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RUNNING HEAD: PRO-ENVIRONMENTAL BEHAVIOUR IN URBAN AND RURAL CANADA

Connectedness to Nature and Pro-Environmental
Behaviour from Early Adolescence to Adulthood:
A Comparison of Urban and Rural Canada

by

Daniel John Anderson

THESIS

Submitted to the Department of Psychology in partial fulfillment of the requirements for

Masters of Arts in Developmental Psychology

Wilfrid Laurier University

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Abstract

Previous research has demonstrated that emotional connectedness to nature (ECN) is one of the strongest predictors of pro-environmental behaviour (PEB). This study investigated the influence of age, gender and living context on ECN and PEB in two Canadian samples.

Study participants completed an environmental survey, which assessed demographic data as well as their levels of ECN and PEB. Project I, which contained 1251 participants, investigated what group factors (age, urban vs. rural living context, male vs. female) contributed to ECN and PEB, as well as whether ECN mediated the relationship between age and PEB. Project II, which contained 84 adolescents, investigated whether participants living in high-accessibility to nature urban settings differed significantly in their levels of ECN or PEB in comparison to those living in a low accessibility to nature urban settings.

Project I's results revealed that ECN was the strongest predictor of PEB in comparison to the other factors. Results showed that adults displayed significantly higher levels of ECN and PEB in comparison to adolescents, and that females displayed higher levels of both ECN and PEB in comparison to males. Moreover, urban and rural participants significantly differed in their levels of PEB, but not in their levels of ECN. Project II's results revealed no significant differences between the two urban settings being compared.

Keywords: Emotions, Morality, Age, Environmentalism, Behaviour.

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Connectedness to Nature and Pro-Environmental Behaviour from Early Adolescence to**Adulthood: A Comparison of Urban and Rural Canada**

Research by the Intergovernmental Panel on Climate Change (IPCC) has found that global temperature averages have risen 1.5° Celsius since the pre-industrial period, circa 1850–1900 (IPCC, 2018). Human activities such as industrialization, large-scale agriculture and transportation are thought to be the dominant cause of this temperature increase (IPCC, 2018). Rising global temperatures are directly linked to many forms of ecological destruction, and pose an existential threat to human and nonhuman life around the globe (Gallup Poll, 2009). Widespread species extinctions, emblematic of declines in biodiversity, have marked the beginning of the sixth great extinction in Earth's history: the Anthropocene (Kolbert, 2014).

Addressing the challenge of climate change requires humanity's concerted effort at multiple levels. Technological innovation is needed to reverse some of the detrimental effects that humans have had on natural ecosystems, such as the oceans and rainforests. Likewise, both national and international oversight is needed in order to regulate the activities of corporations operating around the globe. However, technological innovation and systematic reform are only part of the picture. Individuals' mindsets are also an important factor to consider. The psychological contribution to solving climate change involves motivating individuals of all ages to adopt pro-environmental behaviours and attitudes, which, in turn, will help reduce humanity's environmental footprint.

Individual behaviour can be approached from at least two different angles. For adults, an effective strategy requires understanding how both personal characteristics, and the demand characteristics of a situation, influence individuals' pro-environmental behaviour (Gifford & Nilsson, 2014). When considering children and adolescents, however, a different question is raised; namely, what factors will promote the long-term development of belief systems and personal characteristics that support pro-environmental behaviour (PEB)? Addressing this question is the focus of the current study.

Previous research has demonstrated that children and adolescents moralize the natural environment (Kahn & Lourenço, 2002; Krettenauer, 2017). However, moral judgements, in and of themselves, are typically poor predictors of individuals' moral behaviour (Walker, 2004). Research has demonstrated that affective factors, such as individuals' emotional connectedness to nature (ECN), are much stronger predictors of PEB (Krettenauer, 2017). However, ECN has been found to significantly decline over the adolescent period (Krettenauer, 2017).

What factors contribute to, or detract from, ECN development? Past research has demonstrated that factors such as living context (Hinds & Sparks, 2008), gender (Müller, Kals, & Pansa, 2009), and age (Krettenauer, 2017) can all influence levels of ECN. Taken together, these findings raise several important questions: is the decline in ECN permanent or does it rebound moving into adulthood? Is this decline consistent between urban and rural youth? Is the decline consistent for both males and females? The present study will attempt to answer these questions by investigating the relationship between ECN, PEB and age in urban and rural contexts within Canada.

Pro-Environmental Behaviour

Pro-environmental behaviour (PEB) encompasses a variety of different actions that individuals take to either minimize environmental harm or to help actively restore the environment. While studying this subject, some researchers have focused on individuals' personal practices, such as recycling, and transportation use (Krettenauer, 2017), while others have focused on environmental activism, which involves seeking out environmental education and participating in environmental protests or demonstrations (Alisat & Riemer, 2015).

For the purposes of the present study, the focus will be on the former of these two categories, and thus will center on how often individuals make environmentally-sustainable choices with the intention of reducing their negative impact on the natural environment.

Emotional Connectedness to Nature

Past research has demonstrated that children and youth morally condemn behaviours that harm the natural environment (Kahn & Lourenço, 2002; Krettenauer, 2017). However, there is often a discrepancy between individuals' moral judgements regarding nature and their PEB. That is, those who express moral concern for the environment often fail to behave in ways compatible with their stated views. This discrepancy, which is not unique to environmental issues, is commonly referred to as the judgement-action gap (Butt & Shaw, 2009; Kollmuss & Agyeman, 2002; Urry, 2008). Importantly, the judgement-action gap increases as the personal costs of one's beliefs grow (Gardner & Stern, 2002).

Cognitive factors, which include moral judgements, are poor predictors of individuals' moral behaviour. Past research has demonstrated that individuals' moral judgements (Walker, 2004) and moral reasoning (Krebs & Denton, 2005) are both poor predictors of individuals' moral behaviour, especially when other factors, such as intelligence, are controlled for (see Blasi, 1980). Research in environmental psychology has similarly demonstrated that other cognitive factors, such as individuals' environmental knowledge, minimally contribute to their PEB (Frick et al., 2004; Otto & Pensini, 2017).

In spite of these findings, research has demonstrated that personal norms, which contain a cognitive dimension, are one of the strongest predictors of PEB (Bloom, 2016; Krettenauer, 2017; Stern, 2000; Stern et al., 1999). Personal norms, in this context, can be defined as one's sense of personal obligation to defend nature (Stern, 2000). Personal norms are particularly influential when predicting low-cost behaviours that do not require significant personal sacrifices (Steg & Vlek, 2009), yet, if widespread, would have a significant impact on society as a whole (Schultz & Kaiser, 2012).

Similar research has shown that cognitive perceptions of an issue are influential in determining individuals' behaviour. Research by Han, Lee and Hwang (2016) found that individuals' awareness of climate change, in and of itself, did not influence their PEB. However, individuals' perceptions of their moral responsibility and accountability for climate change were strong predictors of individuals' PEB.

Emotions may assist in explaining why particular moral judgements rise to the status of

personal norms, while others do not. Affective factors, notably empathy, have previously been demonstrated to predict a variety of prosocial behaviours and outcomes (Allen & Ferrand, 1999; Bloom, 2013; Eisenberg, Spinrad, & Morris, 2014; Hertz & Krettenauer, 2016). Research has similarly demonstrated that individuals' emotional connectedness to the environment is a strong predictor of their PEB (Brügger, Kaiser, & Roczen, 2011; Chawla & Derr, 2012; Cheng & Monroe, 2012; Hinds & Sparks, 2008; Kals & Ittner, 2003; Kals, Shoemaker & Montada, 1999; Krettenauer, 2017).

Emotional connectedness to nature refers to a feeling of affinity, closeness, or oneness with nature. In most previous studies, ECN has been conceptualized and measured in purely affective terms, focusing on individuals' love toward nature, or individuals' feelings of freedom, oneness or security when spending time in nature etc. (Müller, Kals, & Pansa, 2009). However, others have tried to avoid this subjective focus, and instead have emphasized self-reported behaviours when assessing ECN (Brügger, Kaiser, & Roczen, 2011). Nevertheless, in both instances this measure proves to be an exceptionally strong predictor of PEB.

ECN provides individuals with an intrinsic motivation to engage in PEB (Otto & Pensini, 2017). When individuals feel connected to nature, the environment is often experienced as an extension of themselves. In turn, environmental harm begins to impact the self more directly. This then motivates individuals to take pro-environmental action in response (Otto & Pensini, 2017).

ECN traces its origins back to an older topic called biophilia. Proponents of the biophilia hypothesis had speculated that the human connection to nature was inherent, and encoded into the human genome (Kellert, 1996; Wilson, 1984). However, the biophilia hypothesis ran into a number of difficulties, including criticisms aimed at its strong genetic claims (Fischer, 1994; Kellert, 2002), evidence of aversions to nature, which are sometimes referred to as "biophobia" (Bixler & Floyd, 1997), anthropological accounts of cruelty toward nature (Diamond, 1993), and references to individuals' affinity for artificial objects and settings (Partridge, 1996).

Subsequent research on the topic has demonstrated that individuals' affinity for nature is likely shaped by cultural forces and individuals' experiences (Kellert, 2002; Nabhan & St. Antoine, 1993). Kahn (1997) studied children in urban and rural settings and investigated their moral judgements (and accompanying reasoning) toward environmental destruction and environmental harm. When study participants were questioned about environmentally harmful behaviours, Kahn discovered that inner-city American children were more likely to employ biocentric reasoning (i.e., reasoning that appeals to the inherent value of ecological entities) than their Brazilian counterparts, who mostly employed homocentric reasoning (i.e., reasoning that appeals to the impact that harm to ecological entities would have on humans). These findings suggest that factors such as living context and culture could influence individuals' moral attitudes toward nature.

Previous research has demonstrated that individuals' exposure to, or contact with, nature can influence their levels of emotional connectedness to the environment (Cheng & Monroe, 2012; Mayer et al., 2009; Pensini et al., 2016). This makes it all the more concerning that human beings' exposure to nature is presently dwindling. Pyle (1978) argued that individuals are currently suffering an "extinction of experience" when it comes to their relationship with nature. Louv's book (2008) *Last Child in the Woods* echoes this sentiment when he describes how children are now living in conditions divorced from nature, where most individuals' connections with nature are indirect (e.g., watching *Planet Earth* instead of actually going outside). This is not mere speculation on these authors' parts, as research indicates that children living in industrialized nations are now spending less time outdoors in comparison to children from previous generations (Clements, 2004; Karsten, 2005). Part of what accounts for this generational change is the growing preoccupation adults have with their children's safety, which can lead to parents shielding their offspring from nature by limiting their outdoor play (Clements, 2004; Louv, 2005, Twenge, 2017). Another contributing factor is the ever-increasing number of home-based technological activities now competing for children's attention and time, which

can push interactions with nature to the wayside (Clements, 2004; Zaradic & Pergams, 2007).

A number of explanations have been proposed to explain why time spent in nature and individuals' emotional affinity for the environment are correlated. Hinds and Sparks (2008) have proposed that this can be explained by the relationship between familiarity and affinity. Research has previously demonstrated that repeated exposures to an object can increase an individuals' affinity for that object and assist in the formation of affective ties to it, which is known as the *mere exposure hypothesis* (Millar & Millar, 1996; Zajonc, 2001).

This hypothesis appears to be supported by a number of studies that investigate the relationship between time spent in nature and individuals' emotional affinity for the environment. Studies have found that individuals who frequently spent time in nature during their early childhood were more likely to engage in PEB than those who had not (Collado et. al, 2015; Hsu, 2009; Wells & Lekies 2006). However, all three of these studies relied upon retrospective accounts of individuals' experiences in nature. Therefore, it was unclear whether the childhood experiences themselves were responsible for individuals' PEB, or alternatively, whether these experiences were merely salient to environmentally-conscious adults (Howes, 2007; Neisser, 1988).

A second problem with Hinds and Sparks' (2008) explanation are cases in which an exposure to nature fails to result in pro-environmental outcomes. Bixler, Floyd and Hammit (2002) demonstrated that early-childhood exposures to nature sometimes resulted in a preference for behaviours that harmed the environment, such as the use of off-road vehicles. Some negative experiences in nature can also weaken individuals' intentions to take pro-environmental action, such as exposures to poison ivy or slipping in a creek bed during childhood (Bogehölz & Rüter, 2004). These findings underscore the importance of children experiencing nature alongside their guardians, who can help facilitate their experiences in nature, and in turn, might positively shape their subsequent attitudes (see Kals et. al., 1999).

Facilitating individuals' experiences in nature is only one of the roles that guardians play in the development of children and adolescents' environmental attitudes. Research has indicated that parents' own environmental attitudes can also play a substantive role in shaping their children's environmental attitudes. Cheng and Monroe (2012) surveyed a large sample of Florida primary school students about their attitudes toward nature and found that family values strongly contributed to individuals' ECN. The authors speculated that children might live closer to nature and spend more time in nature because of their families' values, which, in turn, could create the false impression that contact with nature was responsible for creating their emotional connectedness to the environment.

One final factor worth mentioning is the role of environmental education programs. Previous research has suggested that outdoor school excursions and naturalizing the classroom were simple but effective steps that could be taken toward cultivating ECN and environmental knowledge (Otto & Pensini, 2017). While environmental knowledge makes minimal contributions to the variance in PEB (Frick et al., 2004; Otto & Pensini, 2017); it may, however, play an important role in alerting individuals to ways in which they could effectively combat environmental harm, or ways in which they could behave in an environmentally-sustainable manner. Individuals who score low on pro-environmental measures often cite the lack of perceived opportunities they have to behave pro-environmentally (Mazze, 2006), so this consideration should not be overlooked.

Developmental Considerations

Adolescence is typically characterized as a developmental period associated with increased moral sensitivity. This is typically attributed to the development of abstract thought, the greater ability to adopt the perspectives of others, and an increased awareness of large societal issues (Eisenberg et. al., 1995; Eisenberg et al., 2002). However, despite this positive characterization of adolescence, this developmental period is also linked to declines in social responsibility and prosocial action (Smetana et al., 2009; Wray-Lake, Syvertsen, & Flanagan, 2015).

One such decline is found in adolescents' environmental behaviour. ECN has been found to decline over the course of adolescence within Western industrialized societies (Krettenauer 2017; Negev, Sagy, Garb & Tal, 2008). Some have even gone so far as to characterize adolescence as a "time out" in humans' relationship with nature (Kaplan & Kaplan, 2002).

The decline in PEB may be partially attributable to affective changes occurring over the course of adolescence. Age-related declines in PEB were found to be mediated by corresponding declines in adolescents' ECN (Krettenauer 2017; Szagun & Mesenholl, 1993).

Declines in PEB may also be due, in part, to cognitive factors such as individuals' normative beliefs. Krettenauer (2017) demonstrated that PEB was not only mediated by affective factors but also by the prescriptivity of moral judgements (i.e., the degree to which a behaviour was judged to be obligatory or not). Social Domain Theory suggests that all moral judgements share a particular set of qualities, which differentiate them from other kinds of judgements (Killen, Smetana & Smetana, 2014). For instance, moral issues are typically considered universal (i.e., obligatory regardless of one's identity or group) and non-contingent (i.e., obligatory whether or not a recognized authority reinforces the rule). This is in contrast to personal issues, which are merely a matter of individual discretion, or conventional issues, which are context-dependent (i.e., dependent upon a particular set of customs or circumstances). Although the classification of actions as moral, conventional, and personal is typically stable throughout the course of development (Nucci & Turiel, 2009), it was found that some obligatory behaviours were considered to be discretionary by teenagers during the adolescent period (Smetana et al., 2009). Thus, declines in PEB may be a function of adolescents viewing certain pro-environmental behaviours as optional rather than as mandatory.

It is unclear whether the declines identified during adolescence are permanent or whether they instead represent an "adolescent dip" (Olsson & Gericke, 2016, p.35). Some studies with adults have pointed toward a positive relationship between age and environmental concern (Gifford & Nilsson,

2014; Otto & Kaiser, 2014). However, it is difficult to know whether these findings reflect cohort differences or whether they are owing to more general trends in moral and personality development, which are characteristic of adulthood (Krettenauer, Murua, & Jia, 2016; Krettenauer & Victor, 2017).

Several important questions are raised by these findings: does this decline persist past adolescence? And more importantly, is this decline consistent across various demographics?

Living Context

Past research has also suggested that living context may play an important role in determining individuals' ECN and their PEB (Collado et. al., 2015; Hinds & Sparks, 2008; Müller, Kals, & Pansa, 2009). For example, past research has demonstrated that individuals living in rural environments tended to display higher levels of ECN and PEB in comparison to their urban counterparts (Collado et. al., 2015; Hinds & Sparks, 2008). This may be due, in part, to the frequency of contact with nature that rural individuals experience. Indeed, research has supported this point, showing that individuals living in rural areas tend to have more contact with nature than those living in urban ones (Gifford & Nilsson, 2014).

Bunting and Cousins (1985) found that children living in rural environments engaged in significantly more outdoor activities than their urban counterparts. However, it should be noted that this study was conducted prior to the advent of the Internet. Likewise, these authors found that the motivation to protect nature was higher in rural children than in urban children. Other studies have similarly demonstrated the existence of higher pro-environmental attitudes in rural children (Collado et. al., 2013).

Hinds and Sparks (2008) surveyed a sample of undergraduate students from the U.K. Study participants were asked to fill out a questionnaire, which, among other items, asked them about the places in which they spent time during their childhood (i.e., urban, suburban, or rural), as well as their intention to engage with nature, their environmental attitudes, and their affective relationship to the

environment. Results revealed that participants' attitudes towards, and affective connections with, the environment significantly predicted their intention to engage with nature. Moreover, individuals who had grown up in rural locations reported higher positive affect, identification, behavioural intentions, and positive environmental attitudes in comparison to those who had grown up in urban locations.

However, recent research has suggested that other factors, such as the landscape, may moderate the relationship between living context and ECN. In Collado Corraliza, Staats, and Ruiz's (2015) study of Spanish children, they replicated Hinds and Sparks' (2008) finding that rural children had more interactions with nature than their urban counterparts. However, they also demonstrated that the type of interaction one has with nature informs the impact that it has on the individual. Although contact with nature was always positively related to PEB, the strength of this relationship was moderated by the kind of contact children were experiencing. Rural children living in wilderness settings displayed the strongest relationship between experiences in nature and PEB, whereas rural children in agricultural settings displayed the weakest (the effect of natural experiences on urban children fell somewhere in-between).

Importantly, these findings demonstrate that living in proximity to nature is not all that matters. Studies have also demonstrated that it is important to consider what type of relationship one has with their local ecosystems, whether that be leisure, recreation, or work. In a study of adults, Von Lindern, Bauer, Frick, Hunziker, and Hartig (2013) demonstrated that working in nature can reduce the restorative effects of spending one's leisure time in natural areas. Similarly, it has been found that daily work-related exposures to nature can weaken individuals' motivations to behave in a pro-environmental manner (Larson et al., 2011).

Another factor that may play an important role is industrialization. Müller, Kals, and Pansa (2009) conducted a study that compared the levels of affinity for nature and commitment to engage in PEB between German and Lithuanian citizens. Their study aimed to investigate both the effect of living

context (urban versus rural) as well as the effects of industrialization, since Germany is typically considered to be much more industrialized than Lithuania. The study's findings demonstrated that Lithuanian citizens had significantly higher levels of affinity for nature and were more committed to engaging in pro-environmental protection when compared to their German counterparts. Urban and rural differences did not appear in either country's affinity for nature scores, but did appear in their pro-environmental commitment scores, with Lithuanian rural participants scoring the highest and German rural participants scoring the lowest. The study's findings suggest that a nation's level of industrialization may matter more than its living context when determining individuals' environmental attitudes and behaviours.

Other studies have shown that similar context differences can be driven by social factors, such as culture. Research by Krettenauer, Wang, Jia and Yao (2018) studied 9 to 21 year olds in Canada and China in order to assess the impact of culture on levels of ECN and PEB. Chinese culture is often considered to be a collectivistic, whereas Canada culture is typically considered to be individualistic (Oyserman, Coon, & Kemmelmeier, 2002). The study's findings revealed that ECN was positively correlated with PEB in both countries' samples. Moreover, ECN was negatively correlated with age in both cases. However, it was found that PEB did not decrease over the course of adolescence in the Chinese sample, despite it declining in the Canadian sample. Further mediation analyses revealed that the reason Chinese participants' PEB levels did not decline was related to their anticipation of experiencing positive, self-evaluative emotions whenever they engaged in PEB.

Although it is clear that factors such as rurality, landscape, industrialization and culture are correlated with levels of ECN and PEB, some studies have produced conflicting results. For instance, Berenguer and his colleagues (2005) demonstrated that adults living in urban settings held more pro-environmental beliefs than their rural counterparts; however, despite this finding, rural participants in their study engaged in more PEB. Bjerke and Kaltenborn (1999) discovered that environmental

attitudes could also differ depending on the particular topic being surveyed, with rural farmers scoring lower on their concern for predatory species than urban participants.

Together these findings raise a number of important questions: Is the connection between ECN and PEB the same across rural and urban contexts within Canada? Is the relationship between age and ECN consistent between urban and rural contexts?

Gender

Another noteworthy factor that influences ECN and PEB is gender. Research has demonstrated that there are significant gender differences with regard to individuals' connections to the environment and individuals' PEB, with females typically displaying higher mean levels than their male counterparts beginning as early as childhood (Chawla, 1988; Bunting & Cousins 1985; Kellert, 1996; Mueller, Kals & Pansa, 2009; Stern, Dietz & Kalof, 1993; Zelezny, Chua & Aldrich, 2000).

In Chawla's (1988) paper, she noted that men typically display more knowledge about environmental issues but, in spite of this, women are more likely to express concern for environmental welfare. Chawla suggested that these differences may be explained by the sociocultural emphasis placed on stereotypical feminine qualities, such as empathy and nurturing, versus the emphasis placed on stereotypical masculine qualities, such as independence and dominance. She draws support for this theory based on the developmental timing at which these differences tend to emerge. Boys and girls diverge in their environmental concern around sixth grade, which is well-known as the time period when gender roles become most pronounced during childhood (Chawla, 1988).

Another explanation for these findings is affective differences that exist between the genders. Past research has demonstrated that females are typically more empathetic than their male counterparts (Rueckert & Naybar, 2008). Although there are some sociocultural explanations for these affective differences (Eisenberg & Lennon, 1983), there is also some evidence to suggest that these differences are partially driven by biological factors, such as hormones (Knickmeyer, Baron-Cohen, Raggatt,

Taylor, & Hackett, 2006), or sex-based brain differences (Singer et al., 2006). In all likelihood, both socialization and biology play an interrelated role in explaining these findings.

As pointed out by Stern and his colleagues (1993), it is also important to consider environmental studies that have failed to identify gender differences. For instance, in one study by Lyons and Breakwell (1994), there were no differences between the genders regarding their respective concerns about pollution. Similarly, Hines, Hungerford and Tomera (1986) found no gender differences when surveying individuals about undertaking various pro-environmental behaviours.

The lack of gender differences found in these studies might be attributable to the topics surveyed (e.g., pollution), or to the focus of environmentalism during the historical period, which, as Stern and his colleagues (1993) have speculated, might emphasize particular value orientations that are either shared by both the genders or asymmetrically distributed between males and females.

A more contemporary explanation for these findings is political partisanship. Past research has demonstrated that individuals tend to behave tribally in their political interactions, and will adopt many of their own political party's beliefs (Lizotte, 2017; Luttig, 2018). In recent years, environmental conservation has become a partisan issue in American politics, and is typically considered a flagship issue for the Democratic party (DeNicola & Subramaniam, 2014). Research has shown that males are more likely to identify with conservative or Republican positions than their female counterparts, who typically identify with Democratic and liberal positions (PRS, 2018). Thus, perhaps gender-based differences are partially attributable to these political affiliations, which tend to politically-charge environmental issues and attitudes.

Although individuals' political identities may still be developing over the course of adolescence, research has demonstrated that familial values play an important role in shaping young individuals' environmental attitudes (Cheng & Monroe, 2012). As such, the effect of parents' political partisanship on children and adolescents' perspectives should not be overlooked.

The Present Study

The present study consisted of two projects, which were designed to investigate what factors contributed to ECN and PEB in Canadians. Project I investigated the role of age, living context and gender on ECN and PEB, while Project II investigated the role of accessibility to nature on ECN and PEB.

There are a number of gaps in the previous literature on these topics. First, most studies that have investigated the relationship between environmentalism and living context have focused on European samples. The present study helped to address whether or not these previous findings hold true within a North American context. Second, with the exception of Krettenauer's (2017) recent study on the topic, few studies have investigated the developmental nature of the relationship between ECN and PEB. The present project will help clarify how these constructs develop throughout ontogenesis and provide a deeper insight into how age-based relationships are influenced by factors such as gender and living context. Third, lay theory has commonly emphasized the importance of mere contact with nature as a factor contributing to individuals' PEB; the present study investigated the soundness of these claims by comparing two Canadian urban settings that differed with regard to their accessibility to nature.

This study consisted of five central goals. The first goal of the study was to investigate the developmental trajectory of ECN and PEB. Previous research had revealed a decline in levels of ECN and PEB during adolescence (Krettenauer, 2017). Therefore, it was predicted that ECN and PEB levels would decline between early and late adolescence. It is possible that this decline reverses itself or that it plateaus or increases. Therefore, this research question included an exploratory component.

The second goal of this study was to explore whether factors such as gender and living context moderated the relationship between age and ECN, or age and PEB. Previous research has demonstrated that rural inhabitants typically display higher mean levels of these variables than their urban

counterparts (Hinds & Sparks, 2008). Moreover, research has demonstrated that females display higher mean levels of these variables than males (Chawla, 1988). Therefore, it was predicted that both variables would moderate the relationship, with females experiencing less of an adolescent dip than their male counterparts, and rural inhabitants displaying less of a decline than their urban counterparts.

The third goal of this study was to determine how much unique variance ECN, age, and living context contributed towards PEB. Previous research had frequently demonstrated that ECN is the strongest predictor of PEB, and typically accounts for up to 60% of the variance found in the construct (Otto & Pensini, 2017). However, many studies had failed to look at the effects of age and living context alongside ECN. Nevertheless, based on past findings, it is predicted that ECN will remain the strongest predictor among these three factors.

The fourth goal of this study was to determine whether the age-related variance found in PEB was primarily driven by changes in levels of ECN. Many past studies have shown that ECN explains the majority of PEB (Krettenauer, 2017; Otto & Pensini, 2017). Based on these past findings, it was predicted that ECN would mediate the relationship between age and PEB.

The fifth and final goal of this study was to examine the effect that accessibility to nature had on individuals' levels of ECN and PEB. Due to mixed findings within previous literature, some authors have concluded that no definitive conclusions can be drawn about the relationship between contact with nature and ECN (Müller, Kals, & Pansa, 2009). In order to begin addressing this question, further research is required. Therefore, this study compared individuals living in high accessibility to nature urban settings with those living in low accessibility to nature urban settings. It was predicted that those living in high accessibility to nature urban settings would display higher mean levels of ECN and PEB than their low accessibility to nature counterparts.

The present study consisted of two projects. Each project used a separate data-set for its analyses. As such, the methods, findings and discussion for Project I will be separated from those of

Project II. A general discussion on the entire study's findings can be found at the end of the thesis.

Project I

Method

Project I investigated levels of ECN and PEB across four age-groups living in urban and rural locations within Canada. Project I further investigated what continuous factors significantly contributed to PEB. Finally, Project I assessed whether the relationship between age and PEB was mediated by ECN.

Design and Sample. Four age-groups were included in this project: young adolescents (12-15 year olds), late adolescents (16-19 year olds), young adults (24-29) and adults (35-40). A total of 1251 participants from urban and rural locations were recruited by the polling company Ipsos for this project.

Some of the additional demographic data collected in this study included parental SES (socioeconomic status) and individuals' immigration statuses. Immigration status was measured by asking participants whether they were born in, or outside of, Canada. If participants reported that they were born outside of Canada, then they were asked to provide information on the country they were born in.

Participants' SES was measured by asking participants to provide their parents' job descriptions. The parents' job descriptions were then coded according to the International Standard Code of Occupations (ISCO). Afterwards, ISCO codes were transformed into an International Socio-Economic Index (ISEI) score.

A summary of the sample's demographic distribution can be found in Table 1. The sample for Project I was 45% rural participants and 55% urban participants. The gender breakdown was roughly equal, with 51% of the sample being male, and 49% being female. The age-groups were distributed as follows: 28% of the sample fell into the 12-15 year range, 24% fell into the 16-19 year range, 24% fell into the 24-29 year range, and 24% fell into the 35-40 year range. It is worth noting that individuals

between the ages of 20-23 were not represented in this study. Age groups were chosen in order to best reflect distinct developmental periods (e.g., early and late adolescence, young adulthood, mid adulthood). As such, no data was needed from this age demographic. Approximately 90% of the participants were born in Canada, and 10% were born outside of Canada. Those from outside of Canada originated from 54 different countries. Participants that were included in the study were from a variety of locations across the 10 Canadian provinces and include both anglophone and francophone Canadians.

It should be noted that there was an overrepresentation of young urban participants in the sample. This overrepresentation reflected difficulties that were encountered when attempting to recruit a sufficient number of rural participants in the youngest age category. This overrepresentation presented an independence issue for the variables of living context and age. As such, a Type III Sum of Squares was used in the Factorial analyses to address this issue.

Participants were recruited and administered the same questionnaire used in Krettenauer (2017) online through Ipsos software. Only two of the survey's scales were used in this study.

Participants were compensated for their participation in the study according to the polling company's policies. Prior to data collection, the study underwent review by the Wilfrid Laurier Research Ethics Board. Participants' consent (or their guardians' consent if applicable) was obtained prior to data collection. Participants were free to exit the study at any time.

Measures

All the data used in this study were taken from responses to Krettenauer's (2017) survey *How You Think and Feel About the Environment*. This survey assessed participants' demographic data, including gender, age, parental SES, language and immigration status. The survey also assessed participants' self-reported PEB, emotional connectedness to the environment, moral judgements, moral emotions, moral disengagement, and how often environmental topics were spoken about at home, at

school, and with friends.

The measures listed below were those used for this project's analyses:

Gender. Participants were asked to report their gender using the categories of "male" and "female."

Age. Participants were asked to report their exact age by selecting the year in which they were born.

Living Context. Living context data was obtained through the polling company, Ipsos. In this study, rural participants were defined as individuals living in a population centre with up to 29,999 occupants, while urban participants were defined as individuals living in a city of 200,000 or more occupants. The polling company, Ipsos, determined whether an individual fell into the rural or urban category depending on where they lived in Canada.

Pro-Environmental Behaviour. Self-reported pro-environmental behaviour serves as this study's measure of PEB. This construct was assessed using a collection of items from various instruments that have been successfully employed in previous research (Brosch et al., 2014; Kaiser & Wilson, 2000, 2004; Negev et al., 2008). The response format being used has been taken from anti and prosocial questionnaires, which ask participants to report their levels of particular behaviours (Pancer, Pratt, Hunsberger, & Alisat, 2007). Participants were asked to indicate how often they engage in various pro-environmental behaviours in the last year (ranging from 0 = *never do this* to 4 = *always do this*).

Krettenauer and his colleagues selected items, guided by two major criteria. First, only age-relevant behaviours were included. That is to say, adult-focused items such as purchasing vehicles or performing home renovations were excluded from the instrument's item list. Second, the items corresponded to the scenarios individuals had responded to in the moral judgement and moral emotions

sections of the survey. These sections had participants imagine a scenario where their family, or a neighbourhood family, performed either an environmentally sustainable behaviour or an environmentally unsustainable behaviour. Participants were then asked to report their anticipated moral emotions and moral judgements of the scenario. Most of the instrument's items fell within the categories of energy conservation, waste reduction, recycling, and the disposal of hazardous waste (including e-waste). However, a few of the items also concerned extracurricular activities, such as volunteering and media consumption.

For all twenty-nine items included in the measure, participants were asked to respond using the five-point Likert scale previously mentioned. Energy conservation was assessed using nine items in the survey (e.g., I use public transportation). Waste reduction was assessed using five items (e.g., I use refillable water bottles). Recycling behaviour was assessed using six items (e.g., I collect used paper and put it in the blue box). Lastly, hazardous household waste disposal was assessed using five items (e.g., I put dead batteries in the garbage [reverse-scored item]). The last four items concerned other pro-environmental behaviours such as volunteering on environmental projects, following environmental issues on the news, participation in environmental clubs, and cleaning up after oneself.

PEB captures a wide range of different behaviours across various domains; still, it is possible to aggregate them into a single scale as others have shown in the past (Kaiser & Wilson, 2004). Nevertheless, when this measure was generated, Krettenauer (2017) confirmed that the different types of PEB could be combined into a single scale by running a confirmatory factor analysis. The twenty-nine items used to assess PEB were combined into a single scale with an internal consistency of $\alpha = .81$.

Connectedness with Nature. Participants' emotional connection to nature was assessed using Krettenauer's adapted version of the measure developed by Brügger and his colleagues (2011). Unlike previous measures used to assess this construct, which heavily relied upon abstract concepts and ideas (i.e., "I often feel a kinship with animals and plants"; "I recognize and appreciate the intelligence of

other living organisms”; cf. Mayer & Frantz, 2004), the present measure was made much more concrete for younger participants by describing specific behaviours children and youth might engage in as a means of connecting with nature or expressing their appreciation for the environment.

Another reason this measure was chosen was its minimal reliance on self-reflection. Many of the other scales that assess ECN require individuals to engage in introspection before answering. Brügger and colleagues’ (2011) scale avoids this by asking individuals how much they enjoy various activities rather than asking participants to explore their feelings. This particular instrument was also chosen because it did not overlap with the pro-environmental measure in its scope, and assessed individuals’ appreciation for environmental recreational activities and pastimes without assessing their pro-environmental activity.

In this study, four aspects of emotional connectedness with nature were included, *enjoying nature, hands-on engagement with nature, interest in nature, and empathy for living beings*. Past research has demonstrated that these four aspects of emotional connectedness with nature can be combined into a single scale (Krettenauer, 2017). Participants responded to this measure using a five-point Likert scale (i.e., *strongly disagree, disagree, neither agree nor disagree, agree, strongly agree*).

The full scale was used for analysis in Project I. The twenty-one items were combined into a single scale of sufficient reliability, $\alpha = .90$.

Results

The main purpose of Project I was to investigate the relationship between age, gender, living context, ECN and PEB. In order to investigate these relationships, a 4 (Age) \times 2 (Living Context) \times 2 (Gender) Between-Groups Factorial ANOVA was conducted to examine ECN differences between the groups, as well as a second 4 (Age) \times 2 (Living Context) \times 2 (Gender) Between-Groups Factorial ANOVA examining PEB differences between the groups. Factorial ANOVAs were chosen for these

analyses because they are designed to test the differences in levels of a continuous variable across multiple categorical variables (Field, Miles, & Field, 2012). For a general overview of means, standard deviations, and bivariate correlations of these variables see Table 2.

In addition to these analyses, a Hierarchical Multiple Regression Analysis was conducted to examine which continuous variables predicted PEB. A Hierarchical Multiple Regression Analysis was chosen for this analysis because both the predictor and outcome variables were continuous (Field, Miles, & Field, 2012). Finally, a Hayes Type 4 Mediation Analysis was conducted (Hayes, 2013) in order to determine whether ECN mediated the relationship between age and PEB.

Emotional Connectedness to Nature Across Gender, Age-Groups, and Living Contexts

A 4 (Age) \times 2 (Living Context) \times 2 (Gender) Between-Groups Factorial ANOVA was conducted on ECN to address the following research questions: does ECN vary with age? Does ECN vary based on living context? And finally, do levels of emotional connectedness differ between males and females?

The findings of this ANOVA are summarized in Table 3. The analysis revealed that there was a significant main effect of age on ECN, $F(3, 1235) = 3.91, p < .05$. Bonferroni post hoc analyses revealed that young adolescents ($M = 3.58, SD = .57$) significantly differed from young adults ($M = 3.72, SD = .53$). Similarly, older adolescents ($M = 3.59, SD = .59$) differed significantly from young adults. There were no significant differences between the younger two age groups or between young adults ($M = 3.72, SD = .53$) and adults ($M = 3.69, SD = .57$).

The main effect of living context on ECN was not significant, $F(1, 1235) = 2.21, p = .14$. However, there was a significant main effect of gender on ECN $F(1, 1235) = 41.35, p < .001$, such that females ($M = 3.75, SD = .52$) had significantly higher mean levels of ECN in comparison to their male counterparts ($M = 3.54, SD = .59$).

There were no significant interactions between age and context, $F(3, 1235) = .136, p = .939$, age

and gender $F(3, 1235) = 1.714, p = .162$, or context and gender $F(1, 1235) = .704, p = .402$. The three-way interaction was also nonsignificant, $F(3, 1235) = 1.419, p = .236$. These findings demonstrate that the relationship between age and ECN did not differ between urban and rural participants, or between males and females. Moreover, the ECN levels of males and females did not differ between urban and rural participants.

Fine-Grained Age Analysis

Previous literature had reported a significant decline in levels of ECN from early to late adolescence (Krettenauer, 2017). Upon not finding this decline in the original analysis, a more fine-grained analysis was conducted. Age was recoded into the following five groups, young adolescents (12-13 years old), mid adolescents (14-15 years old), late adolescents (16-17 years old), young adults (18-19 years old), and adults (20-40 years old). This group partitioning was guided, in part, by the tighter age groupings found within Krettenauer's (2017) study, and was intended to capture the speed of developmental change characteristic of the adolescent period.

A one-way ANOVA was conducted on ECN and revealed that there were significant differences between these age five groups, $F(4, 1246) = 8.042, p < .001$.

The results of this analysis are summarized in Figure 1. Bonferroni post hoc tests revealed a non-linear relationship between age and ECN. Young adolescents ($M = 3.71, SD = .54$) significantly differed in their levels of ECN from mid adolescents ($M = 3.47, SD = .57$), but not from late adolescents ($M = 3.56, SD = .60$), young adults ($M = 3.73, SD = .50$), or adults ($M = 3.70, SD = .55$). Tests also revealed that mid adolescents ($M = 3.47, SD = .57$) significantly differed from both young adults ($M = 3.73, SD = .50$) and adults ($M = 3.70, SD = .55$). It was further found that late adolescents ($M = 3.56, SD = .60$) significantly differed from adults ($M = 3.70, SD = .55$). No other age differences between the five age-groups were significant. The findings revealed that the mid adolescent ($M = 3.47, SD = .57$) group scored lowest, and that young adults ($M = 3.73, SD = .50$) scored highest.

Pro-Environmental Behaviour Across Gender, Age-Groups, and Living Contexts

A second 4 (Age) \times 2 (Living Context) \times 2 (Gender) Between-Groups Factorial ANOVA was conducted on PEB to address the following research questions: does PEB vary with age? Does PEB vary based on living context? Does PEB differ between males and females?

The results of this ANOVA are summarized in Table 4. There was a significant main effect of age on PEB, $F(3, 1235) = 4.84, p < .001$. Bonferonni post hoc analyses revealed that young adolescents ($M = 2.71, SD = .52$) had significantly lower levels of PEB in comparison to adults ($M = 2.85, SD = .43$). Older adolescents ($M = 2.75, SD = .54$) displayed no significant differences to other groups. Young adults ($M = 2.75, SD = .53$) displayed marginally significant differences from adults, $p = .07$. No other age group differences were significant.

There was a significant main effect of gender on PEB, $F(1, 1235) = 8.13, p < .05$, such that females ($M = 2.81, SD = .51$) reported significantly more PEB than males ($M = 2.72, SD = .52$).

There was a significant main effect of context on PEB, $F(1, 1235) = 9.92, p < .05$, such that individuals living in urban settings ($M = 2.80, SD = .50$) reported significantly higher levels of PEB in comparison to those living in rural settings ($M = 2.72, SD = .53$). This effect was in the opposite direction of what was originally hypothesized.

There were no significant interactions between age and context $F(3, 1235) = .25, p = .861$, age and gender $F(3, 1235) = .438, p = .726$, or context and gender $F(1, 1235) = 1.710, p = .191$. The three-way interaction was also nonsignificant $F(3, 1235) = .416, p = .742$. These findings demonstrate that the relationship between age and PEB did not differ between urban and rural participants. Moreover, the relationship between age and PEB was consistent for both males and females. Lastly, the relationship between gender and PEB did not differ between urban and rural participants.

Continuous Predictors of Pro-Environmental Behaviour

A Hierarchical Multiple Regression Analysis was conducted in order to determine what

variables significantly contributed to PEB. For this analysis, exact age was used so it could be analyzed as a continuous variable. All the continuous variables (ECN, age and PEB) were converted into Z-scores in order to center the means. Living context was dummy coded for the regression analysis, assigning urban participants '0', and rural participants '1'.

A summary of the Hierarchical Multiple Regression's findings can be found in Table 4. A three-step hierarchical multiple regression was conducted with PEB as the dependent variable. The main effects of age, ECN and living context were entered at Step 1. The three two-way interactions between age and ECN, age and living context, and living context and ECN were entered at Step 2. Finally, the three-way interaction between ECN, age and living context was entered at Step 3.

The Hierarchical Multiple Regression revealed that at Step 1, both age, living context and ECN significantly contributed to the model $F(3, 1247) = 171.76, p < .001$. The analysis revealed that age positively predicted PEB ($\beta = .07, p < .05$), such that older individuals reported higher levels of PEB than younger individuals. ECN strongly predicted PEB, ($\beta = .53, p < .001$), such that those with higher levels of ECN reported higher levels of PEB. Finally, living context significantly predicted PEB ($\beta = .11, p < .001$), such that urban participants reported higher levels of PEB than their rural counterparts.

In Step 2, adding two-way interactions to the regression model made no significant difference, ($\Delta R^2 = .002, \Delta F = 1.08, p = .36$). The interactions between age and ECN ($\beta = -.04, p = .10$) age and context ($\beta = -.03, p = .50$), and between ECN and context ($\beta = -.02, p = .65$) were all nonsignificant.

In Step 3, adding the three-way interaction to the regression model made no significant difference, ($\Delta R^2 = .00, \Delta F = .007, p = .93$). The three-way interaction between the three predictors was nonsignificant, ($\beta = -.003, p = .93$).

Taken together, these findings indicate that the relationship between age and PEB was consistent across levels of ECN. The relationship between age and PEB was the same for both urban

and rural participants. Furthermore, the relationship between ECN was the same for both urban and rural participants.

Emotional Connectedness as a Mediator

Based on previous findings (Krettenauer, 2017), it was hypothesized that there was an indirect effect of age on PEB, such that ECN would mediate relationship between the two. In order to test this assumption, Hayes process model 4 was used.

A preliminary analysis was conducted to determine the relationship between the three variables in question. Bivariate correlations were run between all of the variables in the study. All correlation results can be found in Table 5. Initial analyses revealed a significant but weak positive relationship between age and PEB, ($r = .086, p < .01$).

The mediation results can be found in Figure 2. The mediation model revealed that age significantly predicted ECN, $b = .0049, p < .05, 95\% \text{ CI } [.0016, .0082]$. The effect of ECN on PEB was likewise significant, $b = .4729, p < .001, 95\% \text{ CI } [.4303, .5156]$. However, after mediation, the direct effect of age on PEB was no longer significant, $b = .0024, p = .07, 95\% \text{ CI } [-.0002, .0049]$. A bias-corrected bootstrap confidence interval based on 5,000 samples for the indirect effect ($b = .0023$) did not include '0', $\text{CI } [.0007, .0039]$. These findings demonstrate that ECN significantly mediated the relationship between age and PEB, such that, as individuals get older their levels of ECN increase, which, in turn, leads to an increase in levels of PEB, $R^2 = .28, F(2,1248) = 242.70, p < .001$.

Discussion

Previous research had demonstrated that children and adolescents take a moral stance towards the environment (Kahn, 1997). However, it was unclear how this relationship developed moving toward adulthood, and whether other factors, such as gender and living context, potentially moderated the development of these attitudes. Project I was designed to investigate these questions.

Initial results conflicted with past literature, and revealed no adolescent dip in levels of ECN. In

response to this finding, the age groups were recoded and the analysis was conducted a second time. This second analysis revealed a significant adolescent decline in levels of ECN, which had been obscured by the original age-groups' partitioning. More importantly, all three analyses on age revealed an increase in both ECN and PEB moving toward adulthood.

In line with the original hypothesis, which predicted higher levels of ECN and PEB in females, analyses revealed that females scored higher in both of these categories. However, the effect sizes of these differences were larger for ECN ($\eta^2 = .032$) than they were for PEB ($\eta^2 = .007$). Future research ought to be dedicated to investigating the role of gender on individuals' environmental attitudes and PEB. In particular, research ought to explore whether these gender differences persist across other cultures and whether similar emotional differences exist in other domains. Research might also look to clarify whether particular pro-environmental behaviours and attitudes are more susceptible to these gender differences than others, which might be owing to how certain behaviours are framed or culturally understood. Lastly, future research should be used to determine if ECN differences fully explain the gender gap in PEB, or whether other factors explain these differences.

The direction of living context differences was in the opposite direction to the project's original hypotheses. Moreover, while urban participants differed significantly from rural participants in their levels of PEB, there were no significant differences in their levels of ECN. Rural participants reported significantly lower levels of PEB compared to urban participants. Speculatively, this suggests that other factors, such as the level of available infrastructure in an area, might be more important than the somewhat arbitrary population-based measure of rurality used in this study. Moreover, factors such as the primary occupation or trade in an area (e.g., agriculture, logging etc.) might impact these findings, and should be investigated in future research (Collado, Corraliza, Staats, & Ruiz, 2015; Von Lindern et al., 2013).

Another possible explanation for the direction of these living context differences is political

partisanship. Past research on American populations has demonstrated that rural individuals tend to espouse more Republican or conservative views in comparison to their urban counterparts (PEW, 2018b). In light of the fact that environmental conservation has become a partisan issue in American politics, one ought to consider the possibility that living context differences may be indicative of these partisan trends (DeNicola & Subramaniam, 2014).

Project II

Method

Project II was designed to build on Project I by investigating young teenagers' levels of ECN and PEB in two urban contexts that differed with regard to their access to nature. The two contexts being compared were West Vancouver, BC and Kitchener-Waterloo, ON. Both of these population centres met the criteria of an urban setting; however, they differed with respect to their recreational access to nature. West Vancouver is a mixture of temperate alpine and coastal environments, and is accessible year-round for wilderness recreation. Kitchener-Waterloo, on the other hand, is an agricultural setting lacking similar woodland and coastal features. There are far fewer recreational options available to residents of Kitchener-Waterloo; as such, West Vancouver will be referred to as a high-accessibility to nature urban setting, whereas Kitchener-Waterloo will be referred to as a low-accessibility to nature urban setting.

Design and Sample. An early-to-mid adolescent sample ($n = 49$) was recruited in the early Summer of 2018 from a secondary school in West Vancouver, British Columbia, for this project. The sample from West Vancouver was then paired with participants from a Kitchener-Waterloo databank ($n = 531$). This second set of data came from an ongoing project by Krettenauer with Canadian teenagers. The data set includes Grade 7 and 8 students from schools in the Kitchener-Waterloo region, and their data were collected between 2017 and 2019.

A summary of the sample's demographic data can be found in Table 6. In order to control for

any possible confounding factors when comparing these two samples, case-control matching in SPSS was completed using participants' exact ages, gender, parental SES and immigration status. After using case-control matching to pair participants, only 42 of the West Vancouver participants were able to be matched according to these criteria; as such, the final sample size was reduced to 84 ($n = 42$ West Vancouver, $n = 42$ Kitchener Waterloo). 20.2% of the final sample were fifteen years old, 69% were fourteen years old and 10.7% were thirteen years old; 52.4% of the final sample were male, and 47.6% were female. 52.4% of the final sample were born in Canada and 47.6% of the sample were born outside of Canada. Those born outside of Canada originated from eighteen different countries.

Participants were financially compensated for their participation in this study. The study was approved by the Research Ethics Board (REB) of Wilfrid Laurier University and was conducted in agreement with the Tri-Council policy statement.

Measures. The two instruments being used for Project II are the same as the ECN and PEB measures that were used in Project I.

In Project II, the four sub-scales found in the *Connectedness to Nature* scale were further analyzed in order to identify potential between-group differences. These sub-scales include: (1) *enjoying nature* (e.g., being outdoors makes me happy), (2) *hands-on engagement with nature* (e.g., I like to feed animals in my backyard), (3) *interest in nature* (e.g., I like to watch movies or TV shows with animals as main characters), (4) *empathy for living beings* (e.g., it makes me sad to see an animal being hit by a car). Participants responded to these measures using a five-point Likert scale (ranging from *strongly disagree*, *disagree*, *neither agree nor disagree*, *agree*, to *strongly agree*).

The twenty-one items were combined into a single scale of sufficient reliability, $\alpha = .90$. The sub-scales also had sufficient reliability: *enjoying nature* $\alpha = .80$, *hands-on engagement with nature* $\alpha = .63$, *interest in nature* $\alpha = .80$, and *empathy for living beings* $\alpha = .61$.

Results

The main goal of Project II was to investigate whether accessibility to nature translated into higher or lower levels of ECN or PEB in adolescents. It was hypothesized that individuals living in high-accessibility to nature settings would display higher levels of both ECN and PEB in comparison to those living in low-accessibility to nature settings. In order to test this question, a series of independent t-tests were conducted on ECN, its sub-scales, and PEB. T-tests were chosen for these analyses because levels of a continuous variable were being compared between two groups (Field, Miles & Field, 2012).

Emotional Connectedness to Nature

An independent samples t-test was conducted to determine whether there were significant differences in the mean levels of ECN between participants in Kitchener-Waterloo and West Vancouver. A nonsignificant t-test, $t(82) = -.817, p = .42, 95\% \text{ CI} [-.395, .165]$ revealed that Kitchener-Waterloo ($M = 3.45, SD = .67$) and West Vancouver ($M = 3.34, SD = .62$) participants displayed no significant differences in their levels of ECN. There was an effect size of $d = .18$ and low power (.202). Although nonsignificant, the results were in the opposite direction than was originally hypothesized, with Kitchener-Waterloo participants displaying slightly higher levels of ECN than West Vancouver participants.

The sub-scales that comprise the *How You Feel About Nature* scale were then compared between the two samples. Results were consistent with the initial analysis, with no significant differences being found. On the *Compassion for Living Beings* sub-scale, Kitchener-Waterloo ($M = 3.57, SD = .97$) scored higher than West Vancouver participants ($M = 3.42, SD = .90$), but the differences were not significant, $t(76) = -.820, p = .42$. On the *Engaging with Nature* sub-scale, West Vancouver participants ($M = 2.87, SD = .78$) scored higher than their Kitchener-Waterloo counterparts ($M = 2.79, SD = .93$), but the differences were not significant $t(80) = .444, p = .66$. On the *Enjoying Nature* sub-scale, West Vancouver participants ($M = 3.72, SD = .64$) scored higher than participants from Kitchener-Waterloo ($M = 3.70, SD = .66$), but the differences again were not significant $t(82)$

= .178, $p = .86$. Finally, on the *Interest in Nature* sub-scale, Kitchener-Waterloo participants ($M = 3.29$, $SD = .97$) scored higher than West Vancouver participants ($M = 2.95$, $SD = .87$), but the results only approached significance, $t(82) = -1.727$, $p = .09$.

Pro-Environmental Behaviour.

An independent samples t-test was conducted to determine whether there were significant differences in the mean levels of PEB between participants from Kitchener-Waterloo and West Vancouver. A nonsignificant t-test revealed that Kitchener-Waterloo ($M = 2.57$, $SD = .45$) and West Vancouver ($M = 2.71$, $SD = .47$) participants displayed no significant differences in their levels of PEB, $t(82) = -1.463$, $p = .147$. There was an effect size of $d = .32$, and moderate power (.47).

Discussion

Past research has suggested that there may be a relationship between contact with nature and levels of ECN (Cheng & Monroe, 2012). In order to assess the extent to which nature exposure contributes to levels of ECN and PEB, this project compared high-accessibility to nature urban settings with low-accessibility to nature urban settings.

Contrary to the original hypotheses, no significant differences were found between the two samples. Moreover, many of the nonsignificant effects were in the opposite direction of what was original hypothesized.

It is possible that the threshold of exposure to nature needed to foster ECN is quite minimal. As such, perhaps other factors, such as familial values, partisanship, or cultural differences, play a more important role in forming these attitudes than mere accessibility.

Another explanation for the lack of differences found between Kitchener-Waterloo and Vancouver youth is industrialization. Past research has demonstrated that youth living in industrialized nations are spending less time outdoors than the youth of previous generations (Clements, 2004). Thus,

perhaps the two samples' access to nature is ultimately irrelevant because neither population is taking advantage of the outdoor opportunities available to them. Future research might attempt to test this question quasi-experimentally by exposing a randomized group to nature and comparing their ECN levels to a control group (see Otto & Pensini, 2017). Alternatively, future correlational studies could include measures that require participants to report the amount of time they typically spend in nature in order to determine if this factor significantly differs between samples.

It is also possible that the two locations did not, in fact, differ in their levels of accessibility to nature. Nature itself is a nebulous concept, which makes it difficult to quantify when comparing two heteronomous ecosystems, such as those found in Ontario and British Columbia. While the temperate, alpine and coastal features of British Columbia may appear to be more accessible for recreation than the intemperate forests and lakes of Ontario, this judgement might be based more in perception than in reality.

General Discussion

International data have demonstrated that human behaviour is the leading contributor to rising temperatures around the globe (IPCC, 2018). As such, it is crucial that psychologists investigate strategies that motivate individuals of all ages to curtail environmentally-unsustainable behaviours, and adopt ecologically-sustainable behaviours. The proposed study contributed to this body of knowledge by offering an insight into the developmental dimension of ECN, and investigating the role that fixed factors, such as living context and gender, play in its ontogenesis.

A large amount of ECN literature has focused on the role that contact with nature might play in its development. However, this study's findings suggest that the amount of actual contact needed to forge this emotional connection might, in fact, be quite minimal. Research seems to indicate that future efforts ought to focus on having youth *engage* with nature, rather than just exposing them to a surplus of it (Otto & Pensini, 2017).

In the era of climate change awareness, there are also hidden dangers to merely encouraging contact with nature. Research has revealed that certain ecosystems and species are especially vulnerable to human contact. Research has demonstrated that in an effort to experience certain elements of nature before they are destroyed, individuals will often flock to locations that are most in need of environmental protection and solitude from humans (Groulx et. al., 2014). This phenomenon is often called “last chance tourism” (see Lemieux et. al., 2018). Thus, it would appear that individuals’ desires to experience nature crucially needs to be supplemented with environmental knowledge and guidance, which can help ensure that benign motivations do not inadvertently destroy the environment.

One unexpected finding in Project I was that urban participants reported engaging in significantly more PEB than rural participants. This was the case despite the fact that no significant differences were found in the two groups’ levels of ECN. This finding indicates that factors besides ECN are responsible for the pro-environmental differences identified between these groups.

This unexpected finding might be explained by other relevant factors associated with living context, such as the level of available infrastructure in an area. Although industrialization has been found to be negatively correlated with PEB in past research (Müller, Kals, & Pansa, 2009), the infrastructure that accompanies it may be important in providing individuals opportunities to perform pro-environmental behaviours. Many students who report low levels of pro-environmental action cite the lack of opportunities and resources they have to make a meaningful difference in their communities (Mazze, 2006). Likewise, previous research has demonstrated that PEB is more likely to occur when individuals believe that they can actually make a difference, and play a meaningful part in combatting environmental degradation (Ojala, 2011). Both of these findings highlight the fact that PEB is influenced by how salient and readily available pro-environmental opportunities are, and by the extent to which individuals are convinced there is a meaningful connection between their PEB and environmental improvement or preservation. Many urban settings are arguably better equipped to

provide these opportunities and foster these beliefs than rural settings.

Another potential explanation for these living context differences is political partisanship. Research conducted on Americans has demonstrated that rural individuals tend to adopt more Republican or conservative views when compared to their urban counterparts (PEW, 2018b). In recent decades, environmental conservation has become a partisan issue in American politics, with Democrats typically supporting more pro-environmental policies than Republicans (DeNicola & Subramaniam, 2014). It is possible that an analogous political trend exists in Canada, and that the PEB differences found between rural and urban contexts are attributable to similar partisan divides.

The impact of these modern, geopolitical factors should not be overlooked. Past research has revealed that the amount of trust individuals place in environmental agencies is strongly related to their sense of personal obligation to behave pro-environmentally (Wynveen, & Sutton, 2014). Thus, as environmental issues become embroiled in political dialogue, misinformation and partisan motivations could threaten to undermine such trust and, in turn, could create cynicisms that lead to a decline in PEB.

In line with this study's hypotheses, gender differences were found in both ECN and PEB. Although factors such as partisanship could explain some of the differences found between men and women, biology and socialization likely explain the lion's share of differences found among children and adolescents. As Chawla (1988) speculated, perhaps some of these differences are driven by the traditional feminine emphasis on care and the traditional masculine emphasis on domination. It is possible that reframing PEB might help address the divide currently seen between males and females and help increase males' environmental concern (e.g., frame environmentalism as the act of "combatting" the forces of climate change rather than portraying it as the act of caring for the earth). Examples of such approaches can be seen in African anti-poaching efforts, where militaristic action is taken in response to illegal poaching (Annecke & Masubelele, 2016). Alternatively, perhaps proliferating androgynous gender roles could help address this divide. Future research ought to explore

what drives these gender differences over the course of the lifespan.

Despite this study's initial hypotheses, neither gender nor living context influenced the relationship between age and ECN. This finding may suggest that the adolescent dip is best addressed by attempting to bolster cultural norms that have previously been found to counterbalance the adolescent decline, such as positive, self-evaluative emotions (Krettenauer et. al., 2018). However, perhaps this finding has a silver lining, as it is likely preferable that relatively immutable factors, such as gender and living context, do not wildly influence the trajectory of individuals' ECN and PEB development.

The developmental findings in this study point to a positive relationship between age and ECN, as well as age and PEB. In line with past literature, the fine-grained age analysis conducted in Project I revealed an adolescent decline in ECN, although ECN levels were found to later recover in adulthood. Though it is clear that this adolescent dip presents a problem for the planet, research has revealed factors that could bolster ECN prior to this decline, such as familial values (Cheng & Monroe, 2012), educational initiatives (Otto & Pensini, 2017), and cultural norms (Krettenauer et. al., 2018). In the future, perhaps the most fruitful strategy would be to focus energies on strengthening some of these countervailing normative forces in children and youths' lives.

There is also contemporary evidence to suggest that adolescents are more concerned about the environment now than they have ever been historically. For instance, the *Fridays for Future* movement, which involves elementary, middle and secondary school walkouts around the globe to protest local government responses to environmental problems, highlights children and adolescents' awareness of, and concern for, environmental issues. Perhaps the waning ECN characteristic of adolescence is not the only factor researchers ought to consider, as it appears that other existential, and social motivations have begun rise to salience in the present geopolitical context.

It should be mentioned that this study did not explore the development of ECN and PEB past

the age of 40. Speculatively, developmental factors, such as generativity (Alisat, Norris, Pratt, Matsuba, & McAdams, 2014), may contribute to even further increases in these constructs. It is also possible that existential concerns triggered by aging might overshadow individuals' environmental concerns in the later stages of life. Future research ought to explore whether this developmental trend stagnates, continues to increase or declines past the middle stages of adulthood.

The limitations present in this study should not be overlooked. One major limitation of this research was its cross-sectional design. As is the case with any cross-sectional research, it risks confounding cohort or generational differences with the developmental effects of age, and as such, it may not be reflective of underlying developmental trends. With the amount of growing attention paid to environmental issues in politics, school curricula and the media, it is difficult to determine how these various forces shape generational perspectives on the environment across the lifespan. Future longitudinal research could help address this limitation and would provide insight into the deeper developmental trends at play.

Another limitation worth mentioning was this study's correlational design. Due to its correlational nature, this study was unable to establish any causal claims about the relationships identified, and merely reveals associations between the numerous variables in question. As such, there are a number of alternative explanations for the study's findings that cannot be directly attributed to the factors in question. Such explanations might include the possibility of a reverse relationship between ECN and PEB. This might be explained by individuals attempting to minimize cognitive dissonance by adjusting their attitudes to match their behaviours. There is also the possibility that a third factor explains the predictive relationship between ECN and PEB. Resolving these lingering questions would require the use of experimental designs, heretofore not explored in the literature (for a meta-analysis and future suggestions see Whitburn, Linklater, & Abrahamse, 2019).

This study's questionnaire failed to measure a number of important variables. Most notably, the

amount of time spent in nature by participants was not measured. Likewise, individuals' occupations, the levels of infrastructure in their cities, and the levels of industrialization near their homes were not measured by the questionnaire. Future research ought to use more localized data, such as postal codes, in order to help provide a more detailed understanding of the differences that exist across various Canadian living contexts. This is particularly relevant because technology and infrastructure are not homogenous across all of the Canadian provinces or within the provinces themselves. Any or all of these variables would have provided further insight into where significant differences exist and what factors drive those differences.

There were also potential limitations present in the PEB scale used in this study. Many of the items contained in the scale were arguably biased towards an older age demographic, as they assessed behaviours one typically only engages in once they are no longer a dependent (e.g., “I reuse my shopping bags,” and “I prefer buying environmentally-friendly products”). As a consequence, younger participants may have reported that they never engage in such behaviours simply because the experiences are not age-appropriate, and not because they are unmotivated, or indifferent. In turn, the age-related differences found by this study could be an artefact of the methodological instrument and not reflective of an underlying developmental trend. Future research could help clarify this question by using a revised scale that only includes items relevant to all age groups (e.g., “I let the water run while brushing my teeth”) or by analyzing each item across age.

As is the case with any self-reported study, social desirability presented another possible limitation. Participants may have been driven to report higher levels of ECN and PEB in order to appease researchers. However, since this pressure was consistent for all of the participants who were included in the study, it could not have been responsible for any of the between-group differences identified.

Finally, it should be mentioned that the power in Project II was low, especially when

considering the expected effect sizes for a survey of this kind. As a result of the small sample size, the chances of incurring a Type II error were relatively high. However, many scholars have argued that effect size is more important, in many respects, than statistical significance. Statistical significance is, by its very nature, too dependent upon a study's sample size (see Sullivan & Feinn, 2012). In Project II, the effect sizes identified were considerable, and demonstrate a counterintuitive difference between the two samples in question, which could highlight the importance of other factors, such as partisanship, in determining individuals' levels of PEB. Future studies ought to devote more resources to similar comparisons in order to help identify the role that contact with nature plays in ECN development.

Conclusion

The present study serves as an important first step towards understanding how various factors contribute to PEB within the Canadian context. Unlike many previous studies, the present paper also explores how PEB, as well as the various factors that contribute to it, change over the course of individuals' ontogenesis.

Although larger technological and governmental changes are undoubtedly necessary in order to ameliorate the detrimental effects of rising global temperatures, changing individuals' mindsets should not be overlooked as a strategy worth pursuing.

In line with many previous studies' findings, the present study revealed that ECN is an exceptionally strong predictor of PEB. Relationships of this strength are often explained by an instrument inadvertently measuring what it seeks to predict. In this instance, however, ECN fundamentally differs conceptually from PEB, which makes the findings of this study all the more compelling.

In light of these findings, many have sought out ways to bolster ECN. This has led to efforts such as nature retreats, green classrooms, and the "romantization" of rural living. The present study has demonstrated that future efforts ought to instead focus on environmental engagement and not simply

exposing individuals to the outdoors, as the relationship between contact with nature and the development of ECN appears to be socially moderated and contingent upon a host of other factors.

Based on these findings, and the findings of previous studies, researchers are now tasked with determining how factors such as industrialization, familial values and culture influence ECN development. In light of this challenge, educators and policy makers might be advised to focus their efforts on identifying and fostering other, more direct motivations for PEB.

The number of individuals voting for Green parties across both America and Canada continues to increase as people begin to confront the existential implications of rising global temperatures. These novel, emerging motivations to engage in PEB should not be overlooked as alternative strategies to address the environmental concerns that we presently face. Likewise, educators ought to explore how social motivations, driven by factors such as peer-approval, might be leveraged during adolescence to help combat dwindling ECN characteristic of this developmental period.

In summary, this paper has demonstrated that ECN is an extremely powerful predictor of PEB, albeit one that's genesis is more complicated than initially thought. Moreover, the findings of this paper suggest that heretofore approaches to inculcating ECN ought to focus more on facilitated, environmental engagement than mere environmental exposure. In light of these findings, future research ought to focus its efforts on identifying the strongest predictors of ECN, clarifying the nature of the relationship between ECN and PEB, and identifying some of the other factors that may motivate pro-environmental behaviour in the present geopolitical context.

Appendix A

Things People Do or Don't Do

In the following you find a list of things people sometimes do or don't do. Please indicate for each behavior, how often you have done this **in the last year**.

- 0 = **Never** do this
- 1 = **Rarely** do this
- 2 = **Sometimes** do this
- 3 = **Often** do this
- 4 = **Always** do this

-
- _____ I volunteer on environmental projects.
 - _____ I collect and recycle used plastic containers.
 - _____ In the summer, we keep the air-conditioning running all day so that we don't get sweaty.
 - _____ I collect used paper and put it in the blue box.
 - _____ After a picnic or sporting event, I leave the place as clean as it was originally.
 - _____ I prefer buying EnergyStar-qualified products.
 - _____ In the winter, we keep the heat on so that we do not have to wear a sweater.
 - _____ I prefer buying environmentally friendly products (e.g., biodegradable soap).
 - _____ I put dead batteries in the garbage.
 - _____ I save energy and water by taking shorter showers.
 - _____ I prefer bringing my lunch or snacks in reusable containers.
 - _____ I reuse my shopping bags.
 - _____ I get my parents to ride me to school.
 - _____ I bring unused medicine back to the pharmacy.
 - _____ If I am offered a plastic bag in a store, I take it.
 - _____ If I need batteries, I use rechargeable batteries.
 - _____ I use public transportation or ride my bike to get around.
 - _____ I turn off TV and computer screens when they are not in use.
 - _____ I use refillable water bottles.
 - _____ I prefer buying products made from recyclables (e.g., paper).
-
- _____ I collect used bottles and put them in the recycling bin .
 - _____ I let the water run while brushing my teeth.
 - _____ I dump unused household chemicals (e.g., pesticides, paints, oil) in the garbage or flush them down the toilet.
 - _____ I follow environmental issues in the media.
 - _____ I turn off lights when not needed.
 - _____ I put kitchen waste in the normal garbage.
 - _____ I bring electronic waste (e.g. cell phones) to a collection point to make sure that it is properly disposed.
 - _____ I participate in activities of an environmental club.
 - _____ If I need a new light bulb, I use energy efficient light bulbs.
 - _____ I make sure to dispose food waste in the compost or the green bin.

Appendix B

How You Feel About Nature

In the following you find a list a statements that describe how people feel about nature. Please read each statement carefully. Indicate how strongly you agree or disagree.

	Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
I enjoy watching the stars at night. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I enjoy smelling flowers. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Being outdoors makes me happy. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I talk to animals. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Smashing plants is fun. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I talk to plants. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like to watch movies about the natural environment. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like to read books about animals and plants. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like to garden. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like to watch sunsets. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If there is an insect (such as a spider or a beetle) in my room, I try to catch and release it rather than kill it. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Being in the natural environment makes me feel peaceful. --	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collecting objects from nature (such as rocks and shells) is fun. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Indoor plants are part of our family.-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like to watch movies or TV shows with animals as main characters. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like to run or hike in nearby nature parks or woods. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When I feel sad, I like to go outside and enjoy nature. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Carving a tree is almost like cutting myself.-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like to listen to birds. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feed animals in my backyard (e.g., birdfeeder). -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I prefer outdoor to indoor sports. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It makes me feel sad to see an animal being hit by a car. ----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I like to watch the clouds moving in the sky. -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Table 1: Project I Cell Distribution

	12-15 Years	16-19 Years	24-29 Years	35-40 Years	Total
Rural	Male: 61 Female: 53	Male: 74 Female: 76	Male: 74 Female: 76	Male: 74 Female: 76	564
Urban	Male: 129 Female: 106	Male: 78 Female: 74	Male: 76 Female: 74	Male: 76 Female: 74	687
Total	349	302	300	300	1251

Table 2: Means, Standard Deviations, and Bivariate Correlations of Main Variables

	1	2	3	4	5	<i>M</i>	<i>SD</i>
1. Emotional Connectedness to Nature	-	-	-	-	-	3.64	.57
2. Pro-Environmental Behaviour	.53**	-	-	-	-	2.77	.51
3. Exact Age	.08**	.09**	-	-	-	23.25	9.47
4. Gender	-.19**	-.08	-.02	-	-	.51	.50
5. Living Context	-.05	.08**	-.11**	.02	-	.55	.50

** $p < .01$

Table 3: Emotional Connectedness to Nature Factorial ANOVA

Predictor	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>p</i>	Partial η^2
Intercept	16073.158	1	16073.158	52106.771	.000	.98
Age	3.618	3	1.206	3.910	.009	.009
Context	.682	1	.682	2.210	.137	.002
Gender	12.756	1	12.756	41.354	.000	.032
Age*Context	.126	3	.042	.136	.939	.000
Age*Gender	1.586	3	.529	1.714	.162	.004
Context*Gender	.217	1	.217	.704	.402	.001
Age*Context*Gender	1.313	3	.438	1.419	.236	.003
Error	380.955	1235	.308			

Table 4: Pro-Environmental Behaviour Factorial ANOVA

Predictor	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>p</i>	Partial η^2
Intercept	9212.104	1	9212.104	35630.119	.000	.97
Age	3.757	3	1.252	4.843	.002	.012
Context	2.565	1	2.565	9.921	.002	.008
Gender	2.102	1	2.102	8.130	.004	.007
Age*Context	.194	3	.065	.250	.861	.001
Age*Gender	.340	3	.113	.438	.726	.001
Context*Gender	.442	1	.442	1.710	.191	.001
Age*Context*Gender	.323	3	.108	.416	.742	.001
Error	319.307	1235	.259			

Table 5: Hierarchical Multiple Regression on Pro-Environmental Behaviour

Variable	β	R	R^2	ΔR^2	F	F Change
Step 1		.54	.29	.29	171.76**	171.76**
Age	.07*					
Emotional Connectedness to Nature (ECN)	.53**					
Living Context	.11**					
Step 2		.54	.29	.29	86.44**	1.078
Age	.06*					
ECN	.54**					
Living Context	.11**					
Age*ECN	-.04					
Age*Context	-.03					
Context*ECN	-.02					
Step 3		.54	.29	.29	74.03**	.007
Age	.06*					
ECN	.54**					
Living Context	.11**					
Age*ECN	-.04					
Age*Context	-.02					
Context*ECN	-.02					
Age*ECN*Context	-.003					

Note: $N = 1251$; * $p < .05$, ** $p < .01$

Table 6: Project II Cell Distribution

	13 Years	14 Years	15 Years	Total
West Vancouver	Male: 0 Female: 0	Male: 22 Female: 19	Male: 0 Female: 1	42
Kitchener-Waterloo	Male: 3 Female: 6	Male: 8 Female: 9	Male: 11 Female: 5	42
Total	9	58	17	84

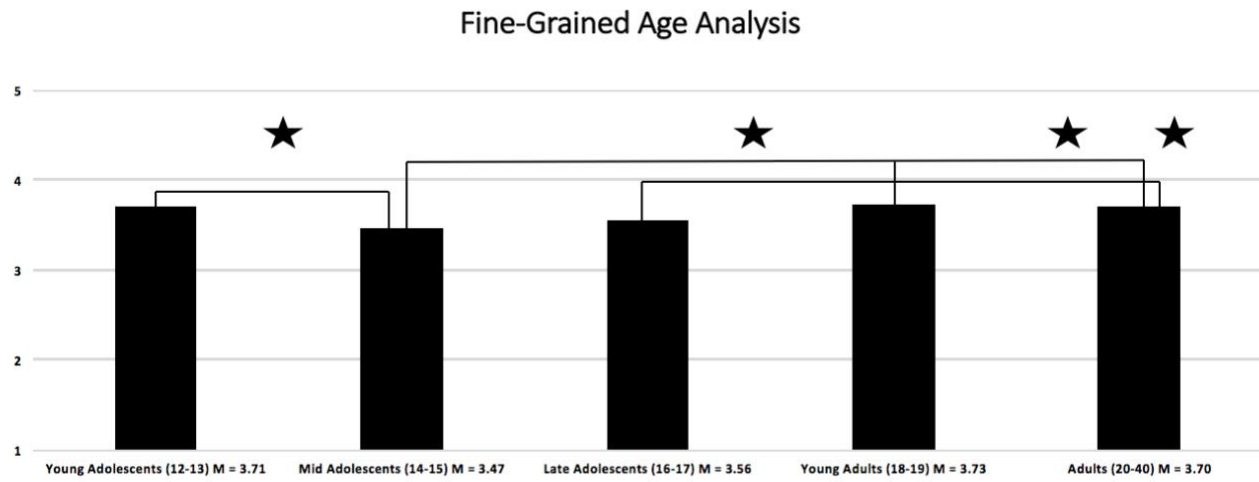
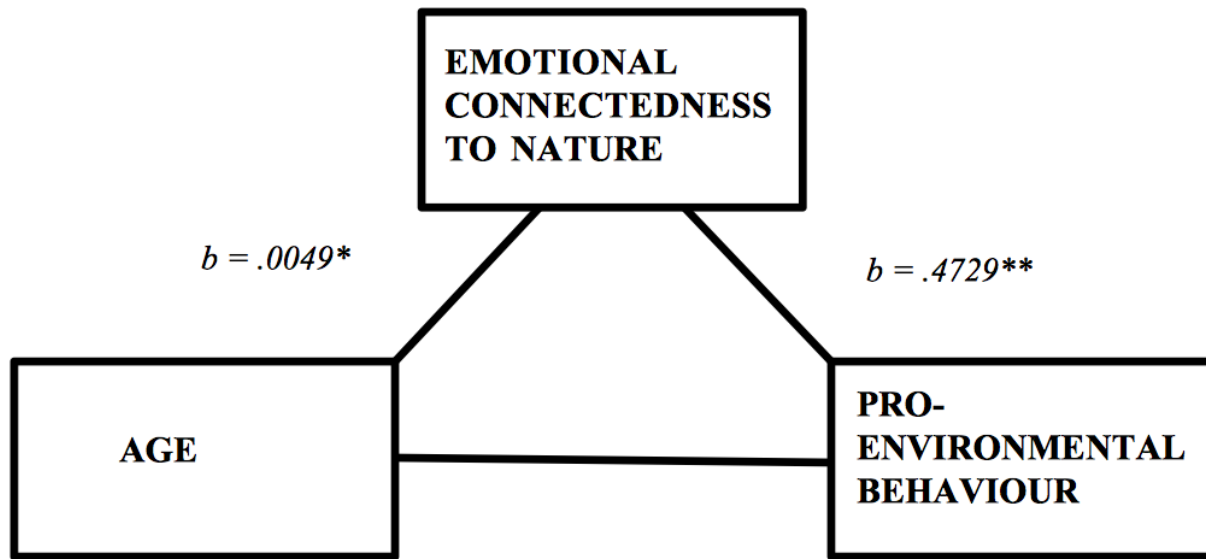


Figure 1: Fine-Grained Age Analysis



* $p < .05$

** $p < .001$

Indirect Effect: $b = .0023^*$, 95% CI [.0007, .0039]

Direct Effect: $b = .0024$, 95% [-.0002, .0049]

Figure 2: Mediation Analysis