chapter introduces the concepts, research, and theories that are discussed in individual studies within chapters two, three, and four.

Nature Deficit Disorder: A Growing Problem Among Kids

Recent research by Kareiva (2008) highlights the growing decline in nature-based pursuits in American society from the late 1980s to the present. Specifically natural areas visitation, camping, hunting, and fishing activities showed a significant decline. In addition, there are a number of kids who spend a majority of time indoors. This phenomenon has been coined "videophilia," the tendency for an individual to spend a majority of his/her free time in front of a TV, computer, or other electronic device (Zardic & Pergams, 2007).

This disconnect from the natural world has led some to argue that an increasing number of young people suffer from “nature- deficit disorder” or (NDD), characterized by a lack of contact with the nature world. The sources of nature deficit disorder include decreased time in natural areas, parental fear, “stranger danger”, and lack of role models that help facilitate the exploration and cultivation of a love for nature (Bruyere, Teel, & Newman, 2009; Louv, 2005). Although not a medical diagnosis, there is a human as well as an environmental cost associated with being disconnected from nature. Increases in attention deficit disorder, obesity, and stress have all been correlated with NDD. In contrast, those who spend quality time in nature, tend to have less physical and psychological problems (Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009).

A potentially more troublesome consequence of NDD relates to our ability to effectively recruit young people who will be the future stewards of earth. The relationship between childhood experiences in nature and environmental stewardship in adulthood is well documented (Chawla, 1999; Tanner, 1980; Wells N. M., 2006). With this growing trend there is a propensity towards losing the next generation of conservationists and environmentalists. Peter Weigl (2009) researched the lack of current interest in natural sciences among those entering college. According to Weigl, this decline is due to the change in student population demographics. The majority of students are coming from more urban and suburban centers where growing up they spent little time outside, thus have no desire to do so now. The amount of time spent in nature is considered to be the main influence on environmental attitudes and activism (Chawla, 1999).

Ecopsychology

From an ecopsychology perspective, a root cause of our ecological problems and most mental ills suffered by humans is their lack of connection with nature (Roszak, Gomes, &

Kanner, 1995). Ecopsychology (EP) as a field merges psychology and ecology together. Its basic tenet is that psychology and ecology need each other (Roszak et al., 1995). EP recognizes that our mental health is tied to the health of the earth (Brown, 1995). From an ecological perspective, we are all connected to nature, including our psyches (soul, spirit, and minds). Ecopsychologists study questions of mental health as it relates to our connection or lack of to nature, with the assumption that we can study the ills of the environment by exploring the mental ills of our society and vice versa. It emphasizes the application of ecological insight to the practice of psychotherapy (Roszak et al., 1995).

With the above recognition that connecting people to nature is of utmost importance, why focus on children? Many scientists believe that children are born with an innate sense of relatedness to nature (Wilson, 1984) and developmental tendency towards affiliation with nature (Barrows, 1995). It is believed that the early years of one's life (specifically early/middle childhood) is the critical time where an emotional bond with nature is made and resulting positive attitudes toward nature. In addition, this is the time when kids are forming their self-identity. They will either identify themselves as part of nature or not part of nature (Kellert, 2002; Sobel, 1993). Subsequently, not allowing kids a chance to foster a love for this glorious world will damage their personal health (Roszak, 1995).

Children who are not connected with nature and view themselves as not part of nature will suffer psychologically. They become self-centered, insensitive, and alienated. Paul Shepard would argue that there is a personal and societal cost of such alienation. Costs include psychological therapy, increased drug use, and self-destructive behaviors toward nature and ourselves (Shepard, 1982).

To combat the mental illnesses affecting kids today, some scientists advocate spending time outside. One study showed that kids who spent quality time in nature had a marked reduction of attention deficit disorder symptoms (Taylor, Kuo, & Sullivan, 2001). Also behavioral conduct disorders and depression were lower in kids who spent time in nature. Contact with nature seems to build a child's mental resilience to mental stresses (Wells & Evans, 2003).

In addition, ecopsychologists posit that establishing an emotional connection with nature unleashes the healing potential of nature to act on these children. When one is connected with nature they will see it as source of rejuvenation and strength, and in times of trouble seek it out. They recognize that spending more time in nature will relieve their stress, allow them to develop coping strategies to handle life, gain perspectives of the events that bothered them, and will stir their creative juices (Roszak et al., 1995).

Not only does a lack of connection to nature among kids affect their health, it sets the stage for continued loss and degradation of the natural world. The loss of connection with nature in our society means that we can expect more exploitation and destruction of nature (Chawla, 1988; Sobel, 1996). We depend on functioning ecosystems for the sustenance of life such as water, clean air, and biodiversity. From an ecopsychology perspective, it is clear that we need nature and nature needs us to for the health of both. We must be open and embrace a new way of thinking, one in which reciprocity is needed between us and earth (Hillman, 1995). Recognizing that we are part of nature and not separate from it will only benefit the health of all including nature. If we care about the mental wellness of our children and the natural world around us, we will strive to connect kids with nature.

Connectedness Theory

To examine the construct of connection to nature it is important to explore connectedness in general from other fields. Connectedness in the literature has been used interchangeably with and related to such terms as *engagement*, *attachment*, *belongingness*, *affinity*, and *affiliation*. The reasons for such a variety of meanings can be attributed to its use in such applied fields as education, medicine, natural resources, sociology, psychology, and most recently in ecopsychology. One of the most parsimonious definitions was given by Hagerty, Lynch-Sauer, Patusky, and Bouwsema (1993) who described the state of connectedness as occurring “when a person is actively involved with another person, object, group, or environment, and that involvement promotes a sense of comfort, well-being, and anxiety-reduction” (p. 293).

In education, depression has been linked to negative behaviors that can impede the social, academic, and emotional well-being of a student (Wilkinson-Lee, Zhang, Nuno, & Wilhelm, 2011). As a result schools have set out to find protective factors that guard a student against these negative behaviors. One such factor is the level in which a student is connected to school, a construct used to describe a child’s belongingness and relatedness to a school environment that has been measured by the classroom climate scale (CCS) (Dahlberg, Toal, Swahn, & Behrens, 2005). In one study, the CCS was measured using ten statements that were rated on a four-point Likert scale ranging from “strongly disagree” to “to strongly agree” ($\alpha = .88$). Statements included “I feel close to people at school” and “teachers at my school treat me fairly.” Results showed that CCS was negatively associated with emotional distress and positively associated with grades (Wilkinson-Lee et al., 2011). The above examples are consistent with other school research that show school connectedness to affect a student’s mental

health and well-being (McGraw, Moore, Fuller, & Bates, 2008; Waters, Cross, & Runions, 2009).

In a similar effort, the Hemingway Scale (HS) was developed as a response to help schools identify the reasons students do well academically and behaviorally. The scale measures connectedness to school, family, and friends. To measure this, adolescents were asked to rate statements as “not at all true” to “very true.” Example statements include: “I enjoy being at school,” “spending time with my friends is an important part of my life,” and “I enjoy being with my parents” (Karcher, 2001). This research supported the notion that kids who feel positively bonded to their school will perform better academically and exhibit more pro-social behaviors than kids who had a lesser affinity to their school (Simons-Morton, Crump, Haynie, & Saylor, 1999). It has been proven to be valid and reliable (Karcher, 2001).

In medicine, Human Relationship Theory has emerged to assess and intervene for patients in nursing facilities. Utilizing a hybrid research paradigm, researchers were able to construct a theoretical model that had connectedness and disconnectedness subsumed under the construct of “relatedness.” This is an individual’s level of involvement with persons, objects, groups, or natural environments, and the concurrent level of comfort or discomfort associated with it. Patients who scored less on relatedness had a decrease in their mental and physical health (Hagerty, Lynch-Sauer, Patusky, & Bouwsema, 1993).

Connection To Nature

In the 1990s, the natural resource profession moved connection to nature from a philosophical discussion to trying to measure it empirically (Clayton, 2009). Dr. Kals and others (1999) recognized that pro-nature protection behaviors cannot be explained by just looking at rational/cognitive thinking. They tested a model that hypothesized past and present experiences

in nature influence a person's emotional affinity for nature, cognitive interest in nature, and indignation towards insufficient nature protection. Up until to this time the authors claimed no such study existed demonstrating how "emotional affinity for nature" influenced motivation to protect nature. They operationalized emotional affinity toward nature as a person feeling good, safe, and oneness with nature. Examples of statements used to measure emotions included: 1) I feel relaxed and have a pleasant feeling of intimacy when spending time in nature, 2) When surrounded by nature I get calmer and I feel at home, and 3) I do not feel especially at ease whenever I spend time in nature. These questions were asked to 281 adults in Germany. Factor analyses confirmed that all items in the four subscales used to measure emotional affinity to nature loaded on the same factor, with Cronbach's alphas of .80 to .92 on all subscales. Mean scores were measured across those items belonging to one factor and results of their study confirmed that emotional affinity for nature ($R^2 = .40, p < .001$) and cognitive interest ($R^2 = .42, p < .001$) leads to more behaviors to protect nature (Kals, Schumacher, & Montada, 1999).

Shultz and others in 2004 used a Modified Implicit Association Test (IAT) to measure a person's relationship with nature. Shultz's study focused on expanding the Value – Belief – Norm Theory (VBN). The VBN hypothesizes that a person's values interact with a given situation to produce a behavior. The VBN has defined 3 values, which are egotistic (concerned with self), altruistic (focused on others), and biospheric (focused on the well-being of plants and animals). The researchers hypothesized that a person's environmental attitudes and subsequent concerns and actions regarding nature would be based on the degree in which a person is "connected to nature." Being very connected would be an individual who believes that they are part of nature, and that animals and plants should have the same rights as humans. The extreme opposite are those who feel that they are disconnected and superior to plants and animals.

The modified IAT developed by Shultz tested the association of the concepts of Me, Not Me, Nature, and Built to measure connectedness to nature. For example, the two words of *nature* and *built* would be presented on the top of a computer screen along with the word animal. Based on the speed the participant chose *nature* or *built* to associate with animals measured their implicit beliefs. This test has suggested that implicit attitudes are automatic and influence decisions and actions without awareness. Results of testing this on 100 undergraduate students at California State University San Marcos indicated that individuals who associate with nature tend to have broader concerns on environmental issues. They found “connectedness to nature” stable over time and is associated with biospheric ($r = .27$) and egotistic concerns ($r = -.21$). The authors claim that this is the first time connectedness has been based on implicitly.

Mayer and Frantz (2004) developed the connectedness to nature scale (CNS) as a tool to measure one’s feelings of connectedness to nature or oneness with nature. Born out of Aldo Leopold’s philosophy that one will take care of the land if one feels connected to it, the CNS is an important tool in research. After testing it in five studies with undergraduate psychology students, the authors concluded that it was an accurate measure of one’s affective connection to nature ($\alpha = .84$) and is a stronger predictor of environmental behaviors than using the new environmental paradigm scale (NEP) or the implicit associations test (IAT). The CNS correlated positively with ecological behavior ($r = .44, p < .001$) and environmentalism ($r = .56, p < .001$). Some items on the CNS include: I often feel part of nature, I often feel disconnected from nature, and I feel a personal bond between nature and me (Mayer & Frantz, 2004).

Most recently Helen Perkins (2010) measured affinity for nature by developing a construct called *love and care for nature*, defined as a deep love and care for nature. She argues that all of the best attempts so far have measured mostly the cognitive aspect of connectedness to

nature instead of an emotional bond. She based her work on the philosophical view that Biophilia is a love for nature and as such can be measured. Perkins developed a 15 item scale that is known as the Love and Care for Nature Scale (LCN). Items on the scale include 1) I feel joy being in nature, 2) I feel a deep love for nature, and 3) I enjoy learning about nature. Testing this scale on 261 adult tourists revealed that the scale exhibited construct and criterion related validity. The LCN significantly predicted willingness to make personal sacrifices such as accepting increased costs ($\beta = .46, p < .001$) or cuts in living standard to protect the environment ($\beta = .43 p < .001$).

Reflecting on the above research, although most studies report to be studying an emotional connection to nature, it is clear that connection to nature has been mostly measured cognitively except for the LCN scale. The use of the word “feel” in both the connectedness to nature scale developed by Mayer and Frantz (2004) and the emotional affinity toward nature scale (EATNS; Kals, Schumacher, & Montada, 1999) has a cognitive connotation. For example, the statements “I feel that all inhabitants of Earth, human, and non-human share a common life force (CNS)” and “By getting in touch with nature today I have the feeling of the same origin (EATNS)” illustrates this point. Research focusing on the development of a reliable and valid measure of a child’s emotional connection to nature will provide practitioners a tool to gauge outreach and education initiatives aimed at increasing connectedness to nature. Chapter two of this dissertation demonstrates the development of a valid and reliable scale used to measure a child’s emotional connection to nature (an emotional disposition).

Emotions

There is general agreement that there is no firm definition of emotions. They have been defined and operationalized differently by many which has led to much confusion and

misunderstanding in theory and research (Izard, 2009). The following are the four major theoretical approaches to emotions.

The Evolutionary or Darwinism theoretical approach of emotions focuses on the function of emotions in the context of natural selection. The premise is that we should share basic emotions with other animals since we co-evolved. Evolutionists and biologists who work under this approach are interested in studying shared emotional expressions universally and the adaptive functions of emotions (Cornelius, 1996).

Charles Darwin began his research under this theoretical umbrella. As an evolutionist, he posited that we share a common set of facial expressions when we experience shared or a primitive set of emotions. He observed that dogs, cats, and monkeys when angered all pin their ears back. Humans on the other hand, seem to universally cry when upset and smile when happy (Darwin, 1872).

When studying emotions under this approach, scientists usually refer to a core set of shared emotions as being “basic emotions.” Basic emotions are ones that appear rapidly and are virtually automatic (in the amygdala) that are crucial in meeting challenges to our survival or well-being when in the presence of ecologically valid stimulus (Izard, 2007). For example, when walking upon a snake, I jump back automatically and run due to fear. Basic emotions include interest, joy, fear, and anger (Izard, 2007).

In addition, evidence that supports this point of view comes from anthropologists through the study of different cultures and their ability to recognize different emotions. Scientists studied western subjects and remote Namibian villagers to see if they could recognize the basic emotions of anger, disgust, fear, and joy in vocalizations. Based on interviews with these peoples in their

native language, they all were able to recognize the above emotions (Sauter, Eisner, Ekman, & Scott, 2010).

The adaptive usefulness of emotions has support from studies showing humans can unconsciously and reflexively point out fear inducing objects automatically. In a study conducted by neuroscientists, participants were presented pictures of snakes and spiders (fear objects) hidden in a grid of other flowers and mushrooms (non-fear objects). These participants were able to pick out fear inducing objects much more faster than non-fear objects (Ohhman, Flykt, & Esteves, 2001). This supports the theory that humans have evolved to attend to fear objects for their survival.

Nico Frijda's work on action tendencies falls under the umbrella of Evolutionary theories of emotions. He states that we have a core of ten action tendencies that correspond with specific emotions and are common to all people due to their evolutionary necessity. For example, the action tendency of avoidance is meant to protect an organism and the emotion that can be ascribed to it would be fear. Other action tendencies are interrupting and attending (emotion of interest). Action tendencies are viewed as being the same as an emotion and have evolved to help humans survive and function in the many environments we find ourselves in (Frijda, 1986).

The Jamesean theoretical approach for studying emotions believes that perceptions of bodily changes are the emotion, literally emotions equal bodily sensations. Under this logic, you feel afraid because you shake and tremble (James, 1884). Some of the best support for the Jamesean theory of emotions came from a 1950s study of forty people who were stimulated into fear and anger. Their physiological reactions of heart rate, respiration, blood pressure, face temperature, hand temperature, and skin conductance were measured in each state. There was a

significant mean score among the subjects to the different emotions. Physiologists concluded that the emotions of fear and anger had a different set of bodily responses (AX, 1953).

The third theoretical approach to the study of emotions is Social Constructivism. Sociologists who view the world through this lens believe that emotions are social constructions that serve social purposes (Cornelius, 1996; Turner & Stets, 2006). Specifically the experience of feeling an emotion, or the experience of seeing an emotion in another person, is the result of conceptual knowledge about the emotion being used to categorize the experience (Barrett, 2006). Emotions are learned phenomenon and have no biological bases. Language plays an important role in the development of emotional knowledge (Barrett, 2004).

James Averill who subscribes to this tradition of study believes that emotions serve a social role. He believed that an emotion has the following components that occur together. They include subjective experiences, expressive reactions, patterns of physiological responses, and coping reactions (Averill, 1980). Cultures impart silent rules and norms on how to appraise a situation, how to interpret the situation, and how to act. The following illustration comes from an emotion study of western and Asian cultures. In western societies if someone publically humiliates you, you might be offended and become angry, and express your anger by shaking your fist at someone, or insulting the other person. Now if you were Japanese and this happened to you, that cultures norms would influence you're behavioral expression. You would most likely not say anything, smile, and be non-confrontational. In addition, in some cultures snakes are fear objects and in some cultures snakes are revered (Spellman, 1989).

The last major theoretical approach to explore emotions is known as the Cognitive. This theoretical approach is based on the assumption that emotions are based on appraisals (cognitions). A basic premise is that we must understand how people make judgments

(prefrontal part of the brain) about objects in their environment because emotions are generated by these judgments. At the heart of cognitive theories is this notion of appraisal (Cornelius, 1996). One must perceive an object, appraise it good or bad (quickly, nonintellectual, immediate, and autonomic), and then the appropriate emotion kicks in. This appraisal occurs with a set of physical responses (Arnold, 1960). These responses can be either to approach or withdraw. For example, to elicit fear one only needs to judge a coyote as being dangerous.

Social Psychologists such as Richard Lazarus view the appraisal process as either primary or secondary. Primary appraisal occurs when a person determines the relevance of the situation on their goal. Secondary appraisals happen when a person thinks of coping actions to either diminish, harm, or acquire more benefit from the situation (Lazarus, 1991). Since emotions are tied to individual appraisals, we can train ourselves to perceive certain situations that were once seen as fearful as being pleasant. For example, if I am fearful of the dentist chair, I can focus my mind on thinking that it really isn't that bad. Then the way a person appraises a situation is a direct function of his/her expectation of the event (which is a cognitive coping skill) (Lazarus, 1991).

Although there is a strict boundary when viewing emotions from these four traditions, there is common ground. So in order to talk about emotions we must discuss them in terms of the emotional response that most scientists agree on. That is emotions include bodily responses (e.g. increased respiration), expressive reactions (e.g. frowning), behavioral tendencies (e.g. running), and subjective emotional experiences (feelings such as sad or happy) (Cornelius, 1996; Izard, 2007). In addition, there are a few emotions that have their origins in our shared evolutionary paths. Some emotions can be totally automatic but some do rely on cognitions and

appraisals. That is why it's possible for a person to approach a rattlesnake out of interest versus someone else running away from it in a fear response.

Conceptual Framework

Even though emotions and cognitions are considered to theoretically be two different systems (Barrett, 2006; Greene, Nystrom, Engell, Darley, & Cohen, 2004) there is acknowledgment that they interact closely (Izard, 2009; Storbeck & Clore, 2007). Cognitive research has shown that values influence beliefs, which influence attitudes, which in turn influence behaviors (Manfredo, 2008). In addition, recent studies suggest that an affective connection with nature (emotions) also influences attitudes and behaviors (Mayer & Frantz, 2004; Schultz et al., 2004). Chapter three takes a mental systems approach in the integration of emotions with cognitions (Jacobs, Vaske, & Roemer, 2012) by acknowledging that emotional dispositions are antecedents to attitudes and behaviors just as value orientations are on the cognitive hierarchy.

The cognitive hierarchy has been the foundation in which much of the research in human dimensions of natural resources has been built upon (Manfredo, 2008). It was developed to help explain the relationship between values, attitudes, and behaviors and has been validated in numerous studies (Vaske & Donnelly, 1999; Teel et al., 2010). It is the foundation upon which this study builds upon. Looking at figure 3.1, as one starts from the bottom and moves up the concepts become more situational specific. Values are desirable end states of being such as freedom and modes of conduct such as honesty (Rokeach, 1973). They form the base of the model and are formed early in life, are hard to change, and explain little variance in a person's behavior. Next are value orientations, which are basic belief patterns toward specific issues or objects that give meaning to values (Vaske & Donnelly, 1999). Value orientations have been

shown to influence a person’s attitudes towards natural resource issues and wildlife (Manfredo, 2008; Manfredo, Teel, & Henry, 2009). Attitudes in social psychology, are mental states often with some degree of aversion or attraction, that reflects the classification and evaluation of specific objects and events (Eagly, Mladinic, & Otto, 1994). A person has numerous attitudes each specific to certain objects or situations. They are considered direct antecedents to behavioral intentions and subsequent behaviors (Vaske, 2008).

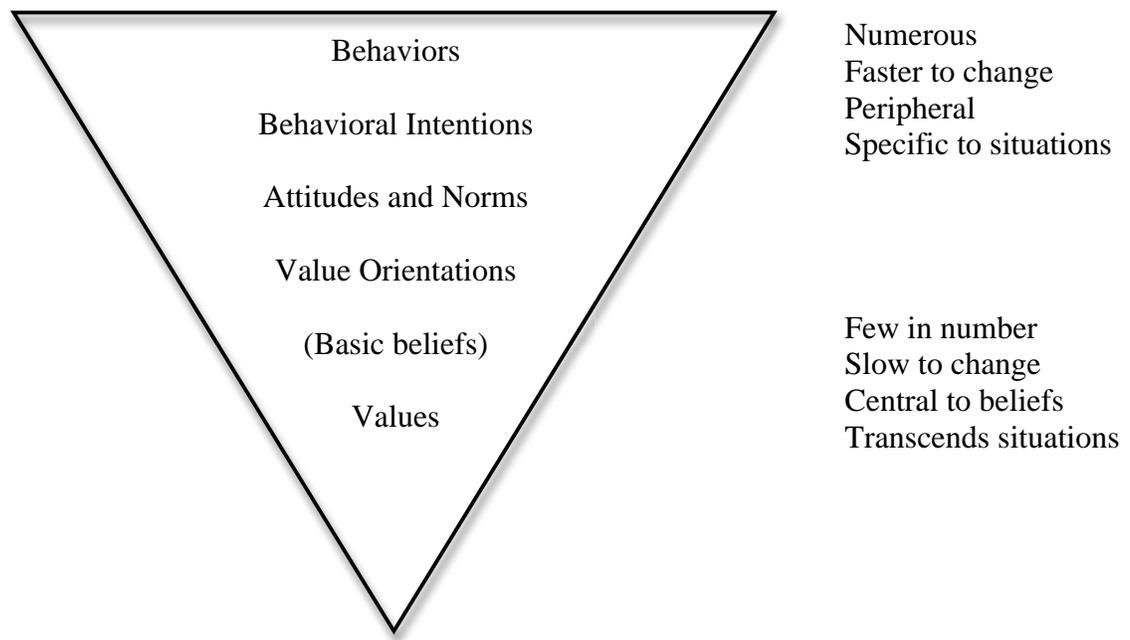


Figure 3.1 The Cognitive Hierarchy Model of Human Behavior (Source Vaske and Donnelly 1999)

Emotional Dispositions

Emotional dispositions just like value orientations are mental traits of an individual and are relatively stable (Jacobs & Vaske, 2010). They are always present (unconsciously most of the time) and are comprised of past memories and emotional experiences with objects or situations. They can be learned or innate evolving from evolution (Manfredo, 2008). It is this

emotional substance that a person filters their environment and appraises objects for relevance (Frijda, 1986; Lerner & Keltner, 2000). Emotional dispositions have also been described as the tendency to react with specific emotions across time and similar situations (Gross, Sutton, & Ketelaar, 1998; Larsen & Ketelaar, 1991). In this study a person with an emotional connection to nature (emotional disposition) would exhibit feelings of joy, peace, wonder, comfort, and love while in nature.

As with value orientations, emotional dispositions are directed toward objects (Ellsworth & Scherer, 2003). You cannot experience an emotion unless it is toward something. The key to an emotional experience is the appraisal of an object against someone's emotional disposition (Frijda, 1988). The most important part of linking cognitions and emotions is the recognition that in order for you to experience an emotion you must appraise a situation. Having an emotional disposition toward nature in theory influences a person to have positive attitudes toward nature and increases their willingness to protect nature (Kals, Schumacher, & Montada, 1999; Mayer & Frantz, 2004; Perkins, 2010). Chapter three of this dissertation illustrates a predictive model demonstrating the influence of emotional connection to nature on attitudes to protect nature and willingness to protect nature (behavioral intentions), while chapter four utilizes a general qualitative approach to study the phenomena of connection to nature among kids and validates what it means to be emotionally connected to nature.

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Chapter II: The Development Of A Reliable And Valid Measure Of Emotional Connectedness To Nature Among Children: A Methodological Study

Introduction

Aldo Leopold wrote in the classic Sand County Almanac “We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect ” (Leopold, 1949, p. VIII). This recognition that having a connection with nature will foster a better land ethic is a powerful tenant that has guided the resource conservation field for many years. In fact, studies have shown affinity for nature as being positively correlated with environmental attitudes (Schultz, Shriver, Tabanico, & Khazian, 2004) and eco-friendly actions (Mayer & Frantz, 2004). Unfortunately, it seems that more youth are disconnected from the natural world today. Addressing all of the environmental problems we face today hinges on connecting the next generation with nature, thus inspiring care and action to help the earth (Kareiva, 2008).

Although connecting people with nature has been a goal of many environmental education (EE) programs it has rarely been studied. Past research has focused on how EE has affected attitudes and environmental responsible behaviors (ERBs). Instead of focusing solely on knowledge transfer, many scientists have realized the importance of connecting kids to nature, but few have tried to define and measure this (Nisbet, Zelenski, & Murphy, 2009). Academic research in this area is seriously lacking. A few studies have focused on the cognitive piece and fewer on the emotional aspect of this concept. Out of these studies only one has studied it in a population under 18 years old (specifically 11th and 12th graders in Europe; Muller, Kals, & Pansa, 2009). The power of emotions to influence behavior is still overlooked today (Manfredo, 2008). This chapter was guided by the following research question: *Can a child’s emotional connection to nature be measured using a semantic differential scale?*

Connectedness Research

There has been a push in recent years to connect kids with nature but the operationalization of this concept is in its infancy. To examine the construct of connection to nature it is important to explore connectedness in general from other fields. Connectedness in the literature has been used interchangeably with and related to such terms as *engagement*, *attachment*, *belongingness*, *affinity*, and *affiliation*. The reasons for such a variety of meanings can be attributed to its use in such applied fields as education, medicine, natural resources, sociology, and psychology and most recently in ecopsychology. One of the most parsimonious definitions was given by Hagerty, Lynch-Sauer, Patusky, and Bouwsema (1993) who described the state of connectedness as occurring “when a person is actively involved with another person, object, group, or environment, and that involvement promotes a sense of comfort, well-being, and anxiety-reduction” (p. 293).

In education, depression has been linked to negative behaviors that can impede the social, academic, and emotional well-being of a student (Wilkinson-Lee, Zhang, Nuno, & Wilhelm, 2011). As a result schools have set out to find protective factors that guard a student against these negative behaviors. One such factor is the level in which a student is connected to school, a construct used to describe a child’s belongingness and relatedness to a school environment that has been measured by the classroom climate scale (CCS) (Dahlberg, Toal, Swahn, & Behrens, 2005). In one study, the CCS was measured using ten statements that were rated on a four-point Likert scale ranging from “strongly disagree” to “to strongly agree” ($\alpha = .88$). Statements included “I feel close to people at school” and “teachers at my school treat me fairly.” Results showed that CCS was negatively associated with emotional distress and positively associated with grades (Wilkinson-Lee et al., 2011). The above examples are

consistent with other school research that shows school connectedness to affect a student's mental health and well-being (McGraw, Moore, Fuller, & Bates, 2008; Waters, Cross, & Runions, 2009).

In a similar effort, the Hemingway Scale (HS) was developed as a response to help schools identify the reasons students do well academically and behaviorally. The scale measures connectedness to school, family, and friends. To measure this, adolescents were asked to rate statements as "not at all true" to "very true." Example statements include: "I enjoy being at school," "spending time with my friends is an important part of my life," and "I enjoy being with my parents" (Karcher, 2001). This research supported the notion that kids who feel positively bonded to their school will perform better academically and exhibit more pro-social behaviors than kids who had a lesser affinity to their school (Simons-Morton, Crump, Haynie, & Saylor, 1999). It and has been proven to be valid and reliable (Karcher, 2001).

In medicine, Human Relationship Theory has emerged to assess and intervene for patients in nursing facilities. Utilizing a hybrid research paradigm, researchers were able to construct a theoretical model that had connectedness and disconnectedness subsumed under the construct of "relatedness." This is an individual's level of involvement with persons, objects, groups, or natural environments, and the concurrent level of comfort or discomfort associated with it. Patients who scored less on relatedness had a decrease in their mental and physical health (Hagerty, Lynch-Sauer, Patusky, & Bouwsema, 1993).

Connection To Nature

In the 1990s, the natural resource profession moved connection to nature from a philosophical discussion to trying to measure it empirically (Clayton, 2009). Dr. Kals and others (1999) recognized that pro-nature protection behaviors cannot be explained by just looking at

rational/cognitive thinking. They tested a model that hypothesized past and present experiences in nature influence a person's emotional affinity for nature, cognitive interest in nature, and indignation towards insufficient nature protection. Up to this time the authors claimed that no such study existed demonstrating "emotional affinity for nature" influenced motivation to protect nature. They operationalized emotional affinity toward nature as a person feeling good, safe, and oneness with nature. Examples of statements used to measure emotions included: 1) I feel relaxed and have a pleasant feeling of intimacy when spending time in nature, 2) When surrounded by nature I get calmer and I feel at home, and 3) I do not feel especially at ease whenever I spend time in nature. These questions were asked to 281 adults in Germany. Factor analyses confirmed that all items in the four subscales used to measure emotional affinity to nature loaded on the same factor, with a Cronbach's alphas of .80 to .92 on all subscales. Mean scores were measured across those items belonging to one factor and results of their study confirmed that emotional affinity for nature ($R^2 = .40, p < .001$) and cognitive interest ($R^2 = .42, p < .001$) leads to more behaviors to protect nature (Kals, Schumacher, & Montada, 1999).

Mayer and Frantz (2004) developed the connectedness to nature scale (CNS) as a tool to measure one's feelings of connectedness to nature or oneness with nature. Born out of Aldo Leopold's philosophy that one will take care of the land if one feels connected to it, the CNS is an important tool in research. After testing it in five studies with undergraduate psychology students, the authors concluded that it was an accurate measure of one's affective connection to nature ($\alpha = .84$) and is a stronger predictor of environmental behaviors than using the new environmental paradigm scale (NEP) or the implicit associations test (IAT). The CNS correlated positively with ecological behavior ($r = .44, p < .001$) and environmentalism ($r = .56, p < .001$).

Some items on the CNS include: I often feel part of nature, I often feel disconnected from nature, and I feel a personal bond between nature and me (Mayer & Frantz, 2004).

Most recently Helen Perkins (2010) measured affinity for nature by developing a construct called *love and care for nature*, defined as a deep love and care for nature. She argues that all of the best attempts so far have measured mostly the cognitive aspect of connectedness to nature instead of an emotional bond. She based her work on the philosophical view that Biophilia is a love for nature and as such can be measured. Perkins developed a 15 item scale that is known as the Love and Care for Nature Scale (LCN). Items on the scale include 1) I feel joy being in nature, 2) I feel a deep love for nature, and 3) I enjoy learning about nature. Testing this scale on 261 adult tourists revealed that the scale exhibited construct and criterion related validity. The LCN significantly predicted willingness to make personal sacrifices such as accepting increased costs ($\beta = .46, p < .001$) or cuts in living standard to protect the environment ($\beta = .43 p < .001$).

Reflecting on the above research, although most studies report to be studying an emotional affinity to nature, it is clear that connection to nature has been mostly measured cognitively except for the LCN scale. The use of the word “feel” in both the connectedness to nature scale developed by Mayer and Frantz (2004) and the emotional affinity toward nature scale (EATNS; Kals, Schumacher, & Montada, 1999) has a cognitive connotation. For example, the statements “I feel that all inhabitants of Earth, human, and nonhuman share a common life force (CNS)” and “By getting in touch with nature today I have the feeling of the same origin (EATNS)” illustrates this point. Research focusing on the development of a reliable and valid measure of a child’s emotional connection to nature would contribute to the growing connectedness to nature literature.

Purpose of Study

The purpose of this study was to develop a reliable and valid measure of a child's emotional connection to nature. Being able to measure a child's emotional connection to nature is important in gauging the impact of outreach and education initiatives geared to increasing connectedness to nature.

Methods

Sampling Design

A convenience and purposeful sample of 266 fifth graders from Loveland, Colorado and the Bronx, New York were selected to test the emotional connection to nature scale (ECNS). In addition, these students were asked to respond to the *inclusion with nature* scale and *willingness to protect nature* scaled index that were used in establishing validity of the ECNS. Two hundred and one children from Loveland Colorado were surveyed at the beginning of a guided hike as part of a school field trip in the spring of 2011. The remaining 65 children from New York City were sampled during their after-school nature program in the fall of 2011.

Defining The Construct of Emotional Connectedness To Nature

The construct of emotional connection to nature (ECN) is defined in this study as an emotional disposition that results in the feelings of love, peace, comfort, wonder, and joy while in nature. Emotional dispositions just like value orientations are mental traits of an individual and are relatively stable (Jacobs & Vaske, 2010). Emotional dispositions have been described as the tendency to react with specific emotions across time and similar situations (Gross, Sutton, & Ketelaar, 1998; Larsen & Ketelaar, 1991). Those who hold a strong emotional connection to nature when in nature (object) will exhibit more positive emotions such as love and joy. While

those who do not hold this connection will tend to experience more negative emotions such as fear and boredom.

Item Measurement

After reviewing the literature and multiple discussions with an expert committee, the decision was made to utilize a semantic differential scale to measure a child's emotional connection to nature. It is designed to measure the connotative meaning of objects, events, and concepts or attitudes. The semantic differential scale was first developed by Charles Osgood (1957) to measure bipolar attitudes. Since then it has been deemed an effective and economical way to measure attitudes and emotions.

Only words that referred to emotional states according to the affective lexicon (Ortony, Clore, & Foss, 1987) were selected for the scale. The affective lexicon consists of words that have a true emotional reference. These are words that fit the following form of "I feel x." For example, this could be structured as "I feel love" or "I feel hate." The statement that "I feel part of nature" would not be considered an emotion, but rather a cognitively based affective attitude.

The emotional connection to nature scale (ECNS) is comprised of 20 polar emotions (see table 2.10) that have been identified in the connectedness literature. These were sad/happy, miserable/joy, afraid/peaceful, anxious/calm, stressed/relaxed, uneasy/comfortable, bored/excited, not interested/fascinated, hate/love, and tense/restful. Each variable on the scale corresponds with a value of -2 to 2. To score, all choices are added and divided by the number of variables rated. A person with a mean score closer to 2 would be considered very emotionally connected to nature and someone with a mean score closer to -2 would be considered very emotionally disconnected to nature.

Table 2.1 *Emotional Connection to Nature Variables*

When I am in nature, I feel...	Very	Somewhat	Neither	Somewhat	Very	
Sad	-2	-1	0	1	2	Happy
Miserable	-2	-1	0	1	2	Joyful
Afraid	-2	-1	0	1	2	Peaceful
Anxious	-2	-1	0	1	2	Calm
Stressed	-2	-1	0	1	2	Relaxed
Uneasy	-2	-1	0	1	2	Comfortable
Bored	-2	-1	0	1	2	Excited
Not interested	-2	-1	0	1	2	Fascinated
Hate	-2	-1	0	1	2	Love
Tense	-2	-1	0	1	2	Restful

Inclusion With Nature Scale

The inclusion with nature scale (INS; figure 2.1) is a single item indicator that measures a person’s cognitive view of their connectedness to nature. It is comprised of a series of seven overlapping circles labeled “self” and “nature.” The non-overlapping circle graphic represents an individual who views him or herself as separate from nature. The graphic of completely overlapping circles represents a person who views him or herself as the same as nature. To score the scale, graphics are assigned a score of 1 to 7, with the lowest value associated with no overlap in the circles (no connection with nature) and completely overlapped circles receiving a score of 7 (complete connection with nature; Shultz, 2001).

Please circle the picture below which best describes your relationship with Nature.

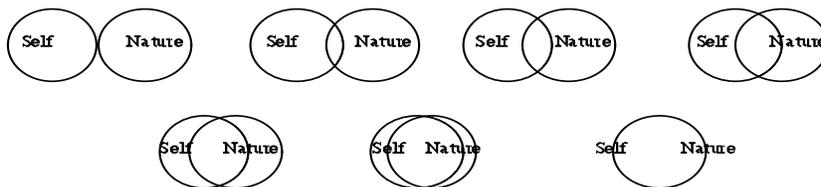


Figure 2.1 Inclusion With Nature Scale

Willingness To Protect Nature

An indicator of a child's willingness to protect nature (WTPN) was measured by asking kids to indicate the level of willingness to a) take action to protect nature b) not harm plants or animals while in nature c) volunteer to help to protect nature d) ride my bike instead of having someone drive me e) recycle my cans and bottles and f) pick up litter that is not mine (items b, c, d adapted from willingness for pro-environmental commitment scale; Kals et al., 1999). These variables were coded on a 5-point Likert scale ranging from "strongly unwilling" (1) to "strongly willing" (5).

Data Analyses

The goal of this paper was to develop a reliable and valid scale that would measure a child's affective connection to nature. To accomplish this, the ECNS was subjected to statistical tests that established reliability and construct validity. The internal consistency or reliability of the 10 semantic differential statements of the ECNS was determined using Cronbach's alpha reliability coefficients.

In order to establish measurement validity, a survey should exhibit *content validity* (does the scale represent what it is intended to measure), *criterion validity* (does the measure exhibit predictive potential), and *construct validity* (does the scale measure what it is intended to measure; Vaske, 2008). The ECNS was subject to content validity (expert panel), criterion validity (regression analyses), and construct validity (correlation analyses) (Morgan & Harmon, 2000). An exploratory factor analyses (EFA) utilizing varimax rotation was used to test whether the 10 statements of sad/happy, miserable/joy, afraid/peaceful, anxious/calm, stressed/relaxed, uneasy/comfortable, bored/excited, not interested/fascinated, hate/love, and tense/restful loaded on one factor as hypothesized. Utilizing EFA allows researchers the opportunity to identify the

factors associated with a group of variables (Vaske, 2008). The emotional connection to nature scale was also subjected to correlation analyses with the inclusion with nature scale, an established instrument that is reported to measure the cognitive piece of connection with nature. After this was done the ECNS was regressed against willingness to protect nature (behavioral intentions) to see if it exhibited predictability as theorized.

Results

Reliability Analyses

The 10 items of the ECNS and the six items on the willingness to protect nature scaled index (WTPN) were subjected to reliability analyses. The results (see table 2.2) revealed a Cronbach's alpha of .91 for the ECNS and .79 for the WTPN, which satisfies the criteria for acceptability established by Vaske (2008) and others (above .70). In addition, a reliability analysis was conducted for the ECNS separately for the Bronx ($\alpha = .95$) and Loveland samples ($\alpha = .89$).

Table 2.2

Items measuring Emotional Connection to Nature and Willingness to Protect Nature

Concept / Variable	Corrected Item Correlation	Cronbach's alpha if Item Deleted	Cronbach's alpha
Emotional Connection to Nature Scale¹			.91
When I am in nature, I feel:			
Sad/Happy	.73	.90	
Miserable/Joyful	.72	.90	
Afraid/Peaceful	.64	.90	
Anxious/Calm	.57	.91	
Stressed/Relax	.68	.90	
Uneasy/Comfortable	.76	.89	
Bored/Excited	.74	.90	
Not interested/Fascinated	.65	.90	
Hate/Love	.68	.90	
Tense/Restful	.64	.90	

Willingness to Protect Nature²			.79
I am willing to take action to protect nature	.63	.74	
I am willing not to harm animals or plants while in nature	.46	.78	
I am willing to volunteer to ride my bike instead have someone drive me	.67	.80	
I am willing to recycle my cans and bottles	.58	.75	
I am willing to pick up litter that is not mine	.57	.75	

¹ Variables coded on a 5-point scale from “Very” (-2) to “Very” (2).

² Variables coded on a 5-point scale from “strongly disagree” (1) to “strongly agree” (5).

The results of the exploratory factor analyses (see table 2.3) on the 10 variables revealed that all loaded on one factor as hypothesized with the lowest loading of .64 for tense/restful. The variables that loaded on the latent construct of emotional connection to nature were, when I am in nature I feel sad/happy, miserable/joy, afraid/peaceful, anxious/calm, stressed/relaxed, uneasy/comfortable, bored/excited, not interested/fascinated, hate/love, and tense/restful. Similar results were also seen when exploratory analyses was conducted for the Bronx group lowest factor loading .76 (not interested/fascinated) and for the Loveland group .66 (tense/restful).

Table 2.3

Exploratory Factor analyses of the Emotional Connection To Nature variables

Emotional Connection To Nature¹	Standard factor loading
While in Nature I feel... Sad/Happy.	.82
Miserable/Joyful.	.80
Afraid/Peaceful.	.80
Anxious/Calm.	.79

Stressed/Relaxed.	.75
Uneasy/Comfortable.	.74
Bored/Excited.	.72
Not Interested/ Fascinated	.71
Hate/Love	.71
Tense/Restful	.64

Note. Variables coded on 5-point semantic scale (-2= very, -1=somewhat, 0=neither, 1=somewhat, 2= very)

¹Factor loadings represent only coefficients >.4

Construct Validity

A bivariate correlation was conducted with ECNS and Shultz’s inclusion with nature (INS) one item indicator (a reported measure of a person’s cognitive connection with nature). The results of this analyses revealed that these were significantly correlated ($r = .513, p < .001$). This lent credence to the fact that both were measuring a component of connection to nature but not the same dimension.

Criterion Validity

The ECNS was regressed against a scaled index that measured a child’s willingness to engage in pro-nature behaviors. The results of the regression showed that a child’s ECN significantly predicted their willingness to engage in pro-nature activates ($R^2 = .22, p < .001$).

Discussion

The purpose of this study was to develop a reliable and valid measure of a child’s emotional connection to nature. Testing the emotional connection to nature scale on 266 children provided evidence that the scale is both reliable and valid. As hypothesized all variables from the ECNS loaded on one factor that measured the latent construct of emotional connection

to nature. This scale relates to the inclusion with nature scale, which is conceptually related but not the same (cognitive connection with nature as opposed to an emotional connection to nature). Also this study provides initial support that being emotionally connected to nature will lead to a willingness to protect nature, a basic tenant of a Leopold Land Ethic (Leopold, 1949). The ECNS was shown to be positively correlated with a child's willingness to protect nature. These findings have implications for application, theory, and future research.

From a theoretical perspective, results reported in this study enhance our understanding of the connection to nature phenomenon. Specifically, being emotional connected to nature meant feeling any combination of happiness, joy, peace, calmness, relaxation, comfort, excitement, fascination, love, and rest while in nature. The opposite is true for those who are emotionally disconnected with nature. They tend to experience more feelings of sadness, misery, anxiousness, stress, uneasiness, boredom, hate, and tension while in nature. Previous research support these findings also (Hinds & Sparks, 2008; Kals et al., 1999; Mayer & Frantz, 2004; Perkins, 2010).

From an applied perspective, the ECNS is designed to equip the field of environmental education (EE) to respond to the criticism that their efforts are not effective because they lack proper evaluation of their programs. In fact, a search of environmental education evaluation in journals such as the *Journal of Environmental Education* revealed only 15 journal articles that dealt with evaluating EE (Carleton-Hug & Hug, 2010). This new instrument addresses this issue. If an environmental education program's goal is to connect kids with nature, the ECNS could be used as a quick and reliable way to measure such effort. Also the ECNS could be used to further explain a person's relationship with nature along with other cognitive measures such as the inclusion with nature scale and the connection to nature scale.

The construction of the ECNS is an exciting contribution to measuring connection to nature among children but should be looked at with caution. Evaluation of the 10 emotional connection to nature variables resulted in one factor supporting a single dimension to this construct. However, due to the purposeful sampling of 266 fifth graders this could be misleading. Would the 10 variables still hold if we randomly sampled fifth graders from throughout the United States? Being able to measure a person's connection with nature is important, but what facilitates this connection is of utmost important also. Future studies should look at the precursors to ECN. Is it spending time in nature with significant others as others have suggested (Chawla, 2006)? Can secondary experiences with nature such as web field trips or other electronic media facilitate an emotional connection to nature? Maybe the ECNS could be used to study the effects of green building design on connecting kids with nature as well (Mayer & Frantz, 2004).

Another future research need is addressing in depth the relationship between the ECNS with pro-environmental behaviors such a WTPN. Although this study did find a positive correlation between ECNS and WTPN, studying the casual relationship between a child's emotional connection to nature and willingness to protect nature would be of great value. Can emotions be integrated into cognitive frameworks to explain environmental responsible behaviors?

In conclusion, this study was successful in creating an emotional measure of connection to nature for kids that is both reliable and valid. The earth is facing many problems that will hinge on connecting kids with nature and in order to measure the success of our collective efforts will depend on being able to measure such a connection. The emotional connection to nature scale is a simple, reliable, and valid tool that can be used to do just that.

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Chapter III: The Influence Of Emotional Connectedness To Nature On Attitudes Toward Nature And Willingness To Protect Nature

A growing human population, habitat destruction, global warming, pollution, loss of biodiversity, and the decline of young people who are connected to nature are all pressing issues facing our world today. Which one of these is most urgent and important? The nature disconnect has been identified by some as the most important and grave problem we face today (Kareiva, 2008). Those who have a greater connection with nature hold broader concerns for the environment than those who are not (Schultz, Shriver, Tabanico, & Khazian, 2004). Addressing all of the environmental problems we face today hinges on connecting the next generation with nature, thus inspiring care and action to help earth (Kareiva, 2008). Unfortunately there are limited quantitative studies demonstrating the relationship among affinity for the natural world, environmental attitudes, and environmental responsible behaviors (Mayer & Frantz, 2004; Perkins, 2010). Overall, the power of emotions, such as those that might constitute a connection to nature, to influence behavior is still overlooked today (Manfredo, 2008).

Much of the research in human dimensions of natural resources (HDNR) and other social sciences has focused on the cognitive hierarchy framework for understanding human behavior (Jasper, 2011). In HDNR, there has been a call for researchers to start to focus their attention on emotions to help explain a person's attitudes and behaviors toward wildlife and natural resource issues (Jacobs, Vaske, & Roemer, 2012; Manfredo, 2008). Cognitive variables (attitudes, values etc.) have been used to explain up to half of the variance in a person's actions toward natural resource issues (Teel & Manfredo, 2010; Whittaker, Vaske, & Manfredo, 2006) but what accounts for the other variance? I would suggest an individual's emotional connection to nature.

This chapter was guided by the following research question: *Can a child's emotional connection to nature influence their willingness to protect nature?*

Conceptual Framework

Even though emotions and cognitions are considered to theoretically be two different systems (Barrett, 2006; Greene, Nystrom, Engell, Darley, & Cohen, 2004) there is acknowledgment that they interact closely (Izard, 2009; Storbeck & Clore, 2007). Cognitive research has shown that values influence beliefs, which influence attitudes, which in turn influence behaviors (Manfredo, 2008). In addition, recent studies suggest that an affective connection with nature (emotions) also influences attitudes and behaviors (Mayer & Frantz, 2004; Schultz et al., 2004). This study takes a mental systems approach in the integration of emotions with cognitions (Jacobs, Vaske, & Roemer, 2012) by acknowledging that emotional dispositions are antecedents to attitudes and behaviors, just as value orientations are on the cognitive hierarchy.

The cognitive hierarchy has been the foundation in which much of the research in human dimensions of natural resources has been built upon (Manfredo, 2008). It was developed to help explain the relationship between values, attitudes, and behaviors and has been validated in numerous studies (Vaske & Donnelly, 1999; Teel et al., 2010). It is the foundation upon which this study builds upon. Looking at figure 3.1, as one starts from the bottom and moves up the concepts become more situational specific. Values are desirable end states of being such as freedom and modes of conduct such as honesty (Rokeach, 1973). They form the base of the model and are formed early in life, are hard to change, and explain little variance in a person's behavior. Next are value orientations, which are basic belief patterns toward specific issues or objects that give meaning to values (Vaske & Donnelly, 1999). Value orientations have been

shown to influence a person’s attitudes toward natural resource issues and wildlife (Manfredo, 2008; Manfredo, Teel, & Henry, 2009). Attitudes in social psychology, are mental states often with some degree of aversion or attraction, that reflects the classification and evaluation of specific objects and events (Eagly, Mladinic, & Otto, 1994). A person has numerous attitudes each specific to certain objects or situations. They are considered direct antecedents to behavioral intentions and subsequent behaviors (Vaske, 2008).

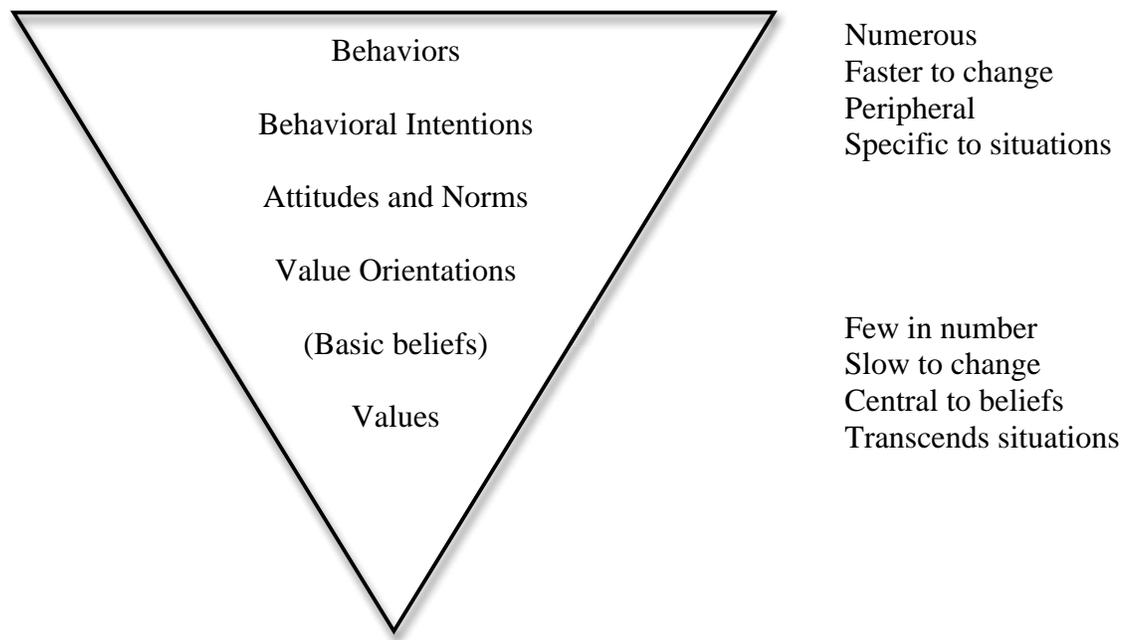


Figure 3.1 The Cognitive Hierarchy Model of Human Behavior (Source Vaske and Donnelly 1999)

Emotional Dispositions

Emotional dispositions just like value orientations are mental traits of an individual and are relatively stable (Jacobs & Vaske, 2010). They are always present (unconsciously most of the time) and are comprised of past memories and emotional experiences with objects or situations. They can be learned or innate evolving from evolution (Manfredo, 2008). It is this emotional substance that a person filters their environment and appraises objects for relevance

(Frijda, 1986; Lerner & Keltner, 2000). Emotional dispositions have also been described as the tendency to react with specific emotions across time and similar situation (Gross, Sutton, & Ketelaar, 1998; Larsen & Ketelaar, 1991). In this study a person with an emotional connection to nature (emotional disposition) would exhibit feelings of joy, peace, wonder, comfort, and love while in nature.

Attitudes

Cognitive research has shown that value orientations influence attitudes (Vaske & Donnelly, 1999). In the same rational, an emotional connection to nature is predicted to influence attitudes toward nature (Kals, Schumacher, & Montada, 1999; Mayer & Frantz, 2004; Perkins, 2010). Attitudes in social psychology, are mental states often with some degree of aversion or attraction, that reflects the classification and evaluation of objects and events (Eagly, Mladinic, & Otto, 1994). They have been one of the most studied concepts in social sciences (Eagly & Chaiken, 1993; Manfreda, Teel, & Bright, 2004).

When studying attitudes, it is important to recognize that they are comprised of a cognitive and evaluative dimension. The cognitive aspect of attitudes refers to what we believe about something. The evaluative piece is the appraisal of the object as good or bad (Vaske, 2008). For example, one might believe that being in nature is safe (cognitive aspect) and evaluate being in nature as a positive experience. In survey research, attitudes have often been measured by asking respondents questions that are framed in terms of like/dislike or positive/negative. In this study attitudes are measured by a child's attitude toward nature.

Behavioral Intentions

There has been much research demonstrating the strong predictive power of attitudes on specific behaviors (Vaske & Donnelly, 1999). Due to resource constraints needed to measure

overt behaviors, researchers have used behavioral intentions as a reliable proxy for behaviors (Fishbein & Manfredo, 1992). In this study, willingness to protect nature is a measure of the behavioral intentions of children and is predicted to be influenced by a child's attitudes toward nature.

Hypotheses

One objective of this study is to examine whether the latent construct of emotional connection to nature can be represented by one factor. A second objective of this study is to casually explore the relationship among emotional dispositions, attitudes, and behavioral intentions. Based on previous literature, we tested the following hypotheses.

H₁ Basic emotions experienced while in nature can be represented by one dimension which constitutes an emotional connection to nature.

H₂ Attitudes toward nature will mediate the relationship between emotional connection to nature and willingness to protect nature.

H₃ Emotional connection to nature will be a direct predictor of attitudes toward nature.

H₄ Attitudes toward nature will be a direct predictor of willingness to protect nature.

Methods

Sample

A convenience and purposeful sample of 266 fifth graders from Loveland, Colorado and the Bronx, New York were selected to conduct a survey that contained the emotional connection to nature, attitudes toward nature, and willingness to protect nature variables. Two hundred and one children from Loveland Colorado were surveyed at the beginning of a guided hike as part of a school field trip in the spring of 2011. The remaining 65 children from New York City were sampled during their after-school nature program in the fall of 2011. In both instances, children

did not self-select into the field trip or the after-school program. In the case of the field trip, it was a required part of the school day. For the after-school program, it is an extension of the school day for working parents. Overall, the nature theme of both programs arguably did not introduce bias in our sample to a “nature friendly” group.

Model Variables

Three concepts were examined in this study: Emotional Connection to Nature, Attitudes Toward Nature, and Willingness to Protect Nature.

Emotional Connection to Nature. The construct of emotional connection to nature (ECN) was measured by asking respondents to rate their level of agreement to the following 10 statements (see Table 3.1).

Table 3.1

Emotional Connection to Nature Variables

When I am in nature, I feel...	Very	Somewhat	Neither	Somewhat	Very	
Sad	-2	-1	0	1	2	Happy
Miserable	-2	-1	0	1	2	Joyful
Afraid	-2	-1	0	1	2	Peaceful
Anxious	-2	-1	0	1	2	Calm
Stressed	-2	-1	0	1	2	Relaxed
Uneasy	-2	-1	0	1	2	Comfortable
Bored	-2	-1	0	1	2	Excited
Not interested	-2	-1	0	1	2	Fascinated
Hate	-2	-1	0	1	2	Love
Tense	-2	-1	0	1	2	Restful

Attitudes Toward Nature. Attitudes toward nature (ATN) were determined by asking children to rate their level of agreement with the following statements: (a) I feel a deep love for nature. (b) I feel close to nature. (c) I am attracted to nature. (d) I care about nature. (e) I am interested in nature. (f) I feel strong bond with nature. (g) I like spending time in nature. (h) Being in nature is fun (items a, b, d, e adapted from love and care scale; Perkins, 2010). These

eight variables were coded on a five-point Likert scale ranging from strongly agree (1) to strongly disagree (5).

Willingness To Protect Nature. A child's willingness to protect nature (WTPN) was measured by the following six variables: (a) I am willing to take action to protect nature. (b) I am willing not to harm plants or animals while in nature. (c) I am willing to ride my bike instead of having someone drive me. (d) I am willing to volunteer to help nature. (e) I am willing to recycle my cans and bottles. (f) I am willing to pick up litter that is not mine (items b, c, d adapted from willingness for pro-environmental commitment scale; Kals et al., 1999). These six variables were coded on a five-point Likert scale ranging from strongly agree (1) to strongly disagree (5).

Data Analyses

Confirmatory factor analysis and structural equation modeling utilizing LISREL 8.80 tested whether the emotional connection to nature, attitudes toward nature, and willingness to protect nature constructs provided a good fit for the data. Cronbach's alphas were also computed for each set of variables comprising the three scales.

Structural equation modeling examined the relationship between emotional connection to nature and attitudes toward nature and the influence of attitudes toward nature on willingness to protect nature. Attitudes toward nature were predicted to mediate the relationship between emotional connection to nature and willingness to protect nature.

To establish mediation, the following must be demonstrated (Baron & Kenny, 1986): First the initial variable (emotional connection to nature) must be significantly related with the outcome variable (willingness to protect nature). Second the initial variable must be significantly correlated with the mediator (attitudes toward nature) and the mediator must be

significantly correlated with the outcome variable. Full mediation occurs when the path between the independent variable and dependent variable becomes insignificant in the partial mediation model. In addition, full mediation is supported when the change in chi-squares statistics indicates the partial mediation model fits no better than the full mediation model (Baron, 1986, Hyaduck 1987).

Results

The confirmatory factor analyses demonstrated that the data provided an acceptable fit to the emotional connection to nature, attitudes toward nature, and willingness to protect nature constructs (see Table 3.2). Specifically, all ten variables used to measure an emotional connection to nature loaded on one latent construct as hypothesized. For the emotional connection to nature construct the lowest standard factor loading was .55. Similar factor loadings were observed for attitude toward nature and willingness to protect nature latent constructs. All of the scales had acceptable Cronbach’s alphas (.79, .91, and .93). Consequently, we fail to reject our first hypothesis.

Table 3.2

Items measuring Emotional Connection to Nature, Attitudes Toward Nature, and Willingness To Protect Nature.

Statement	Standardized Factor Loadings	SE	Cronbach’s Alpha
Emotional Connection with Nature Scale^a			.91
While in Nature I feel... Sad/Happy.	.76	.42	
Miserable/Joyful.	.74	.45	
Afraid/Peaceful.	.66	.56	
Anxious/Calm.	.59	.65	

Stressed/Relaxed.	.70	.51	
Uneasy/Comfortable.	.79	.37	
Bored/Excited.	.76	.42	
Not Interested/ Fascinated	.72	.48	
Hate/Love	.73	.47	
Tense/Restful	.68	.54	
Attitudes Toward Nature ^b			.93
I feel a deep love for nature.	.64	.59	
I feel close to nature.	.63	.60	
I am attracted to nature.	.64	.59	
I care about nature.	.73	.47	
I am interested in nature.	.71	.49	
I feel a strong bond with nature.	.71	.49	
I like being in nature.	.76	.42	
Being in nature is fun.	.75	.42	
Willingness to Protect Nature^c			.79
I am willing to... take action to protect nature	.74	.45	
not harm animals or plants while in nature.	.49	.76	
volunteer to help protect nature.	.80	.36	
recycle my cans and bottles.	.68	.54	
pick up litter that is not mine.	.58	.67	

^a Variables coded on a 5-point scale from “strongly” -2, to “strongly” 2, with neither being 0.

^b Variables coded on a 5-point scale from “strongly disagree” 1 to “strongly agree” 5.

^c Variables coded on a 5-point scale from “strongly disagree” 1 to “strongly agree” 5.

Having demonstrated the reliability of all the scales, three structural models were tested. Hypothesis two predicted that attitudes toward nature would fully mediate the relationship between *emotional connection to nature* and *willingness to protect nature*. In the direct effects model, emotional connection to nature had a significant positive effect on willingness to protect nature ($\beta = .49, p < .001$). In the partial mediated model, the path coefficient between emotional connection to nature and attitudes toward nature was significant ($\beta = .71, p < .001$) but the direct path between emotional connection to nature and willingness to protect nature was insignificant ($\beta = -.01, n.s.$). These findings support hypothesis two and the full mediation model.

Further support for the full mediation model comes from the chi square statistics for the partial and full mediation respective models. The full mediation model ($\chi^2 = 567, df = 228, p < .001$) was statistically the same as the partial mediation model ($\Delta \chi^2 = 1, df = 1, ns$).

To determine the overall fitness of full mediation model, five indicators were used (χ^2/df , NFI, NNFI, CFI, RMR). An acceptable χ^2/df ratio should be between a ratio of 2:1 to 5:1 (Marsh, 1985), the full mediation model fell within this range (2.49). In addition, the full mediation model held values above .94 on the Normed Fit Index (NFI), Non-Normed Fit Index (NNFI), and Normed Noncentrality Fit Index (CFI) indices of fitness demonstrating an acceptable fit (Bollen, 2005). Finally the Root Mean Square Residual (RMR) of this model was less than .05 indicating a close fit of the data (Church & Burke, 1994).



Asterick indicates significant at $p < .001$.

Figure 3.2 An Emotional Disposition-Attitude- Behavior Model

Figure 3.2 illustrates the full mediation model. Consistent with hypothesis three, a significant relationship between emotional connection to nature and attitudes toward nature was observed ($\beta = .71, p < .001, R^2 = 51\%$). The positive coefficient implies that those who hold a greater emotional connection to nature held more positive attitudes toward nature. Finally consistent with hypothesis four, as positive attitudes toward nature increase, willingness to protect nature increases ($\beta = .70, p < .001, R^2 = 49\%$).

Discussion

Similar to the growing body of connection to nature research (Hinds & Sparks, 2008; Mayer & Frantz, 2004; Perkins, 2010), this study supports the examination of emotional connection to nature utilizing a mental systems approach (Jacobs et al., 2012). The emotional connection to nature scale predicted a child's attitudes toward nature and this attitude fully mediated the relationship between emotional connection to nature and the behavioral intention of protecting nature. These results support Aldo Leopold's land ethic, specifically those who are connected to the land (nature) will be more likely to protect it (Leopold, 1949). These findings have implications for application, theory, and future research.

From a theoretical approach, the mental systems framework captures the richness of human behavior by understanding the role emotions and cognitions play in pro-environmental behaviors. In this study, children who held an emotional connection to nature were more likely to hold positive attitudes toward nature and in turn held a stronger willingness to protect nature behavioral intention. These findings mirror Value-Attitude-Behavior models with the substitution of emotional dispositions for value orientations. As with previous cognitive studies, attitudes play a mediation role between emotions and behavioral intentions just like they play a mediation role between value orientations and behaviors (Vaske & Donnelly, 1999). Similar

findings will likely emerge showing the positive effects of ECN on other pro-environmental attitudes toward recycling, energy consumption, land management initiatives, and subsequent pro-environmental behaviors. Future studies should expand this model and add precursors that increase ECN as well.

From an applied perspective, this study shows that practitioners need to engage children in activities that foster positive emotions while in nature. Since most children in the United States live in urban areas, their efforts should incorporate nearby nature. Connecting kids to nature these days may need to be a more urban experience found in urban green spaces and parks rather than wilderness experiences (Bruyere, Teel, & Newman, 2009). In addition, studies have indicated that spending extended time in nature with significant others can help foster positive emotions (Chawla, 2006). Qualitative interviews of adults identified as being environmentalists or that hold natural resource jobs identified contact with nature as being a major influence in their care and love of nature as adults. Specifically time spent outside with a significant adult or mentor was of greatest value. The least amount of influence was knowledge gained in a book (Chawla, 1999, 2006; Tanner, 1980).

Most environmental education programs have focused on cognitive approaches including knowledge to change attitudes and behaviors regarding the environment. Although there is merit to this approach, lessons and programs with emotional appeals will likely add value in changing peoples attitudes and behaviors toward nature as well (Pooley, 2000). With this recognition, environmental educators and natural resource organizations should facilitate an emotional connection to nature among kids if their objective is to cultivate the next generation of land stewards. If practitioners can facilitate an emotional connection to nature among children, then

they can expect to increase positive attitudes toward nature and ultimately positively influence a child's willingness to protect nature.

Although this study adds to the growing literature of connectedness to nature research, results must be viewed with some caution. The fact that a purposefully small sample was used made generalization to the larger population not possible. Other researchers should take the ECNS and test it using a randomized sampling approach. Future research should study what precursors contribute to an emotional connection to nature. In addition, future research could compare the predictive power of value orientations when modeled in with emotional dispositions on pro-environmental behaviors. Do value orientations predict more variance when considered with emotional dispositions? With that said, this study was successful in demonstrating a mental systems approach for studying natural resource issues such as connection to nature.

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Chapter IV: Connection To Nature Through The Eyes Of A Child: A Qualitative Study

Introduction

Recent studies have shown that having a strong affinity for the natural world as being associated with positive environmental attitudes and behaviors. Those who have a greater connection with nature hold broader concerns for the environment than those who do not have a connection (Mayer & Frantz, 2004; Schultz, Shriver, Tabanico, & Khazian, 2004). With this recognition, addressing all of the environmental problems we face today hinges on connecting the next generation with nature, thus inspiring care and action to help the earth (Kareiva, 2008). Specifically, the middle childhood years (ages 6-12) has been identified as a crucial time when a person's experiences with the natural world helps form their identity of self, including their relationship with nature (Kellert, 2002). Unfortunately, it seems that more youth are disconnected from the natural world today and are suffering from "nature deficit disorder" (Louv, 2005).

Although connecting people with nature has been a goal of a majority of environmental education (EE) programs and slogan for many organizations, it has rarely been studied. Past research has focused on how EE has affected attitudes and environmental responsible behaviors (ERBS). Instead of focusing solely on knowledge transfer, many scientists have realized the importance of connecting kids to nature, but few have tried to define and measure this (Nisbet, Zelenski, & Murphy, 2009). Academic research in this area is seriously lacking. A few studies have focused on the cognitive piece and fewer on the emotional aspect of this concept. Out of these studies only 1 has studied it in a population under 18 years old (specifically 11th and 12th graders in Europe; Muller, Kals, & Pansa, 2009).

Unfortunately prior research on connectedness to nature (CN) among children is limited and mainly found in the quantitative arena. Traditional survey research is a good starting point in which to study CN among children but it has its limitations such as being heavily deductive researcher driven. On the other hand, qualitative research utilizing focus groups allows the scientific community a chance to approach a phenomena such as CN through a unfiltered lens bringing out detail that is often missed in quantitative work (Strauus & Corbin, 1990). Utilizing qualitative methods allows researchers the chance to capture a person's experiences through their emotionality and self-feelings and allows their true story to be heard (Denzin, 1989). This chapter was guided by the following research question: *How do children articulate their relationship with nature? Is their descriptions more emotional, more cognitive, or some hybrid of both?*

Connection To Nature

There has been a push in recent years to connect kids with nature but the operationalization of this concept is in its infancy. Connectedness in the literature has been used interchangeably with and related to such terms as *engagement, attachment, belongingness, affinity, and affiliation*. The reasons for such a variety of meanings can be attributed to its use in such applied fields as education, medicine, natural resources, sociology, and psychology and most recently in ecopsychology. One of the most parsimonious definitions was given by Hagerty, Lynch-Sauer, Patusky, and Bouwsema (1993) who described the state of connectedness as occurring “when a person is actively involved with another person, object, group, or environment, and that involvement promotes a sense of comfort, well-being, and anxiety-reduction” (p. 293).

In the 1990s, the natural resource profession moved connection to nature from a philosophical discussion to trying to measure it empirically (Clayton, 2009). Dr. Kals and others (1999) recognized that pro-nature protection behaviors cannot be explained by just looking at rational/cognitive thinking. They tested a model that hypothesized past and present experiences in nature influence a person's emotional affinity for nature, cognitive interest in nature, and indignation towards insufficient nature protection. Up to this time the authors claimed that no such study existed demonstrating "emotional affinity for nature" influenced motivation to protect nature. They operationalized emotional affinity toward nature as a person feeling good, safe, and oneness with nature. Examples of statements used to measure emotions included: 1) I feel relaxed and have a pleasant feeling of intimacy when spending time in nature, 2) When surrounded by nature I get calmer and I feel at home, and 3) I do not feel especially at ease whenever I spend time in nature. These questions were asked to 281 adults in Germany. Factor analyses confirmed that all items in the four subscales used to measure emotional affinity to nature loaded on the same factor, with a Cronbach's alphas of .80 to .92 on all subscales. Mean scores were measured across those items belonging to one factor and results of their study confirmed that emotional affinity for nature ($R^2 = .40, p < .001$) and cognitive interest ($R^2 = .42, p < .001$) leads to more behaviors to protect nature (Kals, Schumacher, & Montada, 1999).

Shultz and others in 2004 used a Modified Implicit Association Test (IAT) to measure a person's relationship with nature. Shultz's study focused on expanding the Value – Belief – Norm Theory (VBN). The VBN hypothesizes that a person's values interact with a given situation to produce a behavior. The VBN has defined 3 values, which are egotistic (concerned with self), altruistic (focused on others), and biospheric (focused on the well-being of plants and animals). The researchers hypothesized that a person's environmental attitudes and subsequent

concerns and actions regarding nature would be based on the degree in which a person is “connected to nature.” Being very connected would be an individual who believes that they are part of nature, and that animals and plants should have the same rights as humans. The extreme opposite are those who feel that they are disconnected and superior to plants and animals.

The modified IAT developed by Shultz tested the association of the concepts of Me, Not Me, Nature, and Built to measure connectedness to nature. For example, the two words of *nature* and *built* would be presented on the top of a computer screen along with the word animal. Based on the speed the participant chose *nature* or *built* to associate with animals measures their implicit beliefs. This test has suggested that implicit attitudes are automatic and influence decisions and actions without awareness. Results of testing this on 100 undergraduate students at California State University San Marcos indicated that individuals who associate with nature tend to have broader concerns on environmental issues. They found “connectedness to nature” stable over time and is associated with biospheric ($r = .27$) and egotistic concerns ($r = -.21$). The authors claim that this is the first time connectedness has been based on implicitly.

Mayer and Frantz (2004) developed the connectedness to nature scale (CNS) as a tool to measure one’s feelings of connectedness to nature or oneness with nature. Born out of Aldo Leopold’s philosophy that one will take care of the land if one feels connected to it, the CNS is an important tool in research. After testing it in five studies with undergraduate psychology students, the authors concluded that it was an accurate measure of one’s affective connection to nature ($\alpha = .84$) and is a stronger predictor of environmental behaviors than using the new environmental paradigm scale (NEP) or the implicit associations test (IAT). The CNS correlated positively with ecological behavior ($r = .44, p < .001$) and environmentalism ($r = .56, p < .001$).

Some items on the CNS include: I often feel part of nature, I often feel disconnected from nature, and I feel a personal bond between nature and me (Mayer & Frantz, 2004).

Most recently Helen Perkins (2010) measured affinity for nature by developing a construct called *love and care for nature*, defined as a deep love and care for nature. She argues that all of the best attempts so far have measured mostly the cognitive aspect of connectedness to nature instead of an emotional bond. She based her work on the philosophical view that Biophilia is a love for nature and as such can be measured. Perkins developed a 15 item scale that is known as the Love and Care for Nature Scale (LCN). Items on the scale include 1) I feel joy being in nature, 2) I feel a deep love for nature, and 3) I enjoy learning about nature. Testing this scale on 261 adult tourists revealed that the scale exhibited construct and criterion related validity. The LCN significantly predicted willingness to make personal sacrifices such as accepting increased costs ($\beta = .46, p < .001$) or cuts in living standard to protect the environment ($\beta = .43 p < .001$).

Reflecting on the above research, it is clear that connection to nature has been mostly measured quantitatively and in adult populations. In summary, identification with nature, cognitive representations of nature, and feelings about nature have all been subsumed under the connectedness to nature banner (Mayer & Frantz, 2004; Perkins, 2010; Shultz, 2001).

Purpose of Study

While there is an emergence of literature that is beginning to conceptualize and operationalize connection with nature, very few studies have focused on children. This study aims to describe the components of connection to nature among fifth graders from Loveland, Colorado. Through semi-structured interviews conducted in a focus group setting, we get a glimpse of this phenomenon. The use of focus groups in qualitative research with children has

been deemed as an effective tool to garner rich and lively discussions (Gibson, 2007; Kennedy, Kools, & Krueger, 2001).

Methods

Sample

A convenience and purposeful sample of 25 fifth graders from a local elementary school in Loveland, Colorado participated in focus groups in the spring of 2012. All students participated in an interpretive program at a nearby natural area. During the field trip, the children were introduced to a variety of nature topics and content through an exploration of a foothills ecosystem in the Rocky Mountains, consisting of sweeping valleys, ponderosa pines, stunning red rock cliffs and more. This natural area is home to elk, insect species, wild turkey, mountain lions, and other wildlife.

Sampling Approach

A general qualitative inductive approach as defined by Thomas (2006) was used to uncover the components of a child's connection to nature. Evaluating data inductively allowed for the emergence of frequent, dominant, and significant themes (Strauss, 1998; Thomas, 2006). The following are the principles of this type of study approach.

1. An analysis of the data is guided by a research objective. The objective acts to guide the interpretation of the data and does not define specific expectations of the data.
2. The primary goal of this analyses strategy is the creation of categories that is supported by themes and processes obtained during the coding process.
3. Findings are a result of the coding process where decisions are made by the researcher on what is important or not in the data (Thomas, 2006).

Data was collected via focus groups with the students. Focus groups are a form of interviews (Kitzinger, 1994) where planned discussions are designed to obtain perceptions, attitudes, motivations, concerns, feelings, and opinions of participants (Krueger, 1994) leading to a collective consciousness (McElroy, 1997) and not a consensus. Three 30-minute focus groups concurred simultaneously with students divided into three groups of eight, eight, and nine allowing for engendered lively discussions, a technique that is recommended as a productive way to conduct focus groups with children (Kennedy et al., 2001). Each of these focus groups was conducted by one researcher. Discussions were allowed to flow around three open-ended questions. These sessions were recorded with permission from the participants. The following are the three focus group questions.

Prompt: Imagine that you were taking this picture or were in this picture



- 1) What are you thinking?
- 2) What do you feel?
- 3) Please tell me about your best nature memory from your field trip at Bobcat or any other place? Why was it special?

At the end of the focus group sessions, students were asked to respond individually to two written prompts asking them to explicitly identify their relationship with nature. The writing prompts were a) What does nature mean to you? and b) Do you feel part of or separate from nature?

Analyses Of The Focus Group Discussions And Written Responses

For this study the research objective was to discover the components of a child's connection to nature. Analyses of the focus groups followed a four-step process. First focus group interviews were transcribed verbatim and read thoroughly to get a feel for the discussions and to identify emergent themes. Next the researcher created and defined categories or themes based on text phrases in the data. For example, the category "sense of excitement" was created and text that directly or indirectly related to kids being excited while in nature was assigned this category. Last the transcripts were reread in order to revise categories by creating new categories, combining others or eliminating some (Strauus & Corbin, 1990).

Afterwards, the responses to the written prompts were read in order to categorize those persons whom explicitly identified themselves as being connected with nature or not. Trust worthiness was established by a fellow researcher conducting a consistency check (another coder takes the category descriptions and assigns text to those categories verifying researchers work).

Results

Data analysis results revealed one major theme that described a child's connection with nature. This was a child's affective relationship with nature. A child's affective connection with nature involves a sense of joy, peace, excitement, wonder, joy, freedom, love, and comfort while in or thinking about nature.

In order to respect privacy, children's comments will only be identified by P# (participant number). In addition, to save the accuracy of their comments, they are transcribed verbatim regardless of grammatical errors.

Affective relationship with nature

The majority of language used by kids to describe their connection to nature involved emotional words. Based on their descriptions, a child's affective connection with nature involves a sense of joy, peace, excitement, wonder, joy, freedom, love, and comfort while in or thinking about nature.

Sense of Joy

Participants from all focus groups described feeling a sense joy while in nature. A sense of joy can be described as a feeling of great pleasure and happiness. The following are examples of this class of emotions.

P₂: "It is just a joyful place to be (nature)."

P₃: "I enjoy it (nature)."

P₅: "Nature makes me feel happy..."

P₁₀: "So I like nature it just makes me feel happy."

P₁₁: "I think it just makes you feel so happy to be able in a beautiful place like right by there (picture)."

P₄: "I feel happy and it just makes me happy when I get to go out and just be in water and just be outside."

P₁₅: "I feel part of nature because it is fun..."

Sense of Comfort

Nature among the kids was a place that provided comfort and relaxation. Sense of comfort can be described as the feelings of physical and psychological ease. The following illustrates this in kids.

P₆: “Id actually feel pretty good (while in nature).”

P₇: “Relaxed.”

P₈: “...I would feel much more relaxed (in nature).”

P₉: “I would feel protected, calm and relaxing (while in nature).”

Sense of Wonder

In this study, nature was seen as cool place to explore and make neat discoveries fostering a sense of wonder. A sense of wonder is described as the awe, astonishment, surprise, or admiration of an object (nature). The following are examples of this category of emotions.

P₁: “Well sometimes in nature I could just feel curious, like just memorized by what like the animals or plants doing.”

P₆: “And I think that it’s just amazing to be there (nature).”

P₁₂: “... lot of neat places to explore and a lot of neat things to see.”

P₁₃: “Well I just think when ever you are out there its pretty you can see all these things you haven’t seen before.”

Sense of Peace

Many of the kids described nature as being a peaceful place. A sense of peace involves feelings of security, contentment, and harmony. The following are examples of this emotion.

P₁₄: “...nature is peaceful...”

P₈: “I could just picture myself there and it would calm me down.”

P₁₀: “I just feel peaceful when I am in nature.”

P₃: “Calm.”

P₁₅: “I usually feel peaceful...”

P₉: “It is a delight to be in such a peaceful place.”

Sense of Excitement

A sense of excitement can be described as feelings of pleasant anticipation or feelings of being stimulated. The following illustrates this emotion in kids while in nature.

P₁₆: “Adrenaline.”

P₁₇: “I be feelin excited to see what other animals were doing...”

P₁₁: “It just makes me feel excited (being in nature).”

P₁₂: “I be feelin excited.”

Sense of Freedom

Two children described a sense of freedom while in nature. This can be described as the feelings of being able to act, think or speak the way they want without restraint. The following quotes exemplify kids experiencing this emotion.

P₁₁: “What nature means to me is that you get to be free.”

P₁: “I think nature is many things. Like freedom, joy, an opportunity to do new things.”

Sense of Love

In this study, a few children described nature as being an object of their deep affection, which we call a sense of love. The following illustrates this emotion in children.

P₄: “I love it (nature).”

P₃: “I love nature, I think it’s awesome!”

P₁₈: “I feel part of nature because I love it....”

Discussion

The main objective of this general qualitative study was to discover the components of a child’s connection with nature. This endeavor was successful in identifying one component or theme to a child’s connection with nature; this was their affective connection with nature.

Although the children were prompted to describe cognitively about their relationship with nature,

no child described it in purely factual terms but their descriptions were heavily emotional laden. These findings lend credence to recent quantitative studies that suggest that a person's connection to nature is mostly an emotional construct (Hinds & Sparks, 2008; Mayer & Frantz, 2004). This has implications for application, theory, and future research.

From a theoretical perspective, in the bigger picture of connectedness research from other fields such as medicine and education, these initial findings support the concept of what it means to be connected to something which is “when a person is actively involved with another person, object, group, or environment, and that involvement promotes a sense of comfort, well-being, and anxiety-reduction” (Hagerty, Lynch-Sauer, Patusky, and Bouwsema (1993), p. 293). It is important that whether dialoging or surveying kids about their connection to nature to include measures of peace, comfort, love, joy, and wonder in order to assess their connection to nature. With this said, this study also validates the newly developed emotional connection to nature scale by this author.

From an applied perspective effectively being able to measure a person's connection with nature, allows environmental education professionals and others the opportunity to measure their work in trying to connect people to nature. This is important because research has shown that a person who is more strongly connected with nature will exhibit more pro-environmental attitudes and willingness to protect nature (Kals et al., 1999). Not only are empirical surveys needed to capture changes in a person's attitudes and behaviors, but mixed methods research should be implemented more to get a richer picture of the impacts of environmental education programs. Qualitative techniques have been shown to complement quantitative procedures to get a better feel for what someone has experienced due to a program (Carleton-Hug & Hug, 2010).

If most environmental education efforts ultimately want change behavior they should put more emphases in the affective domain (emotions) in addition to knowledge based approaches (Pooley, 2000). Efforts should be made to include activities that help facilitate this emotional bonding as well as facilitating feelings of fun, happiness, joy, and freedom while children are in nature. This can include positive experiences in nature with significant others (Chawla, 2006). Also unstructured free time to explore nature can help in this endeavor also.

While these findings add to the growing literature and discussion about connectedness to nature, they must be viewed with an air of caution. The fact that a purposeful small sample was chosen to conduct this study, makes generalization to a larger community difficult. Future research should interview a group of students who have not attended an interpretive program at a natural area and those who researcher's feel may be less "connected with nature" in order to diversify the sample. In addition, future qualitative research could answer the following. What experiences facilitate a connection to nature? Is connection to nature stable over time? Do all children feel connected to nature at an early age?

In conclusion, this study adds to the growing literature and theory suggesting that connection to nature is heavily affective and as such should be measured in the realm of emotions not cognitively. If a goal of environmental education programs is to connect kids with nature then we need to be able to measure this. In addition, current environmental education efforts need to not rely so much in knowledge-based approaches but affective approaches as well (Pooley, 2000). Focusing on a child's emotional affinity for nature is one such way to do this.

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Chapter V: The Value Of Measuring An Emotional Connection To Nature

The purpose of this dissertation was to create an affective measure of a child's connection to nature and study its influence on subsequent attitudes and behaviors toward nature. The first study created a valid and reliable measure of a child's emotional connection to nature, which could be used as a simple way for environmental education (EE) practitioners to gauge effectiveness of their programs. The next study utilized a mental systems approach to demonstrate the predictive power of a child's emotional connection to nature (ECN) on their attitudes toward nature (ATN) and willingness to protect nature (WTPN). Finally the third study undertook a general qualitative approach and confirmed the researcher's previous findings that measuring a connection to nature should be done in the realm of emotions.

Previous limited research has highlighted the importance of measuring and studying connection to nature to help explain pro-environmental behaviors. Many scientists have realized the importance of connecting kids to nature, but few have tried to define and measure this (Nisbet, Zelenski, & Murphy, 2009). Academic research in this area is seriously lacking. A few studies have focused on the cognitive piece and fewer on the emotional aspect of this concept. Out of these studies only one has studied affective connection to nature in a population under 18 years old (specifically 11th and 12th graders in Europe; Muller, Kals, & Pansa, 2009). In recognition of the gap in the literature, this dissertation focused on the development of a tool that measures a child's emotional connection to nature, examined its predictive potential, and sought to understand this phenomenon through the lens of a child.

Summary of Findings

The purpose of chapter two was to develop a reliable and valid measure of child's emotional connection to nature. This was accomplished by testing the emotional connection to

nature scale (ECNS) on 266 fifth graders from both Colorado and New York. As hypothesized all variables of the ECNS loaded on one factor that measured the latent construct of emotional connectedness to nature. This scale relates to the inclusion with nature scale, which is conceptually related but not the same (cognitive connection with nature as opposed to an emotional connection to nature). Also this study provides initial support that being emotionally connected to nature will lead to a willingness to protect nature.

Being emotional connected to nature meant feeling any combination of happiness, joy, peace, calmness, relaxation, comfort, excitement, fascination, love, and rest while in nature. The opposite is true for those who are emotionally disconnected to nature. They tend to experience more negative feelings such as sadness, anxiousness, stress, uneasiness, and hate while in nature. This study adds to the growing literature on what it means to be connected to nature (Hinds & Sparks, 2008; Kals et al., 1999; Mayer & Frantz, 2004; Perkins, 2010).

The results of study one suggested that the ECNS is a simple, reliable, and valid tool that can be used to assess a child's emotional connection to nature. The ECNS supports the philosophical discussions and limited research concerning connection with nature. That is if a person is connected to nature, they will experience any combination of feelings such as of happiness, joy, peace, calmness, relaxation, comfort, excitement, fascination, love, and rest while in nature.

From an applied perspective, the ECNS addresses the call from some to add more rigorous evaluation to the efforts of the environmental education (EE) programs. If one of the goals of EE is to connect kids with nature, the ECNS could be used as a quick and reliable way to measure such effort. The ECNS also could be used to further explain a person's relationship

with nature along with other cognitive measures such as inclusion with nature scale and the connection to nature scale.

The purpose of the study explained in chapter three was to understand the role emotions and cognitions play in willingness to protect nature through a mental systems approach. The model tested in this chapter demonstrated attitudes toward nature fully mediated the relationship between a child's emotional connection to nature and their willingness to protect nature. Results revealed that children who held an emotional connection to nature were more likely to hold positive attitudes toward nature and in turn held a stronger willingness to protect nature, which builds on previous findings from other researchers (Kals et al., 1999; Mayer & Frantz, 2004; Perkins, 2010). These results also support Aldo Leopold's Land Ethic, specifically, those who are connected to the land (nature) will be more likely to protect it (Leopold, 1949).

In addition, this study suggests that the mental systems framework captures the richness of human behavior by understanding what role emotions and cognitions play in pro-environmental behaviors. These findings mirror Value-Attitude-Behavior (VAB) models with the substitution of emotional dispositions for value orientations. As with previous cognitive studies, attitudes play a mediation role between emotions and behavioral intentions just like they play a mediation role between value orientations and behaviors (Vaske & Donnelly, 1999). Similar findings will likely emerge showing the positive effects of ECN on other pro-environmental attitudes toward recycling, energy consumption or land management initiatives, and subsequent pro-environmental behaviors.

These results have implications for environmental education practitioners. Most EE programs have focused on cognitive approaches including knowledge to change attitudes and behaviors regarding the environment. Although there is merit to this approach, lessons and

programs with emotional appeals will likely add value in changing people's attitudes and behaviors toward nature as well. With this recognition, environmental educators and natural resource organizations should facilitate an emotional connection with nature among kids if their objective is to cultivate the next generation of land stewards. If practitioners can facilitate an emotional connection with nature among children, then they can expect to increase positive attitudes toward nature and ultimately influence a child's willingness to protect nature.

One way to do so is spending quality time with a significant other or mentor. Studies have indicated that spending extended time in nature with significant others can provide these types of experiences. Qualitative interviews of adults identified as being environmentalists or that hold natural resource jobs identified contact with nature as being a major influence in their care and love of nature as adults. Specifically time spent outside with a significant adult or mentor was of greatest value. The least amount of influence was knowledge gained in a book (Chawla, 1999, 2006; Tanner, 1980).

The main objective of the general qualitative study found in chapter four, was to discover the components of a child's connection to nature. This endeavor was successful in identifying one theme to a child's connection to nature; this was their affective connection with nature. Although the children were prompted to describe their relationship with nature, no child described nature in purely factual terms but their limited cognitive descriptions were heavily emotional laden. These findings lend credence to recent quantitative studies that suggest that a person's connection to nature is mostly emotional (Mayer & Frantz, 2004; Perkins, 2010).

In the bigger picture of connectedness research from other fields such as medicine and education, these initial findings support the concept of what it means to be connected to something, which is "when a person is actively involved with another person, object, group, or

environment, and that involvement promotes a sense of comfort, well-being, and anxiety-reduction” (Hagerty, Lynch-Sauer, Patusky, and Bouwsema (1993), p. 293). It is important that whether dialoging or surveying kids about their connection to nature to include measures of peace, comfort, love, joy, and wonder in order to assess their connection to nature. With this said, this study also validates the newly developed emotional connection to nature scale by this author.

From an applied perspective, effectively being able to measure a person’s connection to nature, allows environmental education professionals and others the opportunity to measure their work in trying to connect people to nature. This is important because research has shown that a person who is more strongly connected with nature will exhibit more pro-environmental attitudes and willingness to protect nature (Kals et al., 1999). Not only are empirical surveys needed to capture changes in a person’s attitudes and behaviors, but mixed methods research should be implemented more to get a richer picture of the impacts of environmental education programs. Qualitative techniques have been shown to complement quantitative procedures to get a better feel for what someone has experienced due to a program (Carleton-Hug & Hug, 2010).

If most environmental education efforts ultimately want change behavior they should put more emphases in the affective domain (emotions) in addition to knowledge based approaches (Pooley, 2000). Efforts should be made to include activities that help facilitate this emotional bonding as well as facilitating feelings of fun, happiness, joy, and freedom while children are in nature. This can include positive experiences in nature with significant others (Chawla, 2006). Unstructured free time to explore nature can help in this endeavor also.

Limitations and Future Research

The construction of the ECNS is an exciting contribution to the literature regarding measuring connection to nature among children but should be looked at with caution. There are a few limitations to the studies discussed within this dissertation that merit discussion.

Evaluation of the 10 emotional connection to nature variables resulted in one factor supporting a single dimension to this construct. However due to the purposeful sampling of 266 fifth graders could be misleading. Would the 10 variables still hold if we randomly sampled fifth graders through out the United States? Maybe the inclusion of a more diverse sample would lead to more factors?

In addition, generalization to a larger population is not possible due to the non-random sample. Other researchers should take the ECNS and test it using randomized sampling approach. In addition, the precursors that contribute to an emotional connection to nature should be studied also. Future research should interview a group of students who have not attended an interpretive program at a natural area and those who researcher's feel may be less "connected with nature" in order to diversify sample. Also the precursors that contribute to an emotional connection to nature should be thoroughly studied? In addition, future research could compare the predictive power of values orientations when modeled in with emotional dispositions. Do value orientations predict more variance when considered with emotional dispositions? Future qualitative research could answer the following; What experiences facilitate a connection to nature? Is connection to nature stable over time? Do all children feel connected to nature at an early age?

Conclusion

This dissertation demonstrated that the newly created emotional connection to nature scale was a reliable and valid measure of a person's affective connection to nature. This manuscript also advanced an understanding of the integration of emotions and cognitions in the understanding of the relationship among emotional connection to nature, attitudes toward nature, and willingness to protect nature through a mental systems framework. These findings as a whole give environmental educators and others a way of measuring their efforts in "connecting kids with nature." In addition, it adds empirical support for the Aldo Leopold Land Ethic philosophy that those who feel connected with the land will care for it (Leopold, 1949).

If the connection to nature movement wants to succeed it needs to address the issues that keep children away from nature. They include parental fear, fear of nature, and lack of mentors willing to take a child outside. Once they get children outside, the focus should be on allowing them an opportunity for bonding with nature through engaging all the senses. A child must be allowed to explore and engage nature at his/her choosing in order to facilitate the sense of joy, peace, excitement, wonder, joy, freedom, love, and comfort. Activities that develop a sense of wonder and awe for nature should be emphasized. Once this emotional connection is established, we can expect a child to engage in pro-environmental behaviors. In the broader picture, state and federal agencies benefit from supporting programs that facilitate an emotional connection to nature among children. These children will grow up and hopefully find their work relevant and become future supporters of natural resources initiatives.

In conclusion, this dissertation adds to the growing literature and theory suggesting that connection to nature is heavily affective and as such should be measured in the realm of emotions not cognitively. If a goal of environmental education programs and the connection to

nature movement is to connect kids with nature, then we need to be able to measure this.

Focusing on a child's emotional affinity for nature is one such way to do this.

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Appendix A Survey Item

Emotional Connection to Nature Scale

The following questions are to help us understand how you feel about nature, so we can have the best field trips possible for future 5th graders from your school!

Please circle one number for each row that best describes how you feel when you are in nature.

For example, for row one if you feel *somewhat sad* while being in nature you would circle the number -1.

<i>When I am in nature, I feel...</i>	<i>Very</i>	<i>Somewhat</i>	<i>Neither</i>	<i>Somewhat</i>	<i>Very</i>	
Sad	-2	-1	0	1	2	Happy
Miserable	-2	-1	0	1	2	Joyful
Afraid	-2	-1	0	1	2	Peaceful
Anxious	-2	-1	0	1	2	Calm
Stressed	-2	-1	0	1	2	Relaxed
Uneasy	-2	-1	0	1	2	Comfortable
Bored	-2	-1	0	1	2	Excited
Not interested	-2	-1	0	1	2	Fascinated
Hate	-2	-1	0	1	2	Love
Tense	-2	-1	0	1	2	Restful

Below are statements that represent different ways some people feel toward nature. We're interested in knowing how you feel about nature. Circle one number for each statement based on how much you agree or disagree with the sentence

	<i>Strongly Disagree</i>	<i>Slightly Disagree</i>	<i>Neither</i>	<i>Slightly Agree</i>	<i>Strongly Agree</i>
I feel a deep love for nature.	1	2	3	4	5
I feel close to nature.	1	2	3	4	5
I do not love nature.	1	2	3	4	5
I feel distant from nature.	1	2	3	4	5
I am attracted to nature.	1	2	3	4	5
I care about nature.	1	2	3	4	5
I am interested in nature.	1	2	3	4	5
I feel a strong bond with nature.	1	2	3	4	5

Below are statements that represent different ways some people think about nature. We're interested in knowing how you *think* about nature. Circle one number for each statement based on how much you agree or disagree with the sentence

	<i>Strongly Disagree</i>	<i>Slightly Disagree</i>	<i>Neither</i>	<i>Slightly Agree</i>	<i>Strongly Agree</i>
I like being in nature.	1	2	3	4	5
Being in nature is fun.	1	2	3	4	5
Protecting nature is important to me.	1	2	3	4	5
Being in nature is boring.	1	2	3	4	5
Nature can take care of itself.	1	2	3	4	5
I like spending time in nature.	1	2	3	4	5
Nature needs our help.	1	2	3	4	5

Below are statements that represent different ways some people are willing to help nature. We're interested in knowing your willingness to do the following. Circle one number for each statement based on how much you agree or disagree with the sentence

<i>I am willing to.....</i>	<i>Strongly Unwilling</i>	<i>Slightly Unwilling</i>	<i>Neither</i>	<i>Slightly Willing</i>	<i>Strongly Willing</i>
take action to protect nature.	1	2	3	4	5
not harm animals or plants while in nature.	1	2	3	4	5
ride my bike instead of having someone drive me.	1	2	3	4	5
volunteer to help protect nature.	1	2	3	4	5
recycle my cans and bottles.	1	2	3	4	5
pick up litter that is not mine.	1	2	3	4	5

Nature Identity

Please circle the picture below which best describes your relationship with the Nature.

