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The impact of an environmental education program on children's and parents' knowledge, attitudes, motivation and behaviors

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Thesis submitted to the School of Graduate Studies and Research, University of Ottawa
in partial fulfillment of requirements for the degree of Doctor of Philosophy

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This thesis is dedicated to Gil.

Thank you for believing in me.

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ABSTRACT

Developments in the Quebec educational system enabled us to evaluate the impact of a new educational environmental program (EEP) on a group of children enrolled in this program for the first time (i.e., the experimental group). This EEP comprised a formal curriculum and environmental activities. A control group of children was enrolled in schools where environmental issues were confined to the natural sciences subject. The goals of this study were threefold. The first goal was to evaluate the impact of an EEP on children's and parents' ecological knowledge, attitudes, motivation, and behaviors. The second goal was to investigate if a motivational model of ecological behaviors observed in adult populations could be replicated with children. Part of this goal also included the comparison of path analyses results across experimental conditions, independently for children and parents. The third goal was to identify more clearly what specific children's characteristics influenced parents' ecological attitudes and motivation. Included in this goal was the investigation of possible differences in the strength of associations between constructs in paths analyses conducted in the experimental and control groups of parents.

Results suggested that children in the experimental group were more likely to ask teachers and parents for ecological information and presented a more self-determined motivational profile. Additional analyses revealed that children enrolled in an EEP performed ecological behaviors less for extrinsic motives. Level of knowledge, other attitudes and behavioral measures did not differ significantly between the two groups. Parents of children in the experimental group reported lower levels of satisfaction towards the environment and were more likely to get information on ecological issues and strategies from children. No other significant differences between groups of parents were found. Path analyses results suggested that parents' perceptions of children's provision of autonomy support and of ecological information, as well as, joint child/parent involvement in ecological activities favored parents' ecological attitudes and motivation. These results were consistent across the experimental and the control groups. Future studies are necessary to identify optimal intervention strategies devised to foster in people a sense of personal responsibility and self-determination that may propel them into action.

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I had been hanging around beaches all my life without paying much attention to them - seeing them without really ***seeing*** *them. We are all sleepwalkers most of the time anyway, blundering through the world with our minds and senses dozing, when we think we are learning, we are just waking up for a moment.*

Silver Donald Cameron, 1998

The first Earth Day was launched in 1970. At that time, organizers felt confident that threats to the environment would one day be greatly reduced. Yet, twenty-nine years later, people remain relatively inactive. They appear oblivious to the alarming rate at which global environmental stresses occur (e.g., de Young, 1993; Environment Canada, 1998). This state is observed despite the launching of numerous environmental informational programs whose goals were to teach effective environmental strategies so that corresponding behaviors would become, one day, integrated into people's lifestyles. Study after study show people's basic tendency to inertia despite professed concern even in the face of compelling arguments communicated in various media (e.g., Andrew, Dumas, Gilbert, Houle, & Lewis, 1994; Environment Canada, 1998). Proponents therefore looked to the educational system, and particularly children, as a way to solve this problem.

In view of the seriousness of the situation, the ecological future may well depend on today's children to preserve the quality of our environment. Children are at an age where preferred lifestyles have not been determined and by consequence, are a promising target population for successful interventions. Thus, we argue that childhood constitutes a window of opportunity where ecologically sound behaviors could become more easily internalized and integrated into one's lifestyle. Obviously, children are unlikely to have well-established undesirable ecological behaviors to "unlearn" and will have a long-term impact on the environment (Dwyer, Leeming, Cobern, Porter, & Jackson, 1993). Within the school system, Bryant and Hungerford (1979) found that kindergarten children can develop attitudes towards environmental issues (see also Rajeski, 1982). Miller's (1975) research supports the contention that a significant portion of the development of ecological attitudes occurs during elementary school, leveling off around grade 8.

Thus, one important source of influence on children is school. Educational institutions are important initiators of change. More importantly, education is the vehicle through which society prepares its citizens to carry out their responsibilities (Ramsey, Hungerford, & Volk, 1992). Formal and informal educational resources within schools, colleges, and universities, can be used to empower young people in performing ecological behaviors by providing information on the causes and consequences of ecological problems, as well as, teaching successful strategies to deal with problematic situations (i.e., recognition of population growth, rising consumption, harmful and helpful technology; Corson, 1995). As future decision makers, it is important to develop early in children, a sense of concern and an awareness of environmental issues. It is also imperative to convey ecologically sound strategies to ensure enduring environmentally-friendly behaviors. As an added benefit of environmental education, children may in turn serve as agents to motivate behavior changes in their parents.

This proposition is not as preposterous as one may think. Schlossberg (1992) found that 24% of parents recycled, 17% avoided products packaged in certain containers, and 5% conserved energy and resources in response to their child's request. Thus, children can contribute to the re-education of their parents' purchasing and conserving habits. This is especially important as many environmental problems are immediate and pressing (e.g., the depletion of the ozone layer overlying the Windsor and Quebec city corridor). To wait for today's children to grow up may do little in the present to change harmful behaviors. It is today's parents who are the stewards of natural resources and consequently, will determine the quality of the environment inherited by following generations (Sutherland & Ham, 1992). But first, development of environmental education programs need to favor the integration in children's everyday lives of a keen awareness of the environment and a propensity to ecological action. Second, ecological education needs to focus on motivating children to become effective agents of social influence on parents' adoption of environmentally friendly-behaviors that are pervasive and sustained.

The above observations invite many questions. Can a formal environmental education program (EEP) foster in children environmentally-friendly attitudes, motivation and behaviors? Is a formal environmental education children program capable of a broader impact in that parents' ecological

attitudes, motivation, and behaviors are also influenced? Do children, as a group, constitute an important stimulant of adults' ecological behaviors? Or, are only children enrolled in an environmental education program (EEP) capable of becoming active social agents of change in parental ecological attitudes, motivation and behaviors? Those are the questions which the present thesis seeks to answer.

The contents of the remaining introduction are grouped into 4 sections. The first section provides a critical review of environmental studies conducted with children. Within this section we also review children's reported sources of environmental knowledge as well as relevant studies investigating classroom based environmental education programs. The second section comprises a critical review of environmental studies on adult populations. The third section introduces the conceptual framework underpinning the present thesis. As such, self-determination theory is presented with pertinent empirical evidence. Lastly, the goals and hypotheses of the present thesis are enumerated.

Literature review on child populations

A great proportion of studies have investigated children's level of environmental knowledge, awareness and concern. Research findings suggest that children as young as 3 to 5 possess some form of ecological awareness. For instance, Cohen and Horm-Wingerd (1993) ascertained that preschool children were quite aware of the improper uses of the environment (e.g., littering, overcrowding). However, awareness of environmental problems in younger children was limited to instances when they were directly probed. Young children did not *spontaneously* offer information on the proper uses of the environment nor on possible solutions to environmental problems. A keener awareness of environmental problems seemed to surface around the sixth grade, when children spontaneously mentioned environmental problems (e.g., Bartnik & Wall, 1975; Evans, Jacobs, & Frager, 1982). Interestingly, the sixth grade was also the time when children were most likely to recognize the central role of human behavior in environmental problems (Horvat & Voelker, 1976). For example, Evans and colleagues (1982) observed that 6th graders were better at identifying "smog" as caused by human activity when compared to younger children.

Level of concern with environmental issues were found to increase with age (Horvat & Voelker, 1976; Miller, 1975). Lyons and Breakwell (1994) reported that 56% of British children (aged 13 to 16) were concerned with environmental problems. Hausbeck, Milbrath, and Enright (1992) corroborated these findings with 17-18 years old American adolescents. In 1990-91, these authors surveyed 3,200 students in the state of New York. The results suggested that while adolescents demonstrated high levels of awareness and concern for the environment they were deficient in environmental knowledge. However, it appears that the type of environmental knowledge evaluated in their study was perhaps too complex. Participants were questioned on their understanding of basic principles that govern the biogeochemical systems of the planet.

The above findings suggest that children's comprehension of environmental issues and their growing environmental concern are intimately tied to their cognitive development. In a literature review, Chawla (1988) reported that younger school children have a strong emotional response to nature. During middle childhood, a more factual based orientation towards nature evolved (see also Carey, 1985). At this age, children were capable of giving accurate and detailed representations of the natural world. In adolescence, Chawla (1988) reported higher levels of ecological concerns and greater endorsement of ethical principals towards the environment. The increased capacity for multiple level processing of information allowed adolescents to understand complex environmental problems. This may account for Bunting and Cousins' (1985) observations. These authors reported finding increased levels of commitment in environmental preservation throughout middle childhood with levels peaking at the 6th grade level. There was also a general decline in the belief of exploitation of the environment evidenced around the eight and tenth grade.

In sum, these findings suggest that specific attitudes toward the environment are developed in early to middle childhood (Bryant & Hungerford, 1979; Cohen & Horm-Wingerd, 1993; Miller, 1975; Rajeski, 1982). If the goal is to favor environmental attitudes and subsequent appropriate behaviors, then environmental education efforts should ideally commence in early grade school.

Sources of environmental knowledge

Lyons and Breakwell (1994) observed that adolescents' (aged 13-16) concern for the environment was associated with environmental knowledge and greater interest in acquiring knowledge. The rise in urban children's environmental concern depends mainly on indirect sources of information as opposed to direct experience with natural settings (Cohen & Horm-Wingerd, 1993; Newhouse, 1990). Consequently, peers and adults (e.g., teachers, parents) constitute primary sources of ecological information (Chawla, 1998). Exposure to environmental information outside the school (mainly television) was also moderately associated with environmental awareness and concern (e.g., Lyons & Breakwell, 1994). For example, Fortner and Mayer (1991) observed that students could correctly answer general ecological questions that had received recent extensive media coverage. Likewise, Fortner (1985) found evidence that ninth graders' knowledge was increased by a television program and class material. However, attitudes changed only in response to the television program. It is important to note that this particular television program was developed specifically to teach children about environmental issues and as such, constituted the exception rather than the rule. Most media messages are successful in increasing levels of environmental awareness but are ineffective in conveying information on basic principles of environmental thinking (e.g., systemic thinking, biodiversity for ecosystem stability, distinction between growth and development, and thinking in future mode; Hausbeck et al., 1992; Gigliotti, 1990). Attitudes per say, are rarely markedly influenced by the media. Thus, formal means of education are deemed necessary to teach effective ecological strategies and stimulate environmental thinking (Milbrath, 1995). Attention was therefore directed towards developing effective environmental education programs.

Environmental education programs (EEP)

The goals endorsed by environmental educational programs are multiple. They include: (a) convincing people that environmental problems need to be addressed; (b) educating them on the

consequences of harmful practices for the environment and for themselves; (c) assisting them in identifying behaviors that need to be modified to become more environmentally responsible; (d) impressing upon people the need for corrective measures to deal effectively with environmental problems; (e) assisting people in the implementation of changes within their lifestyles; and (f) encouraging people to periodically reassess their ecological attitudes and behaviors (Iozzi, 1989b; Gigliotti, 1990). In short, people must be: (a) educated in ecological system thinking (e.g., interrelationship between parts, looking at processes and networks; Milbrath, 1995); (b) empowered so that they may be in a position to help resolve environmental issues (Monroe & Kaplan, 1988); and (c) encouraged to perform pervasive and sustained responsible environmental behaviors (Ramsey & Hungerford, 1989).

To achieve these goals, educational materials were designed to sensitize children to nature, favor awareness of environmental issues, impart knowledge on ecological principles, clarify values about personal behaviors and help develop action-taking skills (Ramsey, Hungerford, & Tomera, 1981). Numerous educational strategies are used including simulations, role plays, field trips, guest speakers, case studies, value activities, moral dilemmas, local issues and action projects. Of these, the most successful strategies were those of case studies involving solutions to environmental problems and of actual problem-solving experiences. These two strategies were the most influential in fostering sustained ecological interest and environmental behaviors in students (Monroe & Kaplan, 1988).

Curriculum development and classroom implementation of EEPs are fairly recent and exceptional. Iozzi (1989b) observed that schools do not generally include in their curriculum comprehensive ecological education programs. It follows that the investigation and evaluation of environmental education programs is a new domain of research (for a review see Dwyer et al., 1993). A review by Leeming and colleagues (1993) identified only 17 studies evaluating classroom based interventions. Since then, our own literature review has showed continued emphasis on evaluating and developing outdoor ecological interventions with less attention given to the evaluation of classroom based programs (e.g., Bogner, 1998; Emmon, 1997; Hanna, 1995). Concurrently, there have been numerous articles identifying effective elements of interventions (e.g., Chawla, 1998; Munson, 1994; Norris & Jacobson, 1998; Stevenson, 1993;

Zimmermann, 1996) as well as reporting findings of national surveys investigating levels of ecological knowledge and attitudes in juvenile populations (e.g., Gambro & Switzky, 1999; Gigliotti, 1994; Kuhlemeier, van den Bergh, & Lagerweij, 1999). Most relevant to the present thesis is the research program conducted by Ramsey and colleagues (1981, 1989; Ramsey, 1993). This research program involved a series of 3 studies with the goal of investigating the effect of a structured EEP on children's knowledge, attitudes and behaviors. The studies by Sutherland and Ham (1992) as well as by Leeming, Porter, Dwyer, Cobern, and Oliver (1997) are also germane to the present thesis. Interestingly, our literature review yielded only these two studies whose focus has been the investigation of the possible influence that children may exert on parents.

Effects of a structured environment educational program

Ramsey and colleagues developed a formal one-semester classroom-based instructional package entitled "Issue investigation and action training" (IIAT). The goal of this educational package was to initiate children to environmental issues, to develop skills needed to analyze and investigate issues, as well as to teach environmental action strategies. Ramsey and colleagues (1981) evaluated the impact of IIAT on 8th grade children over a 7 month period. In this experimental design, 2 classes formed the experimental group with a third class receiving a standard science curriculum providing for an untreated control group. They observed that children taught to analyze and find solutions to environmental issues subsequently performed more environmental behaviors. These authors also administered a questionnaire to parents assessing their child's environmental awareness and actions, both during and 2 months following the intervention. Parents' responses indicated that children enrolled in an IIAT continued to perform more environmental behaviors 2 months later when compared to the control group. In a 3 year follow-up, students who were part of the experimental group continued to perform more frequently environmental behaviors as compared to the control group albeit, at lower frequencies then originally observed

(Hungerford & Volk, 1990). The authors concluded that to maintain behavioral frequency, students had to have access to a comprehensive EEP over a substantial amount of time (Hungerford & Volk, 1990).

In a second study, Ramsey and Hungerford (1989) investigated the effects of an IIAT on 4 classes over 18 weeks. A control group of 4 classes was also included in the design wherein children received the usual natural science instructions. In the initial 1981 study, the authors had not measured cognitive and affective factors mediating the effect of an EEP on ecological behaviors. The 1989 study addressed these shortcomings by adding measures of response efficacy, self-efficacy, environmental concern, and knowledge of environmental strategies. Measured environmental behaviors included persuasion, political action, consumerism and physical actions (e.g., recycling). Results suggested that access to a IIAT over the period of one semester favored, in 7th grade children, significantly higher levels of response efficacy, self-efficacy, knowledge of environmental strategies, and environmental behaviors. However, level of environmental concern was not significantly altered. The authors hypothesized that concern may be longitudinal in development and was more likely to arise from direct experiences in outdoor settings. Thus, implementation of IIAT in classrooms did favor the development of ecological knowledge, personal beliefs and some of the attitudes that have been identified in the environmental literature review as necessary (but not sufficient) determinants of environmental behaviors.

Ramsey (1993) subsequently replicated this study with another sample. The author reports similar findings to those obtained in the 1989 study. The replication of findings provided additional empirical support that the IIAT could positively influence children's cognitive, affective and environmental behaviors. However, both of the 1989 and the 1993 studies contained limitations. The most critical lies in the statistical analyses. Pretest and posttest measures were not included in a single analysis. The authors only compared posttest measures. Because initial individual levels of attitudes and behaviors were left uncontrolled, this type of analysis precludes drawing strong conclusions of change in attitudes and behaviors over time. In addition, the authors failed to report statistical analyses supporting long-term effects in the 1989 and 1993 studies. Second, the IIAT curriculum did not include ecological activities. This is unfortunate as substantial research evidence arising from the area of outdoor educational programs

attests to the importance of ecological activities in favoring ecological attitudes and behaviors (Chawla, 1998; Peterson & Hungerford, 1981; Tanner, 1980). Third, the impact of a school based environmental education children's program on parents was left unexplored. Clearly, the impact of any EEP could be greatly increased if direct recipients of the program subsequently became active agents of change in others' environmental knowledge, attitudes and behaviors (Leeming et al., 1997).

Child's influence on parents

Children's influence on parental ecological knowledge and attitudes has been investigated in two studies. The first study consisted of a qualitative analysis conducted in Costa Rica by Sutherland and Ham (1992). Participants included sixth grade children (N = 17) and their parents (N = 18). Semi-structured interviews were done before and following the distribution to children of an illustrated booklet describing a local watershed and the human activities contributing to its degradation. The amount of information transferred from children to their parents was then evaluated. Pre-testing established that knowledge of the watershed was restricted to parents in one family. However, 2 to 3 weeks following distribution of the booklets to children, 6 out of 18 parents (33%) possessed detailed knowledge of the booklet's content and claimed to have discussed it with their child. During that same period, children were studying the ecology and ecosystems as part of the normal science curriculum. Parents were therefore questioned on this subject as an additional measure of information transfer. Results revealed that only 6 of the 25 parents were able to define the term ecosystem (24%) and associated this word to information obtained from children. Most interactions between parents and children involved notions learned in mathematics, Spanish and social studies. The authors concluded that the amount of environmental information transferred from children to parents was generally low and superficial. This observation also applied to children, identified by teachers, as highly interested in the ecology.

Based on these findings, the authors made 3 recommendations. First, the integration of environmental content in all subjects could be an efficient means to expand the amount of information

available to parents. This would multiply the instances where parents are in contact with environment issues via homework, take-home projects and test preparation. Second, environmental content should include information about local environmental issues presented in a form that emphasizes the positive and negative consequences to a child and his/her family. Personal relevancy to the recipient, be it child or parent, may serve to heighten interest as well as favor a sense of connection between the environment and the person's world. Third, teachers need to convey to children the importance of environmental information for their present and future well-being. Children are more likely to share environmental information with their parents if they find it to be personally relevant and therefore, important.

While it is recognized that the overall goal was to investigate child-parent transfer of ecological information, this study suffers from several shortcomings. First, no measures of children's ecological behaviors was included. This is important to measure as the authors observed that children's participation in ecological programs may implicitly set an example of environmental sensitivity to parents. Second, the actual interval between experimental inducement and post-testing was relatively short. Findings of a limited effect of child-parent transfer of ecological information is therefore that much more revealing. Third, the experimental manipulation consisted of the distribution of a booklet to children with subsequent interviews of parents to assess information gains. This leaves unanswered several questions. What would be the effects of a longer environmental education program on children's and their parents' level of knowledge? Are children capable of influencing parental ecological attitudes, motivation, and behaviors in addition to knowledge? As eloquently observed by Keen (1991), there is no sense in providing knowledge if ecological attitudes are left unchanged.

In a second study, Leeming and colleagues (1997) conducted a more elaborate investigation of child-parent transfer of ecological information. Participants included 16 elementary classes, part of an EEP named "The Caretaker Classroom Program", and 19 control classes. Surveyed grades included the 1st to the 6th. The EEP involved the selection, by teachers and students, of a minimum of 8 ecological activities that the class could do during the current school year. Frequently listed activities for the grades 4-6 included mild forms of activism (e.g., writing letters to government officials, participating in

environmental organizations), maintaining a bulletin board of environmental issues, engaging in recycling projects, and planting trees and flowers. The method of investigation was a pretest/posttest measure of children's general environmental knowledge and attitudes. The measurement of attitudes included verbal commitment (e.g., I would be willing to go house to house asking people to recycle), actual commitment (e.g., I have talked to my parents about how to help with environmental problems) and affect (e.g., It makes me happy when people recycle used bottles, cans, and paper). Parents' level of environmental concern was measured at the second wave of data collection. Parents' perception of their children's environmental attitudes and behaviors as well as the influence of children on parents' level of concern was also measured. Lastly, parents were questioned on the relative frequency of 36 different ecological behaviors.

Results for the children variables showed increments in ecological attitudes but only for grades 1 to 3. Within the experimental group, children in grades 4 to 6 maintained their positive attitudes compared to the control group who presented a decline. It should be noted that children interested and active in environmental activities (i.e., as identified by the teacher) showed the largest increase in pro-environmental attitudes. As for knowledge, no significant differences were found between the experimental and control groups. In terms of parental responses, no significant differences in level of concern was found between the experimental and the control groups. Concerning actual ecological behaviors, parents in both experimental conditions reported similar frequencies in amounts recycled, conservation behaviors or use of environmentally friendly modes of transport. However, parents in the experimental group reported discussing more frequently environmental issues with their children compared to parents in the control group. When questioned on perceived changes over the school year, parents of children in the experimental group, compared to the control group, reported significantly greater ecological awareness and behavioral changes in their children. They further reported greater changes in their own levels of environmental concern and of ecological behavioral frequency.

The results of this second study are interesting in as much as they offer further empirical support that children can be active agents of change in parents' ecological attitudes and behaviors. Furthermore,

findings suggest that the inclusion of ecological activities within a formal educational setting can favor positive changes in, or at least the maintenance of, ecological attitudes in children. The impact of the program is further enhanced by its duration of one school year. However, this study suffers from several shortcomings. First, no measures of children's ecological behaviors were included. It is important to note that this particular study is not unlike most others in its focus on measuring changes in attitudes and/or knowledge (for a literature review see Dwyer et al., 1993). If enduring changes in behaviors constitute the ultimate goal of environmental education programs, the lack of testing the association between behavioral determinants and frequency of environmental behaviors is unfortunate. Second, no formal implementation of an education program was included. While the addition of ecological activities was sufficient to enhance ecological attitudes, the work of Ramsey and colleagues (1981, 1989; Ramsey, 1993) clearly establishes the positive effect of a formal educational program. In view of the above findings, the combined impact of a formal educational program and ecological activities could be that much more effective. Third, parental variables were only measured at Time 2. This leaves open the possibility that parental responses may not have changed over time. Evidence for this possibility is found in the absence of differences between the experimental and the control groups of parents when actual levels of ecological concern and behaviors were compared. Significant differences were observed only when parents were asked to compare present and past levels of concern and behaviors. A more rigorous approach would be to obtain pretest/posttest measures of parental attitudes and behaviors.

Summary: Literature review on child populations

The last decade has witnessed an emerging interest in understanding the nature of children's involvement with ecological issues. Accordingly, increased attention has been directed at investigating children's ecological knowledge and attitudes. Findings from studies have underlined that environmental educational programs have shown some success in creating positive changes in ecological knowledge and attitudes. There are some indications that once acquired, environmental attitudes tend to last. In a

few instances, enduring changes in subsequent ecological behaviors have also been observed (Hungerford & Volk, 1990).

Successful EEPs provided students with background knowledge about the issue, case studies, and offered examples of others' successful problem-solving experiences. Reading and discussions appeared to be just as effective as actual experience in fostering ecological knowledge and perceptions of competence in performing behaviors (Mayer & Fortner, 1987). Not surprisingly, successful behavioral change was linked to knowledge of environmentally efficient strategies and a sense of personal competence in performing ecological behaviors (e.g., Hungerford & Volk, 1990; Ramsey & Hungerford, 1989). However, environmental concern was not fostered by discussions but seemed to result from direct experiences with the environment (e.g., Ramsey & Hungerford, 1989; Hungerford & Volk, 1990; Tanner, 1980). The content of a successful environmental education program must favor not only the understanding of issues and perceptions of personal competence but more importantly, foster a personal interest in ecological issues and positive environmental attitudes. Interestingly, the addition of a few ecological activities in the classroom was sufficient to significantly promote in children verbal and actual commitment to environmental behaviors as well as concern (Leeming et al., 1997). Since commitment has been linked in numerous studies to sustained behavioral changes in adults, the enhancement of environmental commitment in children can reasonably be expected to also favor environmental behaviors (for a review see Hungerford & Volk, 1990).

In contrast, EEPs' curriculums were found to be less effective when they focused uniquely on knowledge. More importantly, these children tended to acquire a more pessimistic view of the environment and its future (Iozzi, 1989a). Thus, action oriented teaching strategies and practical experience with environmental issues as opposed to simple cognitively based intervention produced more significant changes. Given the complex nature of most environmental issues, the use of inquiry methods that directly involved children is, not surprisingly, highly effective (Iozzi, 1989b).

Lastly, long-term approaches in environmental education programs need to be developed. The use of short, one shot interventions present themselves with a major weakness (e.g., Hungerford and

Volk, 1990). Extensions of these interventions should be done so that the learning experience does not become an isolated event (Keen, 1991). Many educators argue that environmental education should be incorporated into all course subjects over many years as a means of maximizing chances of a successful intervention (Corson, 1995; Gigliotti, 1990; Hungerford & Volk 1990; Iozzi, 1989a, 1989b; Milbrath, 1995; Ramsey et al., 1992; Sutherland & Ham, 1992). In addition, environmental education should be implemented at all levels of the education system including grade school, high school, college, and university (Corson, 1995).

While recommendations on the nature of these interventions abound, our comprehension of the processes underlying changes in children's environmental attitudes remains limited. For the most part, research on children's attitudes and knowledge of environmental problems is largely atheoretical and methodologically unsophisticated. Few studies have incorporated into their design a comparison group. Statistically, analyses are limited to surveys assessing children's knowledge and opinions about environmental problems. Few have sought to measure actual behavioral changes. In addition, very little psychometric data supports measuring instruments. In short, direct methodologically sound investigations of the impact of EEPs are limited and sorely needed (Hungerford & Volk, 1990; Leeming et al., 1993).

Literature review on adult populations

The available literature on children's ecological variables pales in comparison to the number of studies conducted on adult populations. Numerous studies were undertaken in response to the persistent difficulties encountered in changing adults' behavior patterns. Changes in adults' behaviors involves breaking old habits and acquiring new ways of being (e.g., de Young, 1993). To combat inaction and low levels of involvement, researchers have investigated three sources of determinants: the person, the situation and the social context. Of the three sources, person variables constitute the most extensively investigated behavioral determinant.

Person variables

Researched person variables focused on socio-demographic indicators, environmental knowledge, ecological concern, environmental importance and satisfaction, self-efficacy, response-efficacy, and commitment. Initial studies have sought to identify **socio-demographic** variables associated with ecological behaviors. Investigated variables included age, income, education, gender, and place of residence (e.g., urban/rural). In general, associations between socio-demographic variables and ecological behavior were found to be inconsistent (for a review see Van Liere & Dunlap, 1980; Stern, Dietz, & Kalof, 1993; Davidson & Freudenburg, 1996). For example, some studies comparing urban-rural residents have found urban residents to possess more positive environmental attitudes compared to rural residents (e.g., Samdahl & Robertson, 1989), whereas others have not (e.g., Arcury & Christianson, 1993). Interestingly, becoming a parent was associated with increased attention to information on health-related issues that may affect one's children's well-being (Stern et al., 1993). In view of the equivocal results, researchers' interest in socio-demographic variables waned and ecological knowledge became the primary focus of investigation.

Environmental knowledge remains the focus of present educational campaigns. Knowledge has been conveyed through publications, leaflets, newspaper articles and television programs funded by ecological groups and various levels of government (e.g., Andrew et al., 1994; Jordan, Hungerford, & Tomera, 1986; Simmons & Widmar, 1991). While recent survey findings suggest that people have become more knowledgeable (e.g., de Young, 1988-89; Statistic Canada, 1991; Environment Canada, 1998), the overall level of knowledge remains relatively low (Arcury & Johnson, 1987, Brothers, Fortner, & Mayer, 1991; Gigliotti, 1990; Environment Canada, 1998). In addition, the link between knowledge and ecological behaviors has found limited empirical support (Maloney & Ward, 1973; Maloney, Ward, & Braucht, 1975). For example, Seligman (1985) found that well informed people often failed to act on known strategies to conserve energy. As a possible explanation, researchers argued that not everyone may be equally interested in acquiring ecological knowledge (e.g., Griffin, 1989;

Stern et al., 1993; Winett & Kagel, 1984). Notwithstanding the possible lack of interest, environmental knowledge is a prerequisite to action albeit, insufficient in itself.

Accordingly, **environmental concern** became a major focus of environmental research. Like environmental knowledge, empirical support for the association between environmental concern and behaviors is inconsistent. While some studies found a significant association (e.g., Arbuthnot, 1974; Hines, Hungerford, & Tomera, 1986-87; Vining & Ebreo, 1990), numerous others failed to do so (e.g., Gill, Crosby, & Taylor, 1986; Oskamp, Harrington, Edwards, Sherwook, Okuda, & Swanson, 1991; Tracy & Oskamp, 1983-84; Weigel, 1985). When an association is found, it is usually weak. Interestingly, recent opinion polls conducted by Statistics Canada (1991) and other organizations (e.g., Angus Reid Group, 1992; Environment Canada, 1998) indicated that people possessed high level of environmental concern. However, high levels of concern have not translated into a wide range of ecological behaviors (Baldassare & Katz, 1992; Environment Canada, 1998; Vining & Ebreo, 1990).

To a lesser extent, **ecological importance and satisfaction** towards the condition of the environment have also been investigated. While ecological importance has been associated with more active involvement in the preservation of the environment (e.g., Axelrod & Lehman, 1993), this association was again inconsistent (e.g., Griffin, 1989). Weak associations have also been found between level of satisfaction towards the state of the environment and ecological behaviors (e.g., Pelletier, Legault, & Tuson, 1996) including mild forms of environmental activism (Prester, Rohrmann, & Schellhammer, 1987). However, while people may hold strong ecological attitudes, they often reported not knowing about efficient ecological strategies or having the appropriate abilities to behave in accordance with their beliefs (de Young, 1996; Environment Canada, 1998). Thus self-efficacy and response efficacy were considered additional important determinants of ecological behaviors.

Self-efficacy refers to the belief that one can effectively do a behavior. **Response efficacy** is the belief that certain actions will bring about a particular outcome. Conceptually, competence is akin to self-efficacy in that both refer to the knowledge of what one can do (Deci & Ryan, 1985; White, 1959). A

sense of self-efficacy has been found to characterize people who engaged in ecological behaviors compared to people who remained inactive (e.g., Manzo & Weinstein, 1987). Similarly, beliefs in response efficacy have been significantly associated with ecological behaviors (e.g., Hines et al., 1986-87). However, this association was not consistently found. Researchers have observed that people living in high-rises tended to recycle less when collection was done at special sites despite knowledge of effective environmental strategies and perceptions of self-efficacy (e.g., Guagnano, Stern, & Dietz, 1995). Thus, response efficacy and self-efficacy beliefs, while facilitating action, appear insufficient in themselves to instigate action. The goal to protect the environment must compete against numerous other goals such as time constraints and amount of effort required. In other words, the probability of ecological behaviors diminishes as personal costs increase.

The construct of personal **commitment** allowed a more refined discrimination between people who performed ecological behaviors compared to people who did not. Research findings generally underlined that high levels of commitment favored internally regulated behaviors (e.g., Katzev and Pardini, 1987-88) as well as enduring ecological behaviors (Pardini & Katzev, 1983-84; Dwyer et al., 1993). The success of commitment in fostering enduring ecological behaviors was postulated to ensue from personal endorsement or internalization of the regulation of behaviors (de Young, 1993). Pardini and Katzev (1983-84) hypothesized that internalization occurred because participants eventually found their own reasons for doing the activity, possibly began to like doing it, and therefore, became motivated to continue performing the activity. However, the means by which internalization of environmental behaviors are fostered remain uncertain and warrant further investigation.

Situational variables

Studies investigating the use of **behavioral interventions** arose within the behavioral paradigm (see Dwyer et al., 1993; Geller, 1989; Porter, Leeming, & Dwyer, 1995 for literature reviews). Investigated strategies included the use of reinforcement (e.g., bottle refunds, Levitt & Leventhal,

1986), modeling (e.g., videotape on energy conservation; Winett, Leckliter, Chinn, Stahl, & Love, 1985), feedback (e.g., continuous feedback on electricity used; Sexton, Johnson, & Konakayama, 1987), and prompts (e.g., use of signs and verbal appeals; Durdan, Reeder, & Hecht, 1985). On a short-term basis, most interventions successfully increased the amount of environmentally-friendly behaviors (e.g., Porter et al., 1995). Long term effects (more than a few months) have seldom been investigated. The few studies assessing long-term effects generally failed to find enduring changes in environmental behaviors (e.g., Geller, Winett, & Everett, 1982; Katzev & Johnson, 1984; Witmer & Geller, 1976). Withdrawal of behavioral incentives often resulted in a return to baseline levels of ecological behaviors. The absence of sustained ecological behaviors following withdrawal of incentives and the costs involved in maintaining behavioral incentives jointly contributed to the conclusion that these programs were not cost-effective (Jacobs & Bailey, 1982; Katzev & Pardini, 1987-88). In addition, generalization of environmental behaviors to other situations was uncommon (e.g., Aronson & Gonzales, 1990; de Young, 1986; Dwyer et al., 1993).

A related behavioral intervention, **structural changes**, involved direct manipulation of the individual's environment in ways that promote environmentally responsible behaviors. Examples of structural changes included designating high-occupancy vehicles lanes, altering elevator travel time or providing curb-side recycling bins (e.g., Guagnano et al., 1995; Van Houten, Nau, & Merrigan, 1981). Alteration of the environment did favor a higher frequency of ecological behaviors as long as the structures remained in place. Again, researchers observed weak cross-situational generalization of ecological behaviors. People did not tend to perform behaviors in situations where structural changes were absent (e.g., recycling bins are not available at work; Dwyer et al., 1993).

Social context

The study of the social context comprised two lines of research. In the first line of research, researchers sought to identify the prevailing ecological values or norms in the general population. In the

second line of research, researchers determined the effectiveness of social interactions in effecting changes in people's ecological attitudes and behaviors.

Environmental norms. Prevailing environmental norms have initially been investigated within the theoretical framework provided by Schwartz' (1977) theory of altruism. Briefly, an altruistic norm orientation characterizes individuals who value outcomes that benefit others and are motivated to prevent or alleviate perceived negative consequences for others. An altruistic norm orientation is postulated to be associated with higher frequency of environmentally-friendly behaviors when individuals become aware of harmful consequences resulting from the state of the environment and take responsibility for effecting changes in offending environmental conditions.

Stern and colleagues (1993) have expanded Schwartz' altruistic norm orientation to include two other value orientations, namely: an egoistic value orientation and a biosphere value orientation. Individuals possessing the egoistic value orientation become concerned with ecological problems when issues include personally relevant negative implications. Individuals are also motivated to do ecological behaviors when physical or material gains are possible with the provision that expected benefits outweigh personal costs. Proponents of a biosphere value orientation profess a generalized concern for the welfare of all non-human species. These three value orientations are not mutually exclusive (Stern et al., 1993).

A review of studies assessing the predictive validity of values for environmental behaviors yielded inconsistent results. While some researchers reported a direct but weak to moderate association (e.g., Black, Stern, & Elsworth, 1985; Oskamp et al., 1991; Scott & Willits, 1994), others found equivocal findings (e.g., Gagnon-Thompson & Barton, 1994) or reported mediating variables (e.g., response efficacy and sense of responsibility to conserve; Newman, 1986). There is also some evidence of interaction effects between different value orientations. For example, Black and his colleagues (1985) observed that ecological behaviors appear to result from a compromise between altruistic and egoistic motivations. Evidently, individuals do consider personal costs when contemplating engaging in behaviors

originating from an altruistic value orientation. Research on the association between values and ecological behaviors is further complicated by evidence of measurement effects. Questions emphasizing monetary concerns (e.g., higher gasoline taxes) tend to activate a more egoistic value orientation while non financial measures of behavioral intent elicit more biospheric or altruistic value orientations (Stern et al., 1993). Nevertheless, this body of research has enabled researchers to monitor a gradual shift towards more pro-environmental values in the general population. This shift in value orientation may partly reside in social interactions.

Social interactions. The impressive possibilities posed by social interactions, while recognized in the field, have not been extensively investigated (Porter et al., 1995). Stern and colleagues (1993) argued that social interactions can shape people's environmental concern by altering their attentiveness to information as well as influencing ecological attitudes and behaviors. That is, significant others may help change the pervasive idea that conservation behaviors necessarily entail sacrifices to the more realistic perception that ecologically sound behaviors are beneficial for everyone. More importantly, individuals tend to rely on word of mouth for new information (Dresner, 1989-90). For example, people's beliefs concerning the effects of environmental conditions on their health partly originate from information provided by close others (e.g., Belle-Isle & Raman, 1996). The use of "block leaders" (known neighbors) significantly influence ecological attitudes and encourage higher participation in recycling (Burn, 1991; Hopper & Nielson, 1991). Social ties appear instrumental in the recruitment and continued involvement in activism (Edwards & Oskamp, 1992; Manzo & Weinsten, 1987). The success of close others in promoting ecological behaviors may be because information originating from peers has the advantage of being considered credible, personally relevant and is often couched in concrete terms (Seligman, 1985). Alternatively, the effectiveness of social interactions may lie in recipients' perception that ecological behaviors are normative or stem from a fear of rejection if behaviors are not done (Porter et al., 1995).

Some researchers have addressed the qualitative dimensions of social interactions. Yates and Aronson (1983) suggested that maximum environmental compliance resulted from favoring feelings of

choice and personal control in individuals. Evidence for this hypothesis is indirectly provided by studies investigating social pressure and psychological reactance. For example, perceptions of intense pressure were associated with low compliance in performing ecological behaviors (e.g., Geller, 1989). Reactance effects have also been observed in studies using strongly worded prompts for ecological behaviors (e.g., Aronson & O'Leary, 1982). Incidentally, prompts presented in a non-controlling manner proved to be more efficient in enlisting acquiescence (e.g., "Remember to turn off the lights" versus "You must turn off the lights"; Winett & Kagel, 1984). Finally, coercive strategies have been associated with failure to generalize from one type of ecological behavior to another (Simmons, 1991; Simmons & Widmar, 1991).

de Young (1996) has identified several other important qualitative dimensions of social interactions. Specifically, the provision of procedural information (e.g., performance feedback) that made people feel competent in performing ecological behaviors was associated with action. Written rationales for engaging in conservation behaviors (e.g., reusing) also favored a higher frequency of target behaviors (de Young, Duncan, Frank, Gill, Rothman, Shenot, Shotkin, & Zweizig, 1993). Face-to-face communications in concrete, relevant terms, as well as active involvement by participants in assessing their energy efficiency needs, resulted in a greater proportion of homeowners retrofitting their homes (Gonzales, Aronson, & Costanzo, 1988).

Summary: Literature review on adult populations

Educational campaigns have been moderately successful in informing the public on environmental issues and fostering ecological concern. Contemporary people place greater value on the ecology. Paradoxically, they remain relatively inactive in doing things for the environment (e.g., Environment Canada, 1998).

Lessons drawn from studies point to person variables as critical antecedents to environmental behaviors. Four particular antecedents have been associated with active participation: (a) knowledge of environmental issues and strategies; (b) concern with environmental issues; (c) personal commitment;

and (d) perceptions of competence (self-efficacy and response efficacy; Hungerford & Volk, 1990; Ramsey & Hungerford, 1989; Sia, Hungerford, & Tomera, 1985-86). These findings are further corroborated in several surveys. Perceptions of personal inconvenience, lack of knowledge, personal costs, and weak perceptions of competence are often mentioned by people as sources of inaction (e.g., Environment Canada, 1998; Pelletier, Dion, Tuson, & Green-Demers, in press). In addition, people tend to rely on industries and the government to bring about meaningful changes to better the environmental situation (Environment Canada, 1998). This suggests the need to instill in people a sense of personal responsibility in addressing environmental problems.

Findings on investigated situational variables are less encouraging. Behavioral strategies are notorious in their failure to foster enduring behavioral changes. Furthermore, these strategies are often expensive in time, energy, and money. Their effectiveness lies in the continuous use of reinforcements. In contrast, implemented structural changes were successful in fostering ecological behaviors as long as they remained in place. Unfortunately, interventions based on behavioral strategies and structural changes showed weak cross-situational generalization of behaviors.

Studies focusing on the social context emphasized the emergence of ecological values and the influence of people on people. Of the two, social interactions appeared to be the most promising. Successful interventions often involved face-to-face interactions (e.g., securing verbal or written commitment; use of block leaders). Researchers have also identified dimensions of social interactions which favored people's compliance in performing ecological behaviors. These dimensions included perceptions of choice and competence, use of performance feedback, and provision of rationales. Unfortunately, the area of social influence has been relatively unexplored. In addition, research is needed to determine ways of encouraging people who display environmentally-friendly behaviors to become actively involved in promoting ecological behaviors in others (Geller, Berry, Ludwig, Evans, Gilmore, & Clarke, 1990). The use of others as intervention agents could prove critical in attempts to promote ecological behaviors in the general population (Yates & Aronson, 1983). More challenging is that once changed, these behaviors must be maintained (de Young, 1993). Like block leaders, children could

serve to facilitate the development of internally regulated ecological behaviors. The effects of interpersonal behaviors and internalization of behavioral regulation are central constructs in some theories of motivation.

Conceptual framework of the present thesis

The study of motivation is proposed in the present thesis, as a means to gain further insight into correlates of behavioral persistence (Aronson & Gonzalez, 1990; de Young 1986; de Young et al., 1993). de Young (1996) observed that a great deal of human activities can be explained in terms of satisfaction and pleasure motives inherent in the activity. Individuals who participate in activities for internal motives tend to show greater persistence in the absence of external sources of behavior regulation (i.e., constant reinforcement or prompting).

Of the various motivational theories, Deci and Ryan's (1985; Ryan, 1991) self-determination theory offers four advantages. First, it postulates a sequence comprising various motivational antecedents, subtypes of motivation as well as distinct motivational consequences. Second, the authors propose different types of motivation that have proven useful in qualifying variations in ecological involvement. Third, self-determination theory provides a framework explicating modes of internalization, that is the means by which people become more self-determined. Conceptually, internalization is said to depend on the social context and particularly the qualitative dimensions of interactions. Fourth, this theoretical perspective has received substantial empirical support from studies conducted in several important life domains including education (Deci, Vallerand, Pelletier, & Ryan, 1991), interpersonal relationships (Blais, Sabourin, Boucher, & Vallerand, 1990), work (Blais, Lacombe, Vallerand, & Pelletier, 1990), leisure (Pelletier, Vallerand, Green-Demers, Blais, & Brière, 1995), and sports (Pelletier, Fortier, Vallerand, Tuson, Brière, & Blais, 1996). Recently, the theory has been applied to the environment with success (e.g., Green-Demers, Pelletier, & Ménard, 1997; Pelletier, Green-Demers, & Béland, 1997;

Pelletier, Dion, et al., in press; Pelletier, Tuson, Green-Demers, Noels, & Beaton, 1998). A brief overview of the theoretical underpinnings of self-determination theory will be presented in the following pages.

Self-determination theory (SDT)

Deci and Ryan (1985) conceptualize behaviors to arise from different motives varying in level of self-determination. Self-determination refers to the level at which people take responsibility for themselves and their actions. These motives are classified into three broad categories: intrinsic motivation, extrinsic motivation and amotivation.

Intrinsic motivation refers to behaviors which are engaged in for the pleasure and satisfaction derived while doing the activity. As such, intrinsic motivation represents the highest level of self-determination. Intrinsically motivated people act out of personal choice and interest. The behavior is said to be an end in itself (e.g., Because of the pleasure felt while contributing to the preservation of the environment). In contrast, extrinsic motivation characterizes behaviors that are a means to an end, that is, instrumental in achieving an end.

Extrinsic motivation is further subdivided into four subtypes. From high to low levels of self-determination, these subtypes are integrated regulation, identified regulation, introjected regulation and external regulation. Integrated regulation refers to behaviors that are freely chosen. These behaviors are valorized by the individual to the point that they become part of that person's self-definition (e.g., Because it's part of the way I've chosen to live my life). Behaviors characterized by identified regulation are also freely chosen by the individual. However in this case, the individual identifies with the activity as it provides a means to attain personally relevant goals and values (e.g., Because it's the way I've chosen to contribute to a better environment). Introjected regulation qualify behaviors resulting from self-imposed pressures. Regulation of actions often originates from emotions related to self-esteem such as guilt or anxiety. The behavior is considered non self-determined. The individual has merely internalized former external forms of control. In other words, the element of choice is missing (e.g., Because I would feel

guilty if I didn't do anything for the environment). Externally regulated behaviors are initiated by sources of pressure originating in the individual's social environment. Sources of pressure take the form of incentives or punishment. These behaviors are also considered non self-determined (e.g., To avoid being criticized).

Finally, **amotivated** individuals perform activities in a mechanical and meaningless fashion. They are incapable of perceiving consequences to their behaviors and therefore, are unable to recognize the motives underlying their actions. Amotivation is experienced as lack of control and alienation akin to learned helplessness (Abramson, Seligman, & Teasdale, 1978). In many instances, amotivated individuals eventually cease doing the activity (e.g., I honestly don't know, I have the impression I'm wasting time doing things for the environment).

Deci and Ryan (1985) conceptualize the various motivational subtypes as coexisting on a continuum of self-determination. Intrinsic motivation is considered the highest form of self-determination as it characterizes behaviors emitted out of pleasure and freedom. Amotivation represents the lowest possible level of self-determination as it implies a loss of personal control. Extrinsic motivation subtypes coexist between these two poles. From high to low levels of self-determination we find integration, identified, introjected and external regulation. Self-determination is therefore the underlying pivotal dimension of all motivational subtypes.

Level of self-determination is akin to several constructs investigated within environmental research. As a whole, the continuum of self-determination reflects a person's level of commitment to ecological behaviors (de Young, 1993). The construct of integrated regulation embodies the internalization of a combined altruist and biosphere value orientation (e.g., Schwartz, 1977; Stern et al., 1993). The construct of amotivation corresponds to weak beliefs in response efficacy. Thus, it can be argued that higher levels of self-determination reflect higher perceptions of ecologically oriented values, commitment and response efficacy.

Consequences of self-determination. In several studies using various methodological strategies, empirical support of the proposed associations between self-determination levels and motivational consequences have been found (for literature reviews see Deci, 1992; Deci & Ryan 1991; Vallerand, 1997). Consistently, results from studies have established that highly self-determined forms of motivation are associated with more positive psychological and behavioral consequences. The association between motivational subtypes and positive consequences tends to decrease as a function of level of self-determination. Thus, lower self-determined forms of motivation are found to be related with more negative psychological and behavioral consequences. For instance, self-determined motivation has been associated in various domains with, greater interest (Deci, 1992), positive emotions and feelings of competence (Brière & Vallerand, 1990; Ryan & Connell, 1989; Vallerand, Pelletier, Blais, Brière, Senécal, & Vallières, 1992), better conceptual learning, higher levels of rote recall (Benware & Deci, 1984; Grolnick & Ryan, 1987; Grolnick, Ryan, & Deci, 1991), heightened psychological well-being (Pelletier et al., 1995) and greater behavioral persistence (Green-Demers, Pelletier, & Legault, 1992; Pelletier, Fortier, Vallerand, & Brière, in press). In contrast, non self-determined motivations are associated with higher anxiety levels and perceptions that external threats are the main motive underlying behaviors (Gottfried, 1985).

Within the environment domain, self-determined motivational subtypes have been found to significantly predict the occurrence of ecological behaviors (Green-Demers et al., 1997; Tuson & Pelletier, 1992). Specifically, frequency of environmental behaviors increased as a function of self-determination level. In addition, self-determined people tended to engage more frequently in ecological behaviors perceived as difficult or demanding in terms of time, energy and personal resources. Less self-determined individuals were found to engage infrequently in environmentally-friendly behaviors and more interestingly, frequency of ecological activities tended to diminish with increased behavioral difficulty (Green-Demers et al. 1997).

Process of internalization. The issue of internalization of behavior regulation alluded to by de Young (1996) is a central component of SDT. Deci and Ryan (1985; Deci, Eghrari, Patrick, & Leone, 1994) define internalization as an innate process by which people actively transform external behavioral regulations into more internal forms of regulation. The process of internalization arises from the basic needs of autonomy, personal competence and relatedness. These needs encourage people to internalize certain regulations or activities deemed useful for effective functioning. Motivational determinants investigated by Deci and his colleagues (Deci & Ryan, 1985; Ryan 1991) focus on contextual factors that may favor or hinder internalization. An extensively investigated determinant of internalization is the social context. Specifically, internalization of self-regulation are hypothesized to be facilitated or hindered by particular qualitative dimensions of interactions between the individual and his or her social environment. Various dimensions of interpersonal behaviors have been proposed. They include autonomy support, control, information and involvement.

Autonomy support fosters a perception that behaviors originate from the person. In operational terms, autonomy supportive individuals encourage and respect others' opinions and initiatives. For example, the provision of rational and constructive feedback are considered forms of autonomy support. This interpersonal behavior is akin to what Baumrind (1971) defines as authoritative. Alike autonomy support, the authoritative style includes behaviors reflecting warmth, clear communication of rules, consideration of the child's wishes and solicitation of her/his opinions, consistency in setting limits, and appropriate response to disobedience behavior (e.g., child respected while limits are enforced). The use of controls are considered to be the opposite of autonomy supportive behaviors. In essence, the person perceives the origin of his or her behavior to lie in the environment as a result of external demands. That is, the locus of causality of the behavior is external. Exemplars of controlling behaviors include the use of reinforcements, the use of threats, surveillance and feedback emphasizing incompetence (see Deci & Ryan, 1987; 1991 for literature reviews). A controlling interpersonal behavior is akin to Baumrind's (1971) definition of the authoritarian style. Both styles of interpersonal behaviors reflect the use of rigid

enforcement of rules, lack of clear explanation of rules, absence of consideration of the child's wishes or opinions and persistent enforcement of rules by coercion. The provision of information encompasses helpful structured information regarding performance of the behavior and constructive feedback. Involvement implies personal commitment to an individual or a cause (Grolnick & Ryan, 1989). In operational terms, involvement in a common cause contributes to perceptions of cohesiveness and social integration. In existential terms, involvement is associated with positive affect while engaging in behaviors.

In line with self-determination theory, the manner in which social interactions take place affects people's self-determination. Positive dimensions of the social climate (e.g., involvement, information and autonomy support) are posited to enhance people's sense of self-determination. Whereas, negative dimensions of the social climate (e.g., control) are hypothesized to decrease self-determination (for a review see Deci et al., 1991). Theoretical refinements have emphasized an important consideration. What directly affects self-determination is not necessarily contextual factors per say (e.g., others' interpersonal behaviors, rewards or goal-setting), but rather the functional significance attributed to these variables by the individual. This interesting finding underlines the importance of taking into account the meaning of the environment for the individual in predicting its resulting impact on self-determination (Ryan & Grolnick, 1986).

Studies on the environment

Studies adopting the self-determination paradigm have sought to investigate the association between various variables and the resulting gains or decreases in level of self-determination (e.g., competence, satisfaction, importance, etc.). By means of structural equation modeling (LISREL VI), results indicated that the perceived importance attributed by individuals to the current environmental condition and the perceived competence they felt in performing environmentally-conscious behavior were both significant determinants of people's level of self-determination. The greater the attributed

importance and perceived competence experienced by individuals, the higher their level of self-determination. In turn, the importance individuals attributed to the environment was significantly predicted by people's general level of satisfaction towards the current environmental situation as well as their level of perceived competence. Specifically, greater levels of dissatisfaction with the environmental situation (in terms of its conditions and present government policies) were associated with greater importance attributed by the individual to environmental conditions. Similarly, the more individuals felt competent in performing environmentally-conscious behaviors, the more they viewed the environmental situation to be important (Mageau, Legault, Green-Demers, & Pelletier, 1996; Tuson & Pelletier, 1992). Thus, ratings of environmental importance and perceived competence were jointly associated with levels of self-determination. In turn, higher levels of self-determination was correlated with more frequent environmentally-friendly behaviors.

More recently, researchers have investigated the role of interpersonal behaviors in effecting changes in level of self-determination. Previous environmental research has shown an association between environmental behaviors and interventions favoring choice and personal control in individuals (Yates & Aronson, 1983). For example, the provision of prompts in a non-controlling manner (Winett & Kagel, 1984) and the provision of written rationales for performing behaviors (de Young et al., 1993) were found to be effective in enlisting people's cooperation in doing environmental behaviors. Incidentally, these dimensions of social interactions are reflected in the construct of autonomy support. In contrast, reactance effects were observed in response to perceptions of external pressure in the form of strongly worded prompts (e.g., Aronson & O'Leary, 1982). These negative dimensions are akin to the controlling interpersonal behaviors defined in SDT. The provision of performance feedback has been linked to heightened perceptions of competence (de Young, 1996). This particular dimension parallels the construct of information. Lastly, active involvement has been associated with an increased frequency of environmental behaviors (e.g., Gonzales et al., 1988).

Studies using the conceptual foundation of SDT have also investigated the influence of interpersonal behaviors on self-determination. Results from one field study showed that the positive

dimensions of the social climate (i.e., autonomy support, information, and involvement) were associated with higher levels of self-determination either directly or through levels of environmental dissatisfaction, perceived ecological competence, and importance attributed to environmental problems. The control dimension was found to be significantly associated with the non self-determined forms of motivation such as amotivation (Green-Demers, Legault, Pelletier, & Stewart, 1995).

It has long been recognized that people's social network is often a predominant source of influence on one's attitudes and behaviors. Green-Demers and colleagues (1995) have recently conducted two studies assessing the relative importance of significant others' influence on people's self-determination. Results of surveys conducted in the general population suggested that friends and children were two prominent sources of influence on environmental attitudes and behaviors. Interestingly, certain researchers have observed that becoming a parent increased attention to ecological information on health-related issues that may negatively affect the well-being of one's children. (Blocker & Eckberg, 1989; Stern et al., 1993). These findings provide additional support for the arguments presented in the conclusion of the review. If parents are more open and attentive to ecological information, the use of children in promoting parental ecological attitudes and behaviors could prove a critical aspect of intervention strategies attempting to effect enduring changes in adults' ecological behaviors. Furthermore, we suggest that any intervention would need to consider dimensions of the social climate to ensure a meaningful impact. We now present the goals of the study.

Goals of the study

Previous research findings suggest that formal education on environmental issues and strategies as well as participation in environmental activities are promising avenues to foster in children environmental knowledge, attitudes, and behaviors. The present study attempts to extend and replicate this work in several ways. First, while previous studies have investigated separately the effects of a formal education program and of ecological activities, the present study evaluates an environmental education program which incorporates both formal education and practical activities. Second, reviewed studies have

not included measures of both children's and parents' environmental knowledge, attitudes, motivation and behaviors. The present thesis seeks to address this drawback. Third, the lack of a theory-driven model has impeded our understanding of the mechanism by which ecological behaviors can be encouraged in children. In addition, the lack of a theory to guide research on child-parent information transfer hampers the development of efficient strategies optimizing the transfer of knowledge (issues, skills) acquired in the classroom environment. The conceptual framework provided by SDT may prove fruitful in furthering our understanding in these last two areas.

With the above considerations in mind, this thesis was comprised of three goals. The first goal was to evaluate the impact of an EEP on children's and parents' ecological knowledge, attitudes, motivation, and behaviors. The second goal was to investigate if a motivational model of ecological behaviors observed in adult populations could be replicated with children. Part of this goal also included the comparison of path analyses results across experimental conditions, separately for children and parents. The third goal was to identify more clearly which specific children's characteristics influenced parental ecological attitudes and motivation. Included in this goal was the investigation of possible differences in the strength of associations observed between constructs in path analyses conducted on the experimental and control groups of parents.

Hypotheses

1. Children enrolled in schools endorsing an EEP and their parents compared to children enrolled in schools with a regular curriculum and their parents would:

* be more knowledgeable about environmental issues;
* be less satisfied with environmental conditions;
* perceive themselves as more competent in doing something about the environment;
* attribute more importance to environmental issues;
* be more self-determined in performing ecological behaviors;

* perform ecological behaviors more frequently (e.g., recycle, seek information).

These hypotheses stem from past research evaluating classroom-based interventions (e.g., Ramsey & Hungerford, 1989; Leeming et al., 1997) and empirical findings arising from the self-determination perspective on adult populations (e.g., Green-Demers et al., 1997; Mageau et al., 1996; Pelletier, Legault, & Tuson, 1996; Tuson & Pelletier, 1992).

2a. In line with the motivational model of environmental behavior (Mageau et al., 1996; Tuson & Pelletier, 1992), we hypothesized that:

* Greater knowledge of environmental issues and strategies would be associated with lower levels of satisfaction with the environmental condition and perceptions of greater competence in doing something about the environment (Ramsey, 1993; Ramsey & Hungerford, 1989).
* Higher levels of dissatisfaction with environmental conditions would be associated with people attributing greater importance to the current environmental situation. Specifically, perceptions of greater discrepancy between current environmental conditions and those considered safe would be associated with people attributing higher ratings of importance to the environment (Pelletier, Legault, & Tuson, 1996).
* Higher levels of perceived competence would be associated with higher ratings of importance (Deci & Ryan, 1985).
* High ratings of importance would be related with high levels of self-determination. Specifically, evaluation of issues as central, personally relevant and therefore important would be associated with higher levels of motivation to act (Krosnick, 1989).
* Higher perceptions of competence would also be related with higher levels of self-determination (Deci & Ryan, 1985).
* Higher levels of self-determination would be associated with more frequent environmental behaviors (Deci & Ryan, 1985; Green-Demers et al., 1997).

2b. We hypothesized that stronger associations between constructs would be found in the experimental group as compared to the control group, both for children and their parents. Observation of a stronger association would be evidenced by greater unstandardized beta weight values and a higher percentage of variance explained in the criterion variable (i.e., R^2).

3. Compared to children enrolled in schools endorsing a normative curriculum, enrollment of children in an EEP would be more strongly associated with parental ecological attitudes and motivation. We hypothesized that:

* High levels of parental perception of children's provisions of autonomy support and of ecological information, as well as, joint child-parent involvement in ecological activities would be associated with heightened parental levels of dissatisfaction with actual environmental conditions. Parental perception of controlling interpersonal behaviors would be unrelated with or positively associated with levels of parental satisfaction with environmental conditions (e.g., de Young et al., 1993; Geller, 1989; Green-Demers et al., 1995).
* High levels of parental perception of children's provision of autonomy support and of information, as well as, joint child-parent involvement in ecological activities would also be associated with enhanced parental perceptions of ecological competence. Parental perception of children's interpersonal behaviors as controlling would be uncorrelated with or negatively associated with parents' perceptions of competence (e.g., de Young, 1996; Green-Demers et al., 1995).
* In turn, higher levels of dissatisfaction with environmental conditions and greater perception of competence would jointly be associated with greater importance attributed to the environmental situation.
* Higher ratings of importance would be correlated with higher levels of self-determination.

METHOD

Participants

Participants came from 4 schools in the province of Quebec. Surveyed schools were from the area of Hull, Aylmer and Buckingham. A first group of 5 classes were drawn from schools endorsing the Brundtland Green School Project. These 6th grade children were enrolled in schools offering for the first time a structured ecological program[1]. A second group of 6 classes constituted the control group[2]. These children were also enrolled in 6th grade but in schools lacking a formal ecological program. Schools part of the Brundtland Green School Project came from Aylmer and Buckingham. Schools part of the control group were situated in Hull.

A total of 203 children participated in the first wave and 209 in the second wave of data collection. The response rate was of 65% at Time 1 and 67% at Time 2. The overall response rate was 60% with completed questionnaire packages at Time 1 and 2 (N = 184). Specifically, 62% from the experimental group and 52% from the control group completed both questionnaires. Within the experimental condition, there were 39 girls and 46 boys ranging from 10 to 13 years of age (mean age of 11; SD = .54).

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[1] Sixth grade children were chosen because this constitute the age at which a deeper sense of ecological awareness develops (e.g., Evans et al., 1982) as well as greater stability in ecological attitudes and knowledge (Leeming et al., 1995). Also, past personal experience as well as that of other researchers have found that sixth grade children are capable of discriminating their responses on 4 or 5 point scale (e.g., Musser & Malkus, 1994).

[2] A seventh control class originating from a third school was eliminated from the sample for substantive and statistical reasons. When interviewed at Time 2, the teacher acknowledged the extensive use of an ecological program in the classroom. Specifically, children were sensitized to environmental issues throughout the school year and environmental issues were presented in several subject matters. In addition, children in this class had implemented an ecological club for the school. A priori, this school was part of the control group but following these observations, its profile resembled more that of the experimental group. In addition, informal probing of children revealed they had helped their parents answer the questionnaire package. It is important to note that these children were predominantly recent emigrants to Canada and, as such, parents did not master the French language. This created a problem of non-independence of observations between parent and child answers. The above considerations cast doubts on the validity and reliability of responses. Consequently this small number of subjects was eliminated from all analyses (N=15).

The majority of children spoke French at home (98%) with a fair number interacting in more than one language (65%; French and English or other). A small percentage of children communicated at home in a language other than French or English (2%). On average, children reported 2.5 siblings (range 1 to 5 or more).

Within the control condition, there were 49 girls and 50 boys between 10 and 12 years of age (mean age of 11; SD = .49). Children reported interacting mostly in French at home (96%) with a majority speaking more than one language (77%; French, English and other). A minority of children reported communicating in a language other than French or English (4%). On average, children reported 2.2 siblings with a range of 1 to 5 or more.

A total of 194 parents participated in the first wave of data collection and 148 in the second wave. Parental participation was 63% at Time 1 and 48% at Time 2. In terms of complete questionnaire packages (Time 1 and 2), the overall response rate was 42% (N = 131). Specifically, participation was 46% for the experimental group and 39% for the control group with complete questionnaire packages. Participants were evenly distributed with 65 in the experimental condition and 66 in the control condition. In the experimental condition, 52 questionnaires were completed by women and 13 by men. Mean age was 39 years ranging from 26 to 51 (SD = 4.4). A great proportion of parents spoke French at home (91%) with a minority communicating mainly in English or another language (9%). As for employment, 66% worked full time, 20% worked part time outside the home and 13% remained at home. Some parents studied either full-time (3%) or part-time (6%). The household members numbered on average 4 (range 2 to 7; SD = 1). Most families included two children (range 1 to 5; SD = .85). Family revenue was varied with 12.3% earning 20,000$ or less, 7.7% earning between 21 to 30,000$, 9.2% earning between 31 to 40,000$, 15.4% earning between 41 to 50,000$, 21.5% earning between 51 to 65,000$, 12.3% earning between 66 to 80,000$ and 13.8% more than 80,000$ (7.8% did not respond). City-dwellers constituted 68% of the sample, with 10% living in the country and 22% in the suburbs. A total of 83% owned their homes with 17% renting. Most people had access to a household recycling program (89%) as well as a recycling

program at work (77%). A total of 5% of parents reported being a member of an environmental organization.

Within the control condition, 49 women and 17 men completed the questionnaire at both Time 1 and 2. Mean age of respondents ranged from 32 to 59 with a mean of 39 years (SD = 4.2). Parents spoke mainly French at home (97%) with a small proportion communicating in either English or some other language (3%). As for employment, 68% worked full time, 17% worked part time outside the home and 15% remained at home. Some parents studied full-time (5%) or part-time (3%). The mean number of people residing in one dwelling was 4 (range 2 to 7; SD = 1). The average number of children was 2 ranging from 1 to 4 (SD = .72). Family revenue was varied with 13.6% earning 20,000$ or less, 1.5% earning between 21 to 30,000$, 16.7% earning between 31 to 40,000$, 3% earning between 41 to 50,000$, 22.7% earning between 51 to 65,000$, 9.1% earning between 66 to 80,000$ and 25.8% more than 80,000$ (7.6% did not respond). City-dwellers constituted 85% of the sample with 15% in the suburbs. Most participants were homeowners (77%) with some renting (23%). Lastly, more than 91% of households had access to a recycling program at home and 65% at work. A total of 6% of parents reported being a member of an environmental organization.

In sum, the socio-demographic profile of the experimental group was comparable to that of the control group. Children in both groups were roughly equivalent in terms of age and language spoken at home. Parents in both groups were found to be comparable in terms of age, gender, income level, number of residents per household and access to recycling programs both at home and at work. This last variable is important to consider as amount of refuse would vary accordingly. An additional consideration is that income level is closely tied to educational level (Fowler, 1993) which in turn, is associated with higher frequency of ecological behaviors (Finger, 1994). On the surface, both groups are found to be roughly equivalent on socio-demographic variables identified as important in the environmental literature.

Curriculum description

Recent development in the province of Quebec provided a unique opportunity to evaluate the impact of a formal environmental education program offered in selected grade schools. Children in the experimental group were enrolled in the "Brundtland Green School Project" (i.e., "Le projet des écoles vertes Brundtland"). The curriculum for this educational program was developed by interested teachers and parents. Launched in 1992, the Brundtland Green School Project favors three major goals including: (a) implementation of measures pertaining to resource conservation; (b) furthering the protection of the environment; and (c) promoting sustained ecological behaviors. To meet these goals, the program advocates a comprehensive education program based on theoretical and practical components. At a theoretical level, students have access to a formal course on environmental issues. Ecological questions are further pursued in other subjects. For example, understanding electricity is part of the normal natural science curriculum of grade 6. Students learn how electricity is generated, its uses as well as the impact on the environment ensuing from the construction of stations (use of nuclear stations versus dams) and pollution. In the French course, students may be assigned to write a paper on the uses and misuses of electricity. In mathematics, students would be calculating the quantity of electricity needed to light a room for a period of time. At a practical level, students are invited to learn about and get involved in various environmentally friendly strategies such as recycling, planting trees, and composting. Children also organize themselves into various ecological clubs whose purpose is to educate the school population about environmental issues as well as encourage the use of ecological strategies such as sorting lunch leftovers for recycling or composting purposes.

The Brundtland Green School Project curriculum meets numerous recommendations lauded by environmental educators. The program is implemented throughout the school year from junior kindergarten to grade 6. Ecological issues are addressed in all subject matters. Topics taught include background knowledge as well as successful environmental strategies. As previously mentioned, Mayer and Fortner (1987) observed that an intellectual approach appeared to be just as effective as actual

experience in fostering children's understanding of ecological issues. However, this program goes a step further by including an applied component. Students obtain theoretical and actual experience dealing with environmental issues both in school and in outdoors activities. The reader is referred to Appendix A for further information on the modalities of the Brundtland Green School Project.

Children from the control group were enrolled in schools where the curriculum does not contain formal or practical ecological information. Some students had access to recycling bins at the beginning of the school year (2 classes). However, this program was discontinued midway through the year by the school's administration. The low volume of recycling did not warrant the costs of maintaining the service. The remaining students had no access to recycling bins (4 classes). Natural science themes taught to this group of children remained at a general level of knowledge. Covered topics included the life cycle of plants and animals, electricity production and the water cycle. Pollution was briefly touched in April. More importantly, environmental issues were not addressed in other subject matters.

Procedure

Prior to testing, experimenters met with teachers from each school. This interview allowed experimenters to determine which, if any, ecological issues were taught and the presence of ecological programs (ex: ecological clubs, composting, etc.). Towards the end of the school year, experimenters again interviewed teachers on ecological issues raised within the classroom and the school. Teachers were also invited to answer a short survey to determine which ecological topics were taught and if planned ecological programs were actually implemented within their respective schools (see Appendix B).

Children and their parents answered a first questionnaire package in October, 1996. Participants answered the same questionnaire in May, 1997. The first questionnaire provided a baseline measure of children's and parents' ecological knowledge, attitudes, as well as behaviors. The second questionnaire package was to assess changes in measured constructs over the course of a school year. At the request of school officials, testing was delayed until October to ensure that the school year was well under way.

Teachers part of the Brundtland project assured experimenters that formal lessons on environmental issues and practical ecological activities would begin only in October.

During the first session, experimenters informed children as to the goals of the study and what participation in the study would entail. Students were then invited to bring home a questionnaire for their parents and a letter requesting parental consent for the child's participation in the study (Appendix C). The following week, experimenters returned in the same classes, to collect completed parents' questionnaires and signed consent forms. At Time 1, parental consent was obtained for both waves of data collection. Eligible children were then invited to answer the questionnaire package. When parental consent was not obtained, children were invited to do quiet work. Teachers remained in the classroom while students completed the questionnaire. Children were reminded that the goal of the study was to understand their attitudes and behaviors towards the environment. Participants were further assured that participation was voluntary and that their answers would remain confidential. The experimenter read out loud instructions and individual items. Children were reminded throughout testing to ask for clarifications as needed. The same procedure was repeated at the end of the school year with one difference. Parental consent was obtained for children who were not part of the initially tested group but who were interested in participating in the second part of the study.

This quasi-experimental repeated-measures design allowed us to investigate whether children and parents in the experimental condition, compared to children and parents in the control condition, demonstrated at the end of the school year: (a) enhanced knowledge of environmental issues; (b) favorable ecological attitudes; (c) a more self-determined motivational profile; and (d) a higher frequency of environmentally-friendly behaviors.

Measuring instruments

Measuring instruments used in the children's questionnaire package necessitated adaptation from scales previously used in an adult population. This was necessary as no known ecological attitude

and behavior measurement instruments had been validated with a younger population. Parts of the children's adapted version of the questionnaire was also included in the parents' questionnaire package. This was done to accommodate parents' varying levels of vocabulary and fluency in French. Our primary goal in conducting this exercise was to eliminate possible error and bias in participants' responses due to item complexity in language and level of abstractness. Given that parents are liable to come from various educational backgrounds, we preferred to adopt a cautious stance. Finally, items were added to some scales to allow evaluation of context-specific attitudes and behaviors. When applicable, these changes have been identified in the description of the measuring instrument.

Adaptation of the vocabulary at a level understood by children was done with help from grade 8 students enlisted in the Franco-Ontarian education system. Two reasons underlined the use of grade 8 students. First, students' age corresponded closely to the target population. Second, pre-testing was done in Ontario to prevent contamination of the target Francophone population residing in Quebec. We pre-tested oral and written instructions for completing the questionnaire package and the various scales. This was done to ensure that items were written in a language that was both simple and straightforward. The researcher proceeded by first reading the scale instructions and then each item to the class. Any word or expression proven to be unclear was explained to the children. Children were then invited to suggest alternative wording or vocabulary. Pre-testing also served to ascertain that responding to the questionnaire did not exceed 30 minutes. We felt that longer responding time might result in participant fatigue. A revised version of the questionnaire package was then administered to 7th grade students enlisted at the same school. Parental consent was obtained for 8 children (5 girls and 3 boys). All children were 12 years old. This second pre-testing satisfied us as to the legibility of the adapted version for the target population and established that the questionnaire could be completed within 30 minutes.

The majority of scales used in the children's questionnaire package have been adapted from measurement instruments validated in university and general populations. An environmental research program headed by Pelletier and his colleagues has validated some of the scales included in the parents' questionnaire notably the environmental motivation and satisfaction scales (e.g., Pelletier et al., 1997;

Pelletier et al., 1998; Pelletier, Legault, & Tuson, 1996). The remaining measurement instruments have been extensively used in field studies (e.g., Green-Demers & Pelletier, 1993; Green-Demers et al., 1997; Green-Demers et al., 1995; Mageau et al., 1996; Pelletier, Dion et al., in press; Pelletier et al., 1998; Tuson & Pelletier, 1992). Past results have shown that these scales possessed acceptable internal validity, good convergent as well as divergent validity, and satisfactory reliability. The psychometric properties of previously used scales are described in the parents' questionnaire package section. Appendix D contains the children's questionnaire package whereas Appendix E comprises the parents' questionnaire package. To ease the reader's identification of constructs, items have been regrouped into subscales. In the original version of both questionnaire packages, items representing the same construct were mixed.

Children's questionnaire

The **Motivation Towards the Environment Scale** (MTES) is an adapted version of the scale developed by Pelletier and colleagues (Pelletier et al., 1998; Pelletier et al., 1997). The initial instrument contained six subscales (4 items/subscale) corresponding to various motives for engaging in ecological behaviors. For the purposes of this study, 4 types of motivation were measured. In line with SDT, these motives are positioned along a continuum of self-determination (Deci & Ryan, 1985, 1991). From high to low levels of self-determination, they are intrinsic motivation, identified regulation, external regulation and amotivation. Items are formulated in response to the question: "Why are you doing things for the environment?". To assist children in responding to items, the MTES was altered in several ways. First, several items were restated to accommodate the vocabulary level of children. Second, the original 7 point scale was replaced by a 5 point scale. This decision was based on extensive work conducted by Harter with elementary level populations (e.g., Harter, 1981, 1992; Harter & Jackson, 1992) and our own pilot testing of the scale. Third, anchor points were reworded and individually identified to ease responding (e.g., rarely, sometimes, often, very often, and almost always). Again, this was done to

accommodate the cognitive developmental stage of children. Fourth, the number of items per subscales was reduced to 3 in order to prevent participants' fatigue. Choice of items retained in the questionnaire package was based on factorial analyses results obtained on adult samples. Specifically, items were favored when the item-total correlation to their respective factor was consistently elevated. Moreover, items were retained in function of their pertinence for children established during the pre-testing session. A final modification was the elimination of subscales portraying introjected forms of motivation. Exclusion of introjected motives was based on two considerations: keeping the overall length of the questionnaire reasonable and the non-necessity of these motives for computational purposes. This last consideration will be elaborated later on with the introduction of the computation of a global motivational score. The final version of the scale measured intrinsic motivation (e.g., "I take pleasure in doing things for the environment"; 3 items), identified regulation (e.g., "I think it's a good idea to do things for the environment"; 3 items), external regulation (e.g., "Others force me to perform ecological behaviors"; 3 items) and amotivation (e.g., "I don't know, I feel that I'm wasting my time"; 3 items)[3].

Exploratory factor analysis was conducted on the MTES using maximum likelihood extraction with oblique rotation. Oblique rotation was chosen as the preferred factor rotation procedure because factors were found, in the past, to be correlated to one another. Analyses were conducted on both Time 1 and Time 2 scores. Results generally supported the intended 4-factor solution representing the subscales of intrinsic motivation, identified regulation, external regulation and amotivation. The solution accounted for 50% of the variance at Time 1 and 54% of the variance at Time 2. Items representing external regulation and amotivation loaded uniquely on their respective factor. However, some items measuring identified regulation and intrinsic motivation tended to load onto both factors albeit loadings were higher on their respective factor. This was not deemed problematic given that these motives are both located at the high end of the continuum of self-determination.

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[3] All examples of items provided for the children's and parents' measures represent English translations of the original French-Canadian version of the items.

Construct validity was assessed by a series of correlation analyses between subscales and with relevant psychological constructs. The adapted MTES displayed the proposed simplex pattern. Correlations with other psychological constructs included in the questionnaire were in the hypothesized direction. Internal consistency values were found to be acceptable (mean alpha values at T1 = .69, T2 = .72). These results offer preliminary indications that the modified version of the MTES possessed adequate psychometric properties. Correlations between subscales are presented in Table 1. Table 2 contains observed correlations between the subscales and related constructs.

For the purposes of the present study, a self-determination index (SDI) was computed. As in previous studies using global motivational scores, SDI scores were generated by weighting each subscale according to its position on the self-determination continuum and than summing the weighted scores (Blais, Sabourin et al., 1990; Fortier, Vallerand, & Guay, 1995, Grolnick & Ryan, 1987, 1989; Grolnick et al., 1991, Patrick, Skinner, & Connell, 1993; Ryan & Connell, 1989; Vallerand & Bissonnette, 1992). Specifically, weights were assigned to the subscales in the following fashion: (2 x intrinsic motivation) + (1 x identification) + (-1 x external regulation)+ (-2 x amotivation). Computation of the SDI requires an even number of subscales. In the past, some researchers have simply not included introjected motives in scale validation studies (e.g., Guay & Vallerand, 1995). In line with these studies, the present version of the scale did not include items reflecting introjected motives. Results from past studies have provided extensive support of the validity and reliability of self-determination indices (e.g., Blais, Sabourin et al., 1990). Use of the SDI not only simplifies but renders parsimonious the explanation of investigated psychological and behavioral processes (Vallerand, 1997).

Table 1.

Correlations between children's MTES subscales (Time 1 and Time 2) and reliability values.

Subscales	I	II	III	IV
I. Intrinsic Motivation	.48***	.76***	.08	-.37***
II. Identified Regulation	.73***	.48***	.06	-.45***
III. External Regulation	-.01	.04	.36***	.12
IV. Amotivation	-.39***	-.41***	.18**	.38***

Note. Values appearing above the diagonal represent correlations at Time 1 whereas values appearing below the diagonal represent correlations at Time 2. Values in the diagonal represent test-retest correlations.

** $p < .01$. *** $p < .001$.

Table 2.

Correlations between children's MTES subscales and related constructs at Time 1 and 2.

	Motivational Subscales			
Constructs	Intrinsic Motivation	Identified Regulation	External Regulation	Amotivation
Time 1				
Satisfaction	.10	.08	-.03	-.11
Importance	.61***	.60***	.05	-.39***
Competence	.57***	.57***	-.02	-.44***
Ecological behaviors	.59***	.59***	.10	-.32***
Time 2				
Satisfaction	.08	.13*	.04	.00
Importance	.60***	.63***	-.01	-.43***
Competence	.51***	.55***	-.03	-.38***
Ecological behaviors	.60***	.61***	.04	-.24***

* $p < .05$. ** $p < .01$. *** $p < .001$.

The **Attitudes Towards the Environment Scale** combines in one section three distinct constructs pertaining to children's level of environmental satisfaction (e.g., "Environmental conditions in my neighborhood are satisfactory"; 3 items), perceived importance of environmental issues (e.g., "I'm worried about the environmental situation"; 3 items) and perceived competence in performing ecological behaviors (e.g., "I feel capable to do things for the environment"; 3 items). Environmental satisfaction items originated from the Environmental Satisfaction Scale developed by Pelletier, Legault, and Tuson (1996; Pelletier, Blanchard, & Legault, 1996). Pelletier and colleagues' Perceived Importance of the Environment Scale provided the items measuring attributed seriousness of environmental problems (e.g., Pelletier et al., 1997; 1998). Items measuring children's perception of their ability to do environmental behaviors were drawn from the Perceived Environmental Competence Scale used by Pelletier and colleagues (e.g., Pelletier et al., 1997, 1998).

As with the MTES, these scales were altered to facilitate responding and diminish possible measurement errors due to participants' confusion. First, several items were restated to accommodate the vocabulary level of children. Second, the original 7 point scale was replaced by a 5 point scale. Third, anchor points were reworded and individually identified to ease responding (e.g., rarely, sometimes, often, very often and almost always). Fourth, the number of items per subscales was reduced to 3 items. Lastly, only one of the two subscales composing the Environmental Satisfaction Scale was retained in this study. Specifically, items pertaining to satisfaction towards the environmental condition were included. The subscale measuring satisfaction towards government policies was excluded as this was deemed irrelevant to children's life experience. Lastly, internal consistency values were considered adequate in the altered version of the scales (e.g., satisfaction, alpha T1=.77, T2=.76; importance, alpha T1=.76, T2=.81; competence ; alpha T1=.74, T2=.72).

The **Frequency of Environmental Behaviors Scale** (FEBS) was partly based on past research conducted on adult populations by Pelletier and associates (Green-Demers et al., 1997; Pelletier et al., 1997, 1998). This provided a guide of commonly measured behavioral constructs in the

environmental literature. Careful attention was also given to creating additional items relevant to children's life experience. In keeping with the above considerations, the scale's intended factorial structure comprised five categories of behaviors reflecting waste management, participation in an ecological organization, purchasing, recycling/reusing and sources of information. While the first 4 categories of behaviors generally mirrored items developed in the past, the sources of information subscale was developed specifically for the purposes of this study.

In consideration of the children's context, six possible sources of information were identified. These included parents, teachers, friends, television, books and school work on the ecology. Children were asked how frequently they asked parents, teachers or friends for ecological information. They also identified the frequency with which they watched ecological programs on television, read ecological books independently of readings assigned by the teacher and the amount of school work pertaining to ecological issues. Following verification of frequencies, friends as a source of information was deleted from further analysis. This particular item had high levels of kurtosis and skewness indicating that most children infrequently used friends as a source of ecological information (mean = 1 for both groups). The remaining items allowed us to identify the relevancy of various sources of information for both groups as well as the frequency of information seeking. Participants self-reported the frequency of all ecological behaviors on a 5 point scale (e.g., 1 = rarely and 5 = almost always).

Following exploratory factor analysis, the final structure of the scale was reduced to 3. The first factor (8 items) represented mainly sources of information (e.g., I ask my parents environmental information). The second factor portrayed purchasing behaviors (e.g., I ask my parents to buy recycled toilet paper; 3 items). The third factor represented recycling/reusing behaviors (e.g., I ask for reusable containers in my lunch box; 4 items). For the purposes of the present study, a global ecological behavior score was computed by summing subscales scores. The use of a global score served to simplify and render more parsimonious the explanation of investigated psychological processes in complex analyses (path analyses). The sources of information subscale also served as a manipulation check for testing differences between the experimental and control groups. As such, this subscale was used in preliminary

analyses in addition to its inclusion in the composite score of behaviors. Complete data analyses of the FEBS are presented in the results section.

The **Ecological Knowledge Scale** was developed specifically for this study. Items were inspired by the work of de Young (1986) and the Francophone ecological game "Toujours vert". The scale contains 15 questions following a multiple choice format. Participants were instructed to choose one out of four possible answers for each question. The theoretical range for scores was between 0 to 15. Areas of knowledge assessed included ecological issues (e.g., endangered species, health problems and nuclear energy; 8 items) and ecological strategies (e.g., recycling, composting; 7 items). Special effort was expanded to broadly sample the domain of environmental knowledge. This was done to prevent favoring students enlisted in the Brundtland Green School Project. Our goal was to evaluate the overall knowledge possessed by all participants. Accordingly, questions were chosen for their simplicity, relevance and past media coverage.

Demographic information. Children were asked to identify their gender, age, language spoken at home and number of children in the family.

Parents' questionnaire

Motivation Towards the Environment Scale (MTES; Pelletier et al., 1997, 1998; Green-Demers, Pelletier, & Legault, in press) is a self-report measure assessing participants' perceived reasons for engaging in environmental behaviors. Items are formulated in response to the question of "Why are you doing things for the environment?". The MTES comprises a total of 24 items (4 items/subscale) representing the different types of motivation proposed by Deci and Ryan (1985, 1991). Measured motives included intrinsic motivation (e.g., "Because I take pleasure in mastering new ways to help"), integrated regulation (e.g., "Because it's an integral part of life"), identified regulation (e.g., "Because it's the way I've chosen to contribute"), introjected regulation (e.g., "Because I feel bad when I do nothing for the environment"), external regulation (e.g., "Because others will be upset if I didn't") and amotivation

(e.g., "I don't really know, I can't see what I'm getting out of it"). Participants evaluated each item on a scale from 1 ("Does not correspond at all") to 7 ("Corresponds exactly"). To fulfill the goals of the present study, the MTES was slightly modified. First, subscales were reduced from four to three items. In so doing, we endeavored to maximize the total number of constructs measured while favoring questionnaire completion. We also hoped that the more parsimonious version would minimize participants' fatigue and negative reactions. The choice of items was partly dictated by consistent elevated item-total correlation with their respective factors observed in past factor analyses conducted on independent groups (Pelletier et al., 1997, 1998). In addition, items included in the children's questionnaire were favored. This was done to render comparable both questionnaire packages.

The psychometric properties of the MTES have been established in previous studies. Overall, the MTES has shown satisfactory internal consistency values (.71 < alpha > .96) and adequate test-retest reliability over a one-month period (test-retest correlations .63 < $\underline{r}$ >79). In terms of validity, results of both exploratory and confirmatory factor analyses (using LISREL) supported the 6-factor structure of the scale. Construct validity was also found to be good as assessed by a series of correlation analyses between subscales and with relevant psychological constructs. Finally, the scale has been evaluated for possible social desirability effects. Authors used the Paulhus (1984) Balanced Inventory of Desirable Responding (BIDR). Results showed that individual subtypes of motivation were not significantly associated with either the BIDR self-deception subscale (range -.05 to .06) or the impression management subscale (-.06 to -.05).

To assess the psychometric properties of the slightly altered version of MTES used in this study, exploratory factor analysis (EFA) was conducted using maximum likelihood extraction with oblique rotation. Results of the EFA supported the anticipated six factorial structure at both times. The solution accounted for 65% of the variance at Time 1 and 68% at Time 2. Examination of internal consistency values was also found to be satisfactory (e.g., intrinsic motivation; alpha T1=.86; T2=.85; integrated regulation, alpha T1=.90; T2=.91; identified regulation, alpha T1=.80, T2=.82; introjected regulation,

alpha T1=.81, T2=.82; external regulation, alpha T1=.77, T2=.73; amotivation, alpha T1=.77, T2=.82). Moreover, as in previous studies including the MTES, the present version displayed a simplex pattern as well as correlations with other psychological constructs in the anticipated direction. These results indicate that the MTES displays adequate psychometric properties.

To facilitate analyses, a self-determination index (SDI) was computed using the different motivational subscales. Like previous studies using global motivational scores, SDI scores were generated by weighting each subscale according to its position on the self-determination continuum and then summing the weighted scores (Blais, Sabourin et al., 1990; Fortier et al., 1995, Grolnick & Ryan, 1987, 1989; Grolnick, Ryan, & Deci, 1991; Patrick et al., 1993; Ryan & Connell, 1989; Vallerand & Bissonnette, 1992). Specifically, weights were assigned in the following way: (3 x intrinsic motivation) + (2 x integrated regulation) + (1 x identified regulation) + (-1 x introjected regulation) + (-2 x external regulation) + (-3 x amotivation). The resulting score not only reflected the degree of self-determination present in parents' ecological motives but allowed for the consideration of the entire motivational continuum. As previously stated, past research has yielded extensive support for the validity and reliability of self-determination indices (e.g., Blais, Sabourin et al., 1990). The use of SDI has also proven useful in complex designs as it allows the investigation of a simple, parsimonious yet complete explanatory model of human behavior (Vallerand, 1997).

The Environmental Satisfaction Scale (ESS) is a self-report measure of two subscales measuring a person's level of satisfaction toward the state of the environment and level of satisfaction toward existing government environmental policies (4 items/subscale; Pelletier, Legault, & Tuson, 1996; Pelletier, Blanchard, & Legault, 1996). Examples of scale items include "The local environmental conditions are excellent" and "In most ways, the quality of the government's environmental programs are good". Prior to answering, participants were instructed to evaluate levels of water, noise, and air pollution present in their neighborhood. Items are answered on a 7 point scale (e.g., 1 = "Completely disagree" and 7 = "Completely agree"). In the context of the present study, the ESS was slightly altered. First, only

items measuring level of satisfaction toward the state of the environment were included. This was done in order to keep parents' and children's questionnaire packages comparable. Second, the number of items was diminished from four to three. As previously stated, this was done to maximize the total number of constructs measured while favoring questionnaire completion. The choice of items was partly justified by consistent elevated item-total correlation with their respective factors observed in prior factor analyses conducted on independent groups (e.g., Pelletier, Legault, & Tuson, 1996; Pelletier, Blanchard, & Legault, 1996). Items retained in the children's questionnaire were also favored.

In previous studies, the ESS was found to display satisfactory internal consistency values (mean alpha .82), good divergent as well as convergent validity and an adequate test-retest reliability over one month (mean test-retest correlation .67; Pelletier, Blanchard, & Legault, 1996; Pelletier, Legault, & Tuson, 1996). Similarly, the shortened version of the subscale measuring general environmental satisfaction yielded satisfactory internal consistency values (alpha T1=.88, T2=.86). Moreover, the present version yielded correlations in the anticipated direction with other psychological constructs. These results indicate that the modified version of the ESS displays adequate psychometric properties.

Perceived Importance of the Environment (Pelletier et al., 1997, 1998) assesses people's level of concern for environmental problems. An example would be "I feel the seriousness of the environmental situation has been blown out of proportion" (reverse coded). Prior to answering, participants were instructed to evaluate levels of water, noise, and air pollution present in their neighborhood. Items were answered on a 7 point scale (e.g., 1 = "Completely disagree" and 7 = "Completely agree"). To ensure a maximum number of constructs measured while favoring questionnaire completion, this scale was shortened. Specifically, three items remained in the questionnaire out of a possible of four. The choice of items was partly dictated by results obtained in prior internal consistency analyses conducted on independent groups (e.g., Pelletier et al., 1997, 1998). In addition, two items closely matched those comprised in the children's version of the scale. The only difference was the use of simplified but synonymous words in the children's version.

In past studies, internal consistency levels have been found to be acceptable (mean alpha = .82; Green-Demers et al., 1995; Green-Demers et al., 1997; Pelletier et al., 1997, 1998; Tuson & Pelletier, 1992). In terms of validity, divergent and convergent associations with related psychological constructs were found to be in the hypothesized direction. In view of the above modifications, the psychometric properties of the modified scale were investigated. Examination of Cronbach alpha values led to the elimination of one item. This item was worded in a negative direction reflecting low levels of importance. Following deletion of this item, internal consistency values were found to be within acceptable range (alpha T1=.74, T2=.77). In addition, correlations with other psychological constructs included in the questionnaire were in the appropriate direction. These results indicate that the scale displays adequate psychometric properties.

Perceived Environmental Competence (PEC) evaluates participants' perceived ability to perform environmental behaviors (Pelletier et al., 1997, 1998). Items were adapted from the "competence" subscale of the Rochester Assessment Package for Schools (Wellborn & Connell, 1987). An example of items would be "I think I can effectively do things to help the environment". Individual items were answered on a 7 point scale (e.g., 1 = "Completely disagree" and 7 = "Completely agree"). Again, three items were retained in the questionnaire out of a possible of four. The choice of items was partly dictated by results obtained in prior internal consistency analyses conducted on independent groups (e.g., Pelletier et al., 1997, 1998). In addition, two items closely matched those comprised in the children's version of the scale. The difference was the use of simplified but synonymous words in the children's version.

Results in past studies have shown the PEC to possess satisfactory internal consistency values (mean alpha = .84; Green-Demers et al., 1997; Pelletier et al., 1997, 1998; Tuson & Pelletier, 1992). In addition, evidence of good construct validity as well as divergent and convergent validity was found. In the present sample, internal consistency values was found to be satisfactory (alpha T1 = .75; T2 = .80). Moreover, examination of correlations between the PEC scale and other psychological constructs were

found to be in the anticipated direction. These results indicate that the scale possesses acceptable psychometric properties.

Children's Interpersonal Behaviors Scale (CIBS) was developed specifically for the purpose of this study. This scale was based on work conducted by Pelletier and colleagues as well as the theoretical framework provided by Deci and Ryan. Specifically, this self-reporting scale is partly inspired by the "Interpersonal climate for environmental change questionnaire" (ICECQ) developed by Pelletier and colleagues (Green-Demers et al., 1995; Mageau et al., 1996). The ICECQ was designed to assess the qualitative dimensions of dyadic interactions as defined in self-determination theory (Deci & Ryan, 1985; Ryan, 1991). Measured dimensions of interpersonal climate included those of autonomy support (4 items), information (4 items), involvement (4 items), control (4 items) and indifference (4 items).

The Children's interpersonal behaviors scale assesses the qualitative dimensions of the child-parent interactions involving environmental issues. Participants evaluated each item on a 7 point scale (e.g., 1 = "Does not correspond at all" and 7 = "Corresponds exactly"). However, the new version of scale differs from previous work in several aspects. First, the scale only included the qualitative interpersonal dimensions of autonomy support (e.g., "My child encourages me to keep doing things for the environment), control (e.g., My child insist I do things for the environment"), information (e.g., "My child informs me on new environmental projects") and involvement (e.g., "My child and I take pleasure working together to better the environment"). Second, items were worded to follow a common stem of "My child". This was done to ensure that parents would answer items bearing in mind past interactions with their child. Third, additional items were generated to address more specifically the child-parent interactions. While respecting Deci and Ryan's (1985; Ryan, 1991) theoretical definition of the constructs, items were formulated to address the power imbalance in a parent-child relationship. This power balance was not taken into account in the ICECQ version of the scale as it was mainly developed to measure interpersonal climate between adults. With this in mind, items reflecting the autonomy supportive and the control dimensions of child-parent interactions were generated. Lastly, two items assessing the influence of the

school program on parents were also created. This new dimension was incorporated within the informational subscale (e.g., "My child informs me on new ecological strategies learned in school").

The original version of the scale contained 20 items (5 per subscale). However, following data analysis, the final structure of the scale was reduced to a total of 11 items measuring autonomy support (3 items), information (4 items), and involvement (4 items). The control subscale was deleted from further analyses because of poor construct validity. Complete data analyses of the CIBS are presented in the results section.

Perception of Children's Ecological Attitudes and Behaviors Scale was designed to assess parental perception of children's ecological attitudes and behaviors. Items included in this section generally mirrored those contained in the children's questionnaire. Items were reformulated to complete the stem "My child". Parents answered items on a 7 point scale where 1 is labeled "Does not correspond at all" and 7 is labeled "Corresponds exactly".

Pertaining to attitudes, parents were asked to evaluate how important ecological issues were for their child (e.g., "My child finds it important to do things for the environment"; 3 items) and how competent the child felt in performing ecological behaviors (e.g., "My child feels capable to do things for the environment"; 3 items). One item measuring perceived level of competence was deleted from further analysis because of a low item-total consistency value observed in the internal validity analysis. Final internal consistency values were considered adequate for both perception of the child's level of importance attributed to the environment (alpha T1 = .90, T2 = .89) and perception of the child's sense of competence in accomplishing ecological behaviors (alpha T1 = .85, T2 = .92).

Concerning environmental behaviors, items from the children's questionnaire were selected when deemed present in child-parent interactions. Parents were first queried on their child's self-initiated ecological behaviors. Behaviors investigated included recycling (e.g., "My child recycles things without prompting"; 1 item), purchasing (e.g., "My child tends to buy environmentally-friendly products"; 1 item) and participation in ecological clubs (e.g., "My child participates in an ecological club"; 1 item) The above

behaviors were also self-reported by children. Two items were added to measure parents' perception of the child's general level of involvement in doing things for the environment (e.g., "My child will, on his own, do things for the environment"). Internal consistency values for the perception of the child's self-initiated ecological behaviors subscale were found to be satisfactory (alpha T1 = .84, T2 = .86). Second, parents were questioned on their child's interest in acquiring more information on the environment. Adults evaluated the use by their child of three possible sources of information. Children also assessed the use of the same sources of information. Specifically, parents were asked if children questioned them on environmental issues, viewed ecological programs on television and read on environmental issues outside of school work. Examination of internal consistency values for this subscale was found to be satisfactory (alpha T1 = .85, T2 = .87).

Parental Frequency of Environmental Behaviors Scale assessed an ensemble of environmental behaviors. This self-reported scale is partly based on previous scales developed by Pelletier and colleagues (Green-Demers et al., 1997; Pelletier et al., 1997, 1998; Tuson & Pelletier, 1992). Like past instruments, this scale evaluates the frequency of four broad categories of environmental behaviors namely waste management, conservation habits, purchasing environmentally-friendly products and ecological organization membership. Participants were asked to quantify and to report the frequency of behaviors (e.g., weekly quantity of garbage bags left at the curbside).

The waste management subscale, items were formulated to assess if participants indeed recycled, the monthly frequency of recycling (range of answers: "never" to "weekly"; 1 item) as well as the quantity contained in the recycling bin during the previous week (range of answers: "less than one bin" to "one and a half bin to two"; 1 item). As recycling is relatively easy to perform (Green-Demers et al., 1997), we wanted to assess not only its prevalence but also the quantity. Also measured was the frequency of recycling toxic waste (1 item), amount of weekly garbage bags (1 item) and weekly composting (2 items). Clearly people may answer that they do recycle on a weekly basis and yet, their recycling bin is less than half full. Participants chose the most appropriate frequency in two ways: by identifying the prevalence of

the behavior (e.g., "I've recycled twice in the past month") and the quantity (e.g., "Three garbage bags were left at the curb last week"). An exception was measurement of recycling toxic waste which was answered on a 7 point scale where 1 was labeled "Never" and 7 was labeled "Always". The waste management subscale presented acceptable levels of internal consistency (alpha T1 = .64, T2 = .62).

The purchasing subscale was composed of 11 items assessing lunch packaging and product purchasing habits. Items pertaining to lunches included the use of lunch boxes, thermos, juice boxes, plastic containers, ziploc bags and pre-package products (6 items). In addition, 5 items assessed grocery purchasing habits such as biodegradable products. Of the original subscale, one item reflecting grocery purchases was eliminated because of low item-total squared multiple correlation observed in the internal validity analysis. Participants evaluated the frequency of performing these types of behaviors on a 7 point scale where 1 was labeled "Never" and 7 was labeled "Always". Internal consistency values for this subscale was deemed acceptable (alpha T1 = .63, T2; = .60).

The energy conservation subscale was divided into two scores one representing the quantity of energy conserving hardware in the household (6 items) and the other specifically addressing energy conservation behaviors (3 items). In the first instance, participants identified which if any energy conservation hardware was used in the household (e.g., lamp timers, exterior light timers, thermostat automatic control). Parents simply ticked the hardware used. Regarding energy conservation behaviors, participants were asked if they turned off the lights when absent from the home (1 item). Respondents were also asked whether they lowered the temperature in their homes when absent during the day and if they lowered the household average temperature at night (2 items). These items were answered on a 7 point scale (e.g., 1 = "Never" and 7 = "Always"). Participants also reported the average household winter temperature maintained in the home during the day and at night (e.g., 21^{0}C). These last two questions were not included in the computation of the energy conservation behavior score. They served as response checks.

The usual mode of transportation to work was assessed. Participants were asked how often they either walked, bused, cycled, car-pooled or drove their car to work. Participants reported the frequency of use of the different forms of transport on a 7 point scale where 1 was labeled "Never" and 7 was labeled "Always". A global score representing the usual mode of transportation to work was then computed by averaging the reported use of ecological modes of transport and then subtracting the reported frequency of automobile use. High values of the resulting score represented higher use of ecological modes of transportation to work whereas lower values indicated more frequent automobile use.

One last item assessed level of mild activism (Séguin, Pelletier, & Hunsley, 1998). Participants were asked if they were members of an environmental organization. When the answer was yes, people were further asked to identify the organization.

For the purposes of the present study, a composite score of parental ecological behaviors was computed by summing the subscale scores of waste management (5 items), purchasing (10 items), energy conservation hardware (6 items), energy conservation (3 items) and mode of transport (1 item). The composite score of ecological behaviors presented acceptable internal consistency values (alpha T1 = .74; alpha T2 = .75).

Ecological Knowledge Scale contained identical items used in the children's questionnaire. To reiterate, items were inspired by the work of de Young (1986) and the Francophone ecological game "Toujours vert". Our goal was to evaluate overall level of ecological knowledge possessed by parents. Accordingly, questions were chosen for their simplicity, daily relevance and past media coverage. Couched in a multiple choice format, this measure contained 15 items assessing knowledge of environmental issues and strategies.

Demographic information was obtained from parents to identify the characteristics of the sample. Participants were asked to identify their gender, age, language spoken at home, whether they were students or workers, number of person living in the household, family income, place of residence and access to a recycling program at home and at work.

RESULTS

Overview of Statistical Analyses

To accomplish the 3 goals of the study, the statistical procedures of factor analyses, analyses of variance, and of path analyses are used as outlined below.

Preliminary analyses. Analyses were first conducted to establish if data conformed to a certain number of basic assumptions required by the use of analysis of variance techniques and of path analyses. As well, factor analyses were conducted to assess the psychometric properties of two adapted measuring instruments before their subsequent use in major analyses.

Descriptive analyses. Given the new status of the experimental schools in the Brundtland Green School Program, it was judged important to verify if this group differed from the control group on distinct characteristics given their endorsement of the program. Qualitative data was obtained from all teachers by means of a short informal interview at Time 1 and a questionnaire at Time 2. Teachers' responses were compared across groups. Children's sources of ecological information were also examined. Responses obtained from children were first compared across groups and then, subjected to a repeated measures analysis.

Analyses of variance of child variables. A series of multivariate analysis of covariance (MANCOVA) was conducted to establish if attitudinal, motivational, and behavioral differences existed between the experimental group and the control group of children. To avoid unnecessary loss of power, simultaneous testing was restricted to variables representing similar constructs. Specifically, separate MANCOVAs were conducted on children's ecological attitudes, motivation, and behaviors.

Analyses of variance of parental variables. A series of MANCOVA was done to explore attitudinal, motivational, and behavioral differences between the experimental group and the control group of parents. Again, to avoid unnecessary loss of power, simultaneous testing was restricted to variables representing similar constructs.

Motivational model of ecological behaviors. Path analyses were done to assess relations between children's ecological knowledge, attitudes, motivation, and behaviors. In the first instance, path analyses tested an a priori proposed model in an attempt to replicate past findings of associations between these ecological constructs. All relations were examined separately for children in the experimental and control groups resulting in a total of 2 path analyses.

In the second instance, path analyses were also executed to investigate an a priori proposed model assessing relations between parents' ecological knowledge, attitudes, motivation, and behaviors. Analyses were conducted independently for parents in the experimental and control groups for a total of 2 path analyses.

Proposed children-parents model. Path analyses investigated if children's interpersonal behaviors mediated the influence of an environmental education program on parental ecological attitudes and motivation. This model was tested and compared across the experimental and the control groups necessitating 2 path analyses.

Preliminary Analyses

This first section is further subdivided into four subsections. A first series of analyses verified basic assumptions prior to the use of MANCOVAs on children's measured variables. This section also contains preliminary analyses related to the multivariate repeated measures analysis conducted on children's sources of information. A second series of analyses verified basic assumptions prior to the use of MANCOVAs on parents' measured variables. A third series of analyses investigated basic assumptions prior to the use of path analyses. Lastly, the psychometric properties of adapted measuring instruments are assessed.

Basic Assumptions of Analyses of Variance on Child Variables

The use of MANCOVA is valid provided that the data conform to a certain number of basic assumptions. The main goal of the preliminary analyses was to ascertain whether these assumptions held for the sample under study. In agreement with the planned series of MANCOVAs, data screening was conducted on within group variables that reflected similar constructs: ecological attitudes, motivational subtypes, self-determination index, and ecological behaviors. In addition, analyses were conducted to ascertain that data related to children's sources of information conformed to the assumptions underlying the use of a multivariate repeated measures analysis. These assumptions are similar to those required by the use of MANCOVA with the exception of homogeneity of hyperplanes. In all, 10 preliminary screening analyses were conducted.

Outliers. Examination of the distribution of standardized scores for within group variables revealed the presence of potential univariate outliers with z-scores in excess of |3.0|. As their numbers never surpassed 5% per analysis, it was decided to keep these participants in ulterior analyses (Tabachnick & Fidell, 1989). Multivariate outliers were identified through examination of standardized residuals, Cook's and Mahalanobis' distances. Multivariate standardized residuals displayed acceptable values, ranging from -2.11 to 3.22 in the experimental group and from -2.11 to 2.29 in the control group. Cook's distances below 1.00 are generally considered satisfactory (Hamilton, 1992). No scores were observed above this value in the experimental group (maximum value = .23) nor in the control group (maximum value = .15). However, following multiple regression analyses, several cases presented significant Mahalanobis' distances. Specifically, cases presenting significant multivariate values were identified in the following within cell groups: 1 case in attitudinal determinants found in the control group ($\chi 2$ (df = 9) > 27.877, $p < .001$); 2 cases in motivational subtypes found in the experimental group ($\chi 2$ (df = 9) > 27.877, $p < .001$); 1 case in self-determination index found in the experimental group and 1 case in the control group ($\chi 2$ (df = 3) > 16.266, $p < .001$); 1 case in the sources of information scale for the experimental group and 3 cases in the control group ($\chi 2$ (df = 10) > 29.588, $p < .001$). These subjects

were excluded, when applicable, from subsequent MANCOVAs or the multivariate repeated measures analysis.

Sample size and missing data. The use of MANCOVA requires a minimal ratio of 5 cases per dependent variable in each within group cell (Tabachnick & Fidell, 1989). Sample size in MANCOVAs averaged 80 cases in the experimental group (range 77 to 85) and 93 in the control group (range 91 to 95), more than respecting this requirement (number of dependent variables per analysis ranged from 1 to 4). In multivariate repeated measures analysis, sample size is determined by the number of variables for each case times the number of repetitions. In the present study, 5 dependent variables were measured twice yielding 10 measures per case. To avoid singularity of variance-covariance matrices more than 50 cases per group is required (Tabachnick & Fidell, 1989). This requirement was met in the present study wherein 81 cases were found in the experimental group and 94 in the control group. For all analyses, missing data were found in both groups and appeared to be random. Such cases were omitted from further respective analyses through listwise deletion.

Normality. Summary statistics for all variables involved in the present study were first examined. Mean and standard deviation values displayed appropriate dispersion. Examination of kurtosis and skewness values revealed the presence of values greater than $|1.0|$ in both groups. While in MANCOVA, problems of skewness are more problematic than those engendered by kurtosis, deviations were not considered highly problematic for three reasons. First, the F-test is normally robust to non-normality when: (a) sample size is equal; (b) there are no outliers; and (c) the test conducted is two-tailed (Stevens, 1992; Tabachnick & Fidell, 1989). Second, the nominal and actual alpha value become very close to one another when there are more than 50 cases per group (Stevens, 1992). Third, the mean value of both kurtosis and skewness did not exceed $|2.0|$ per within cell groups for each analysis (Muthén & Kaplan, 1985). These considerations being met in the present sample, the decision was not to transform. Moreover, from a multivariate perspective, the distribution of the standardized residuals and

the normal probability plots appeared fairly normal. Mean, standard deviation, kurtosis and skewness values of within group variables are shown in Appendix F.

Linearity. Spot check examinations of bivariate distributions revealed generally linear configurations. As previously mentioned, the distribution of multivariate residuals appeared fairly normal. In addition, most dependent variables presented reasonably balanced distributions within each group.

Multicollinearity and singularity. Examination of the correlation matrix failed to reveal any correlation in excess of .90 (Tabachnick & Fidell, 1989). Multicollinearity and singularity were also assessed by means of the tolerance values obtained in the multiple regression procedure used to detect multivariate outliers. Tolerance values near 0 indicated possible problems of multicollinearity or singularity. Results revealed an absence of multicollinearity or singularity among variables included in each within group analysis.

Multivariate homogeneity of variance-covariance matrices. Box's M test is used to assess multivariate homogeneity of variance-covariance matrices across groups. In general, results showed multivariate homogeneity of variance-covariance matrices in the preliminary analyses for MANCOVAs. However, Box's M test is notoriously sensitive to even small violations of homogeneity of variance. When results were found to be significant, it was not deemed problematic (i.e., motivation subtypes). The MANCOVA F-test is usually robust against some heterogeneous variances provided there is an absence of multivariate outliers and the cell sample size ratio is less than 4:1 (Stevens, 1992; Tabachnick & Fidell, 1989). In the present study, the ratio was of 1.2:1 for the experimental to the control group. Thus, statistical power remained adequate as the Type 1 error was only slightly affected (Stevens, 1992).

In the multivariate repeated measures analysis, Bartlett's test of sphericity is usually examined to ascertain multivariate homogeneity of variance-covariance matrices when data is collected on more than 2 occasions. In the present study, this was not necessary as there were only two waves of data collection (Levine, 1991).

Multivariate homogeneity of hyperplanes. Homogeneity of hyperplanes across groups requires finding a non significant covariates by independent variable interaction as well as covariates by dependent variables interactions. The covariates by independent variable interaction was examined by means of an ANOVA testing the total sum of covariates by independent variable interaction. This resulted in an omnibus F-test allowing us to determine the similarity of regression hyperplanes across both groups (i.e., non significance indicates homogeneity). The use of Roy-Bargman stepdown analysis required additional testing of regression homogeneity involving a series of ANOVAs where at each step of the analysis, each dependent variable joined the list of covariates by independent variable interactions. When heterogeneity of regression was found at a certain step, interpretation of the remaining stepdown analysis became distorted. In the present study, the alternate statistical procedure of repeated measures analysis was done as suggested by Tabachnick and Fidell (1989) whenever violations of regression homogeneity occurred.

Manipulation check of experimenters. A series of t-tests were performed to investigate possible differences in participants' responses as a function of experimenters. Investigated variables included ecological attitudes, motivation, behaviors, and sources of information. Results indicated an absence of significant differences between participants tested by the two experimenters at both points in time. One exception was found for the amount of school work (M = 2.4, SD = 1.3, vs. M = 1.9, SD = 1.1; range 1 to 5) at Time 1. Subsequent oneway ANOVAs (in function of schools and classes) were conducted for this variable. Results showed significant differences between 2 classes in one school. However, the remaining 9 classes (across schools) did not significantly differ from one another regardless of the experimenter.

Gender differences. A series of t-tests were conducted on dependent variables including ecological attitudes, motivation (SDI), motivational subtypes, ecological behaviors, and sources of information. A Bonferroni procedure was used to control for an inflated Type 1 error by keeping the overall alpha at an acceptable .05. Adjustment was provided in function of the same grouping of variables

used for MANCOVA analyses (e.g., ecological attitudes). Results showed significant gender differences in ecological attitudes (Bonferroni adjusted p-value = .0125). Boys (M = 12.66, SD = 2.1) perceived themselves as more competent than girls (M = 11.13, SD = 2.9) at Time 2 (t (177) = -4.01, p = .000). Significant gender differences were also found in level of self-determination. Boys (M = 16.01, SD = 10.21) reported a higher level of self-determination than girls (M = 11.63, SD = 11.98; t (174) = -2.62, p = .01). No other significant differences between gender was found.

To ascertain that these gender differences did not bias results in the main analyses, analyses of covariance were then conducted on the combined variables of ecological attitudes and on self-determination. A 2 (experimental/control group) x 2 (boys, girls) MANCOVA was first conducted on children's levels of importance, satisfaction, competence, and knowledge measured at Time 2. The covariates included in the analysis were measures of importance, competence, knowledge, and self-determination taken at Time 1. Preliminary evaluation of basic assumptions established normality of distributions and linearity. One multivariate outlier was identified in the control group and deleted from the analysis. In addition, homogeneity of variance and of regression hyperplanes across groups was observed. Results indicated a significant main effect for the independent variable gender (Wilk's F.(4,163) = 4.82, p < .05). However, no significant effects were found for the independent variable group (Wilk's F (4,163) = 1.41, p > .05) nor for the interaction between gender and group membership (Wilk's F.(4,163) = 1.29, p > .05).

A 2 (experimental/control group) x 2 (boys, girls) ANCOVA was then conducted on children's level of self-determination measured at Time 2. The covariates included levels of self-determination and of importance reported by children at Time 1. Preliminary evaluation of basic assumptions established normality of distributions and linearity. Two multivariate outliers were identified in the control group and deleted from the analysis. In addition, homogeneity of variance and of regression hyperplanes was observed. Results revealed a significant main effect for the independent variable gender (Wilk's F (1,168) = 8.42, p = .004). However, no significant effects were found for the independent variable group (Wilk's F

(1,168) = .11, $p > .05$) nor for the interaction between gender and group membership (Wilk's F.(1,168) = .10, $p > .05$).

Statistical power analysis. This test takes into consideration the relationship among four components: sample size, significance criterion, effect size, and statistical power. Cohen (1988) suggests a method for determining sample size for F-tests conducted in analyses of variance and covariance. In accordance with conventions, power level was set at .80 and the alpha level was set at .05 (Cohen, 1988; Keppel, 1991). Past studies in the domain of environmental psychology have generally yielded a medium effect size (effect size, f = .25; η^2 = .06)[4]. This medium effect size indicates that statistical significance will be attained when the difference between group means will be of half a standard deviation (d = .50). In the present study, the minimum number of cases per group in analyses was observed to be 77. Given this sample size, statistical power was found to be at .85, given an alpha level of .05 and a medium effect size (f = .25).

Statistical power analysis was conducted for the multivariate repeated measures analysis. Sample size estimates were derived from existing tables with an alpha level set at .05, anticipated medium effect size (f = .25; d = .50), a desired power level of .80 and the presence of 2 groups. In the present study, sample size was observed to be 81 participants per group. Statistical power was therefore evaluated to be at .90, given an alpha level of .05 and a medium effect size (f = .25).

Effect size. In the present study, effect size was assessed by ETA squared (η^2) which is a generalization to 2 or more groups of the R^2. At a multivariate level, η^2 represents the proportion of variance of the combined dependent variables accounted for by group membership. At the univariate level, η^2 represents the proportion of variance of the dependent variable accounted for by group membership (Cohen, 1988; Tabachnick & Fidell, 1989). To provide the reader with a reference point,

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[4] Cohen (1988) defines "f" as the standard deviation of the standardized k population means and "d" as the range of standardized population means.

Cohen (1988) defines a small effect size as an η^2 of .01, a medium effect size as an η^2 of .06 and a large effect size as an η^2 of .14.

Summary: Basic assumptions of analyses of variance on child variables. Results from preliminary analyses indicated that the data generally conformed to premises underlying the use of MANCOVAs and of repeated measures analyses. Evaluation of the assumptions of normality, linearity, multicollinearity, multivariate homogeneity of variance-covariance matrices, and multivariate homogeneity of hyperplanes was satisfactory. Multivariate outliers were identified and excluded, when applicable, from subsequent analyses. Group differences were found in function of experimenters but remained confined to the variable of amount of homework done on the ecological topic for 2 out of 11 classes surveyed. Gender differences were also found for the combined dependent variable of children's attitudes and for children's level of self-determination. However, subsequent covariance analyses revealed no significant effects of the multiplicative term gender by group membership on these dependent variables. Thus, the consideration of gender does not yield additional explanation of group differences. As the present study's main focus involved identifying differences between the experimental and the control groups, investigation of the independent variable gender was not pursued. Given that no significant violations of the basic assumptions were found, hypotheses testing of group differences for child variables proceeded.

Basic Assumptions of Analysis of Variance on Parental Variables

In agreement with the planned series of MANCOVAs, data screening was conducted on within group variables representing similar constructs: parents' ecological attitudes, perception of children's ecological attitudes and behaviors, perception of children's interpersonal behaviors, motivational subtypes, self-determination index, and ecological behaviors. In all, 12 preliminary screening analyses were conducted.

Outliers. Examination of the distribution of standardized scores for within group variables revealed the presence of potential univariate outliers with z-score in excess of | 3.0 |. As their numbers never surpassed 5% per analysis, it was decided to keep these participants in ulterior analysis (Tabachnick & Fidell, 1989). Multivariate outliers were identified through examination of standardized residuals, Cook's and Mahalanobis' distances. Multivariate standardized residuals generally displayed acceptable values, ranging from -2.1 to 1.97 in the experimental group and from -1.3 to 3.8 in the control group. Cook's distances below 1.00 are generally considered satisfactory (Hamilton, 1992). No scores were observed above this value in the experimental group (maximum value = .16) nor in the control group (maximum value = .46). However, following multiple regression analyses, several cases presented significant Mahalanobis' distances in the following within cell groups: 1 case for ecological attitudes found in the control group ($\chi 2$ (df = 9) > 27.877, p < .001); 1 case for perceived children's ecological attitudes and behaviors found in the experimental group ($\chi 2$ (df = 9) > 27.877, p < .001); and 1 case for the composite ecological behaviors score in the experimental group and 1 in the control group ($\chi 2$ (df = 3) > 16.266, p < .001). When applicable, these subjects were excluded from subsequent MANCOVAs.

Sample size and missing data. The use of MANCOVA requires a minimal ratio of 5 cases per dependent variable in each cell (Tabachnick & Fidell, 1989). Sample size in analyses averaged 58 cases in the experimental group (range 50 to 62) and 55 in the control group (range 45 to 61), respecting this requirement (number of dependent variables per analysis ranged from 1 to 6). Missing data were found in both groups and appeared to be random. Such cases were omitted from further respective analyses through listwise deletion.

Normality. Summary statistics for all variables involved in the present study were first examined. Mean and standard deviation values displayed appropriate dispersion. Examination of kurtosis and skewness values revealed the presence of values greater than |1.0| in both groups. Any deviations observed were not considered highly problematic for three reasons. First, the F-test is normally robust to non-normality when: (a) sample size is equal; (b) there are no outliers; and (c) the test conducted is two-

tailed (Stevens, 1992; Tabachnick & Fidell, 1989). Second, the nominal and actual alpha value become very close to one another when there are more than 50 cases per group (Stevens, 1992). Third, the mean value of both kurtosis and skewness does not exceed |2.0| in each analysis (Muthén & Kaplan, 1985). In general, these considerations were met in the present sample and the decision was not to transform. Moreover, from a multivariate perspective, the distribution of the standardized residuals and the normal probability plots appeared normal. Mean, standard deviation, kurtosis and skewness values of within group variables are shown in Appendix G.

Linearity. Spot check examinations of bivariate distributions revealed generally linear configurations. As previously mentioned, the distribution of multivariate residuals appeared fairly normal. In addition, most dependent variables presented reasonably balanced distributions within each group.

Multicollinearity and singularity. Examination of the correlation matrix failed to reveal any correlation in excess of .90 (Tabachnick & Fidell, 1989). Multicollinearity and singularity were also assessed by means of the tolerance values obtained in the multiple regression procedure used to detect multivariate outliers. Tolerance values near 0 indicate possible problems of multicollinearity or singularity. Results revealed an absence of multicollinearity or singularity among variables included in each within group analysis.

Multivariate homogeneity of variance-covariance matrices. Box's M test was generally found to be non-significant. In the instances when the test was found to be significant, this was not deemed problematic. The F-test is usually robust against some heterogeneous variances when there is an absence of multivariate outliers and the cell sample size ratio is less than 4:1 (Stevens, 1992; Tabachnick & Fidell, 1989). In the present study, the ratio was found to be equivalent. Thus, statistical power remained adequate and the Type 1 error was only slightly affected (Stevens, 1992).

Multivariate homogeneity of hyperplanes. Analyses were conducted to test the significance level of the combined covariates by independent variable interaction as well as covariates by

dependent variables interactions. A similar strategy to that used in analyses conducted on child variables was adopted when this assumption was violated.

Homogeneity of sample. Homogeneity of the 2 groups was verified for gender, revenue, access to a home recycling program, and age. These socio-demographic variables were targeted for analyses as they are sometimes found to be significantly associated with ecological variables (e.g., Pelletier et al., 1997, 1998). Results from the chi-square tests failed to find significant differences in gender, access to a home recycling program and revenue. A t-test conducted on age also found no significant differences between groups.

Gender differences. T-tests were conducted on all dependent variables including ecological attitudes, perception of children's ecological attitudes and behaviors, perception of children's interpersonal behaviors, self-determination, motivational subtypes, and ecological behaviors. A Bonferroni procedure was used to control for an inflated Type 1 error by keeping the overall alpha at an acceptable .05. Adjustment was provided in function of the same grouping of variables used in MANCOVA (e.g., ecological attitudes). Results showed significant gender differences in level of self-determination. Men (M = 43.25, SD = 25.87) reported a lower level of self-determination than women (M = 57.09, SD = 27.62) at Time 1 (t (197) = 3.07, p = .002). Results also revealed significant gender differences in perceived children's interpersonal behaviors at Time 1 (t (211) = 3.12, p = .002). Specifically, men reported lower levels of involvement (M = 15.30, SD = 4.96) compared to women (M = 17.78, SD = 5.09). No other significant gender differences were observed.

To ascertain that these gender differences did not bias results of the main analyses, covariance analyses were conducted on the self-determination index and on the combined variables of perceived children's interpersonal behaviors. A 2 (experimental/control group) x 2 (men, women) ANCOVA was first conducted on parents' level of self-determination measured at Time 2. The covariates included in the analysis were levels of self-determination and of importance measured at Time 1. Preliminary evaluation of basic assumptions established normality of distributions, linearity, homogeneity of variance, and

homogeneity of regression hyperplanes. One multivariate outlier was identified in the experimental group and deleted from the analysis. The dependent variables were not significantly affected by the independent variables of gender (Wilk's F.(1,107) = 2.14, p > .05) and of group membership (Wilk's F (1,107) = .56, p > .05). In addition, the dependent variables were also not significantly affected by the multiplicative term of gender by group membership (Wilk's F (1,107) = .80, p > .05).

A 2 (experimental, control) x 2 (men, women) MANCOVA was then conducted on parents' perception of autonomy support, of information, and of involvement measured at Time 2. Covariates retained in the analysis were measures of perceived children's autonomy support, information, and involvement, as well as parents' level of self-determination obtained at Time 1. Preliminary evaluation of basic assumptions established normality of distributions and linearity. No multivariate outlier was identified. In addition, homogeneity of variance and of regression hyperplanes were observed. Results failed to find significant main effects of gender (Wilk's F (3, 101) = .80, p > .05) and of group membership (Wilk's F (3, 101) = 1.82, p > .05) on the dependent variables. The dependent variables was also not significantly affected by the multiplicative term of gender by group membership (Wilk's F (3, 101) = .63, p > .05).

Statistical power analysis. Cohen (1988) suggests a method for determining sample size for F-tests conducted in analyses of variance and covariance. In accordance with conventions, power level was set at .80 and the alpha level was set at .05 (Cohen, 1988; Keppel, 1991). Past studies in the domain of environmental psychology have generally yielded a medium effect size (f = .25; d = .50). This medium effect size indicates that statistical significance will be attained when the difference between group means will be of half a standard deviation. In the present study, a minimum of 45 participants per group was observed. With this sample size, statistical power was established at .80, given an alpha level of .05 and a medium effect size (f = .30).

Effect size. Effect size was assessed by ETA squared (η^2) which is a generalization to 2 or more groups of the R^2. At a multivariate level, η^2 represents the proportion of variance of the combined

dependent variables accounted for by group membership. At the univariate level, η^2 represents the proportion of variance of the dependent variable accounted for by group membership (Cohen, 1988; Tabachnick & Fidell, 1996). To provide the reader with a reference point, Cohen (1988) defines a small effect size as an η^2 of .01, a medium effect size as an η^2 of .06 and a large effect size as an η^2 of .14.

Summary: Basic assumptions of MANCOVAs on parental variables. Results from preliminary analyses indicated that the data generally conformed to basic assumptions underlying the use of MANCOVA. Evaluation of the premises of normality, linearity, multicollinearity, multivariate homogeneity of variance-covariance matrices, and multivariate homogeneity of regression hyperplanes was found to be satisfactory. Cases of multivariate outliers were identified and deleted from subsequent analyses when applicable. The experimental and the control groups were found to be comparable on important socio-demographic variables identified in the literature. Subsequent use of these particular socio-demographic variables as covariates was therefore not justified. Some gender differences were found in t-tests for parents' level of self-determination and for perceived child-parent involvement in ecological issues. However, subsequent covariance analyses yielded a non significant effect on these dependent variables of the multiplicative term gender by group membership. Investigation of the independent variable gender was therefore not pursued. Given that no significant violations of basic assumptions were found, hypotheses testing of group differences in parental variables proceeded.

Basic Assumptions of Path Analyses

The use of path analyses is valid provided that the data conform to a certain number of basic assumptions. The main goal of these preliminary analyses was to ascertain whether these assumptions held for the sample under study. In agreement with the planned series of path analyses, data screening was conducted on variables included in 2 separately tested models. Model 1 investigated an a priori motivational model of ecological behaviors on the associations between people's ecological knowledge, satisfaction, competence, importance, self-determination and behaviors. This model was tested

independently for children and parents in function of group membership. Model 2 investigated whether children's interpersonal behaviors influenced parents' ecological attitudes and motivation. Tested variables included: a composite score of children's interpersonal behaviors as well as parental ecological satisfaction, competence, importance and self-determination. This model was tested separately for parents in the experimental and control groups. A total of 6 preliminary analyses were conducted.

Outliers. Examination of the distribution of standardized scores for within group variables revealed the presence of potential univariate outliers with z-scores in excess of |3.0|. As their number never surpassed 5% per tested group, it was decided to keep these participants in ulterior analysis (Tabachnick & Fidell, 1989). Multivariate outliers were investigated through examination of standardized residuals, Cook's and Mahalanobis' distances. Multivariate standardized residuals displayed acceptable values, ranging from -2.07 to 1.97 in the experimental group and from -1.29 to 3.80 in the control group. Cook's distances below 1.00 are generally considered satisfactory (Hamilton, 1992). No scores were observed above this value in the experimental group (maximum value = .16) nor in the control group (maximum value = .45). Lastly, no cases presented significant Mahalanobis' distance.

Sample size and missing data. The use of path analysis requires a minimal ratio of 10 cases per variable in each analysis (Tabachnick & Fidell, 1989). Sample size in children's analyses was 81 cases in the experimental group and 91 in the control group, more than respecting this requirement (6 variables in model 1). Sample size in parents' analyses was 60 cases in the experimental group and 59 in the control group respecting this requirement (6 variables in model 1). For model 2, sample size in the child-parent model was 62 cases in the experimental group and 69 cases in the control group limiting the number of variables tested to a maximum of 6. Model 2 contained 5 variables respecting the required ratio of cases to number of variables. For all analyses, missing data were found in all groups and appeared to be random. Such cases were omitted from further respective analyses through listwise deletion.

Normality. Summary statistics for all variables involved in the present study were first examined. Mean and standard deviation values displayed appropriate dispersion. Examination of kurtosis and

skewness values revealed the presence of some values greater than |1.0| for variables in each groups. These deviations were not considered highly problematic as the mean value of both kurtosis and skewness did not exceed |2.0| per within cell groups for each analysis (Muthén & Kaplan, 1985). The decision was therefore not to transform. Moreover, from a multivariate perspective, the distribution of the standardized residuals and the normal probability plots appeared fairly normal. Mean, standard deviation, kurtosis, and skewness values of within group variables are shown in Appendix F for children and Appendix G for parents.

Linearity and homoscedasticity. Spot check examinations of bivariate distributions revealed generally linear configurations. As previously mentioned, the distribution of multivariate residuals appeared fairly normal. In addition, most dependent variables presented reasonably balanced distributions within each group.

The inclusion of interactive terms in a path analytic model constitutes a violation of the assumption of linearity (Pedhazur, 1982). In accordance, analyses were conducted to determine the existence of an interaction between predictor variables positioned at the same level in a model within each group. For both models, two possible interactive terms were identified namely, satisfaction by competence and importance by competence. Analyses were conducted separately for children and parents in function of group membership. This resulted in a total of 8 analyses.

Hierarchical multiple regression analyses investigated a possible interaction effect between levels of satisfaction and of competence in predicting level of ecological importance. In the first step, main effects of satisfaction and of competence were entered into the regression analysis. In the second step, the multiplicative term of satisfaction by competence was entered into the regression analysis. Results of all analyses revealed that the multiplicative term of satisfaction by competence failed to add significant predictive power of the criterion variable importance ($t > .05$).

Hierarchical multiple regression analyses were also conducted to determine a possible interaction effect between levels of importance and of competence in predicting level of self-determination. In the

first step, main effects of importance and of competence were entered into the regression analysis. In the second step, the multiplicative term of importance by competence was entered into the regression analysis. Results of all analyses revealed that the multiplicative term of importance by competence failed to add significant predictive power of the criterion variable self-determination ($t > .05$).

Multicollinearity and singularity. Examination of the correlation matrix failed to reveal any correlation in excess of .90 (Tabachnick & Fidell, 1989). Multicollinearity and singularity were also assessed by means of the tolerance values obtained in the multiple regression procedure used to detect multivariate outliers. Tolerance values near 0 indicate possible problems of multicollinearity or singularity. Results revealed an absence of multicollinearity or singularity among variables included in each analysis.

Statistical power analysis. Statistical power analysis was conducted for path analyses. Sample size estimates were derived from existing tables found in Cohen (1988). A minimum sample size of 59 was observed for motivational model of ecological behaviors (6 variables). Statistical power was therefore evaluated to be at an acceptable .70, given an alpha level of .05 and an anticipated medium effect size ($f^2 = .15$). For the child-parent model (5 variables), a minimum sample size of 62 was observed. Statistical power was therefore evaluated to be at an optimal .80, given an alpha level of .05 and an anticipated medium effect size ($f^2 = .15$).

Effect size. To avoid overestimating the R^2 due to the modest sample size, adjusted R^2 values are reported as recommended by Tabachnick and Fidell (1989). To provide the reader with a reference point, Cohen (1988) defines a small effect size as an R^2 of .02, a medium effect size as an R^2 of .13 and a large effect size as an R^2 of .25.

Summary: Basic assumptions of path analyses. Results from preliminary analyses indicated that the data generally conformed to basic assumptions underlying the use of path analysis. Evaluation of the premises of normality, linearity, homoscedasticity and multicollinearity was found to be satisfactory. Of note, no significant multiplicative terms were found in all analyses. Investigation of the

presence of univariate and multivariate outliers failed to identify any cases. Given that no significant violations of basic assumptions were found, hypotheses testing of the two models proceeded.

Factor Analyses

The adaptation of several measuring instruments to met the goals of this study necessitated preliminary assessment of their psychometric properties. Accordingly, factor analyses were conducted on the following scale: (a) children's Frequency of Environmental Behaviors Scale; (b) parental perception of the Children's Interpersonal Behaviors Scale.

The **Frequency of Environmental Behaviors Scale (FEBS)** factorial structure was assessed by means of an exploratory factor analysis using maximum likelihood extraction with oblique rotation. Oblique rotation was chosen as the preferred procedure because factors were found, in the past, to be correlated to one another. Results yielded a three factor solution. The first factor reflected mainly sources information (8 items). A second factor represented purchasing behaviors (3 items) while a third factor portrayed recycling/reusing behaviors (4 items). Of the original scale, five items were eliminated for reasons of multicollinearity (1 item), absence of item-total correlations with their respective factor (2 items) and high cross-loadings (2 items). The remaining items showed satisfactory factor loadings varying from .33 to .87 and accounted for 39% of the variance at Time 1. Table 3 presents a summary of the factor loadings. Internal consistency values were found to be satisfactory for all subscales (i.e., information, alpha T1=.78, T2=.80; purchasing, alpha T1=.81, T2=.84; recycling/reusing, alpha T1=.64, T2=.72).

Internal consistency levels were also examined for the sources of information subscale. This subscale was used as a manipulation check to establish differences between the experimental and the control groups' curriculum (reported in the Descriptive subsection). The item measuring friends, as a source of ecological information, was deleted as it presented high levels of skewness and kurtosis

indicating rare use of this source by children. Examination of internal consistency values was found to be satisfactory (alpha T1 = .70; T2 = .71).

Construct validity was assessed by a series of correlations between subscales and with other psychological constructs. All correlations were found to be in the appropriate direction. For example, a higher frequency of ecological behaviors was positively associated with the more self-determined motives (i.e., intrinsic motivation and identified regulation). Likewise, all subscales displayed significant positive correlations with the constructs of importance and of competence. In contrast, negative correlations were observed between all three behavioral subscales and amotivation. Correlations between subscales are presented in Table 4. Table 5 contains observed correlations between the FEBS subscales and related constructs.

As in previous studies, a composite score of ecological behaviors was generated by summing the scores obtained on individual subscales (e.g., Pelletier et al., 1997, 1998). The use of a global score renders more parsimonious the explanation of investigated psychological processes in complex models. Internal consistency values for the composite score were found to be acceptable (alpha T1 = .83; alpha T2 = .86). Construct validity of the composite score was also deemed satisfactory with observed correlations between the composite score and other psychological constructs in the hypothesized direction (see Table 5).

Table 3.

Three-factor solution of children's Frequency of Environmental Behaviors Scale at Time 1.

Items	Factors		
	I	II	III
Sources of information			
I ask my teacher for information on the environment	.66		
I read about environmental issues in addition to school work	.63		
I pick up rubbish on the street and in the school yard	.55		
I participate in ecological clubs	.50		
At school, I write papers on the environment	.44		
I involve myself in environmental programs	.42		
I ask my parents for information on the environment	.38		
I watch television programs on the ecology	.34		
Purchasing			
I ask my parents to buy biodegradable shampoo		.93	
I ask my parents to buy biodegradable soap		.82	
I ask my parents to buy recycled paper tissues		.53	
Recycling/reusing			
I ask for reusable containers in my lunch box			-.74
I ask for a fabric or a reusable plastic lunch box			-.64
I recycle without anyone asking me			-.41
I ask for a thermos in my lunch box			-.32

Note. All examples of items provided represent English translations of the original French-Canadian version of items.

Table 4.

Correlations between children's Frequency of Environmental Behaviors subscales (Time 1 and Time 2) and reliability values.

Subscales	Sources of information	Purchasing	Recycling/reusing
I. Sources of information	.53**	.41**	.46**
II. Purchasing	.49**	.48**	.40**
III. Recycling/reusing	.46**	.40**	.53**

Note. Values appearing above the diagonal represent correlations at Time 1 whereas values appearing below the diagonal represent correlations at Time 2. Values in the diagonal represent test-retest correlations.

* $p < .01$. ** $p < .001$.

Table 5.

Correlations between children's Frequency of Environmental Behaviors subscales and related constructs at Time 1 and Time 2.

Constructs	Subscales			
	I	II	III	IV
Time 1				
Intrinsic motivation	.56***	.30***	.48***	.59***
Identified regulation	.54***	.27***	.51***	.59***
External regulation	.18**	-.01	-.01	.10
Amotivation	-.27***	-.12	-.31***	-.32***
Satisfaction	-.05	-.04	.01	-.01
Importance	.50***	.21***	.48***	.55***
Competence	.44***	.16**	.44***	.48***
Time 2				
Intrinsic motivation	.54***	.38***	.47***	.60***
Identified regulation	.51***	.35***	.55***	.61***
External regulation	.07	-.01	.02	.04
Amotivation	-.20**	-.12	-.23***	-.24***
Satisfaction	-.02	.02	.02	-.01
Importance	.48***	.39***	.44***	.56***
Competence	.39***	.19**	.42***	.44***

Note. Factor labels: I Sources of information; II Purchasing; III Recycling/reusing; IV Composite score of ecological behaviors.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Children's Interpersonal Behaviors Scale (CIBS). Analyses were done to ensure that this new measure effectively differentiated the four interpersonal styles of behaviors postulated in self-determination theory (Deci & Ryan, 1985; Ryan, 1991). Recall that qualitative interpersonal dimensions included those of autonomy support, control, information, and involvement. To assess the scale's structure, an exploratory factor analysis was conducted on the CIBS using maximum likelihood extraction with oblique rotation. Oblique rotation was chosen as the preferred factor rotation procedure in the present case because factors were postulated to be correlated to one another. The resulting solution generally supported a four factorial structure at Time 1. However, a few items were found to be problematic and eliminated for reasons of low item-total correlation with their respective factor (2 items) and high cross-loadings (3 items). The factorial structure of the remaining items was satisfactory (i.e., all factor loadings were above .30 with no cross-loadings). This solution accounted for 76% of the variance. Internal consistency levels were also found to be satisfactory (e.g., autonomy support alpha T1 = .90, T2 = .89; control alpha T1 = .87, T2 = .91; information alpha T1 = .95, T2 = .95; involvement alpha T1 = .89, T2 = .91). The final scale structure comprised 3 items measuring autonomy support, 4 items measuring control, 4 items measuring information and 4 items measuring involvement. Table 6 presents a summary of the factor loadings.

Construct validity was assessed by a series of correlation analyses between subscales and with other relevant psychological constructs. Theoretically, interactions can be grouped under two broad categories comprising positive and negative dimensions of the social climate. Positive dimensions include interactions perceived as autonomy supportive and informational, as well as eliciting personal involvement. Negative dimensions comprise interactions perceived as controlling. Past research findings have found that positive dimensions were either uncorrelated or negatively associated with the negative dimension of social interactions. In addition, positive dimensions of social interactions were positively associated with self-determined motives whereas the negative dimension of social interaction was positively associated with non self-determined motives (Green-Demers et al., 1995; Mageau et al., 1996).

Examination of the pattern of correlations between subscales yielded unexpected results. As can be seen in Table 7, correlations were positive among all subscales. Subsequent examination of divergent and convergent associations with related psychological construct also yielded unanticipated results. Specifically, the positive dimensions of social interactions were observed to be positively associated with parents' self-determined motives (intrinsic motivation, integrated, identified) as well as with non self-determined motives (introjected and external regulations) at both Time 1 and Time 2. As anticipated, the positive dimensions of social interactions generally displayed significant positive correlations with the constructs of importance and of competence.

The negative dimension of control was positively and significantly correlated with the non self-determined motives with the exception of amotivation. However, control was also significantly and positively associated with parents' self-determined motives as well as with parental competence. Table 8 presents the correlations between the interpersonal dimensions and various psychological constructs.

For the purposes of the present study, a composite score of interpersonal behaviors was computed by summing the subscale scores of autonomy support, information, and involvement. The control dimension of interpersonal behaviors was not included in the composite score because of its problematic associations with other constructs (i.e., between subscales and with related psychological constructs). Internal consistency levels for the composite score were found to be acceptable (alpha T1 = .96; alpha T2 = .95). Construct validity was also satisfactory with observed correlations between the composite score of social interactions and other psychological constructs in the appropriate direction (see Table 8).

Table 6.

Four-factor solution of the Children's Interpersonal Behaviors Scale (CIBS) at Time 1.

Items	I	II	III	IV
Autonomy support				
Is proud of me when I do things for the environment	.76			
Appreciates what I do for the environment	.72			
Encourages me to keep on doing things for the environment	.57			
Information				
Informs me on new environmental projects		-.96		
Talks about new ecological strategies learned in school		-.92		
Suggests new means of being careful with the environment		-.78		
Teaches me a lot of things on the environment		-.74		
Involvement				
Likes to do environmental things with me			.87	
Is enthusiastic to undertake ecological projects with me			.87	
Takes great pleasure working with me to better the environment			.62	
Likes to talk with me about the environment			.56	
Control				
Criticizes me when I don't do things for the environment				.94
Reproves of me when I forget to do things for the environment				.87
Makes me feel guilty when I forget to do environmental behaviors				.67
Pushes me to do things for the environment				.44

Note. The control subscale is not included in the composite score because of problematic associations with other constructs (see Table 8). All examples of items represent English translations of the original French-Canadian version of items.

Table 7.

Correlations between subscales of the Children's Interpersonal Behaviors Scale (Time 1 and Time 2) and reliability values

Subscales	I	II	III	IV
I. Autonomy Support	.58	.69	.79	.66
II. Information	.78	.52	.69	.51
III. Involvement	.82	.74	.52	.64
IV. Control	.77	.67	.72	.62

Note. Values appearing above the diagonal represent correlations at Time 1 whereas values appearing below the diagonal represent correlations at Time 2. Values in the diagonal represent test-retest correlations. All correlations are significant at $p < .001$.

Table 8.

Correlations between subscales of the Children's Interpersonal Behaviors and related parental constructs at Time 1 and Time 2.

Constructs	Subscales				
	I	II	III	IV	V
Time 1					
Satisfaction	-.08	-.06	.01	.02	-.05
Importance	.18**	-.00	.16**	.05	.11
Competence	.28***	.18**	.33***	.15*	.28***
Intrinsic motivation	.25***	.13*	.40***	.13*	.28***
Integrated regulation	.37***	.16*	.46***	.18**	.35***
Identified regulation	.27***	.18**	.36***	.16*	.29***
Introjected regulation	.28***	.11	.24***	.32***	.22***
External regulation	.24***	.24***	.19**	.29***	.25***
Amotivation	.03	.13*	-.01	.05	.08
Self-determination index	.11	-.01	.25***	-.01	.12
Ecological behaviors	.18**	.14	.29***	.12	.21**
Time 2					
Satisfaction	.05	-.01	.05	.11	.02
Importance	.17*	.06	.24**	.13	.16
Competence	.35***	.22**	.37***	.29***	.32***
Intrinsic motivation	.32***	.21*	.46***	.16	.35***
Integrated regulation	.33***	.15	.42***	.26***	.32***
Identified regulation	.33***	.15	.43***	.26***	.32***
Introjected regulation	.24**	.14	.28***	.30***	.23**
External regulation	.31***	.36***	.28***	.37***	.34***
Amotivation	-.01	.10	-.08	.01	.00
Self-determination index	.13	-.04	.24**	-.01	.11
Ecological behaviors	.20*	.12	.36***	.16	.24**

Note. Factor labels: I Autonomy support; II Information; III Involvement; IV Control; V Composite score of interpersonal behaviors. The composite score does not include the "Control" subscale score.

* $p < .05$. ** $p < .01$. *** $p < .001$

Summary: Exploratory Factor Analyses. Analyses conducted on the FEBS demonstrated that this scale possessed satisfactory psychometric properties. Specifically, analyses demonstrated adequate item-total correlations as well as satisfactory internal consistency values. Convergent and divergent validity analyses of the subscales and the composite score yielded correlations in the anticipated direction. Inclusion of the FEBS in main analyses testing group differences in child variables therefore proceeded.

Analyses conducted on the CIBS yielded satisfactory item-total correlations as well as internal consistency values. However convergent and divergent validity analyses yielded unanticipated results. Specifically, the observation of positive correlations between positive (e.g., autonomy support, information, involvement) and negative dimensions (e.g., control) to most subtypes of motivation is intriguing given past research results, albeit conducted on adult populations. In view of the above findings as well as the exploratory nature of this variable, only the child-parent positive social interaction dimensions were retained in subsequent analyses. The control dimension of social interaction was dropped.

Descriptive Analyses

The justification of combining different schools into an experimental or a control group was based on whether they endorsed or not the Brundtland Green School Project. At Time 1, schools part of the Brundtland Green School Project were about to commence implementation of the program. In the present study, teachers assured us that the implementation of the ecological program did not start until October and was not fully operational until December. Thus, the main goal of the descriptive analyses was to ascertain that the premises on which the Brundtland Green School Project was based, were functionally present in schools at Time 2. That is, do teachers in the experimental condition report greater integration of the ecology topic in subjects other than the natural science? Do teachers spend more time teaching about ecological issues? Do in fact, children engage more frequently in ecological activities? Do children

from the experimental condition report not only using more school based sources of information but also seek more information? Do children also report greater amounts of school work on ecological issues? More importantly, do children part of the control group follow the conventional grade 6 curriculum? To answer these questions, the frequency and type of ecological topics covered in the curriculum as well as the prevalence of children's sources of ecological information were investigated.

Ecological themes covered in the curriculum

Experimenters informally questioned teachers at the end of the school year to establish the curriculum covered. Teachers also answered a short questionnaire on ecological themes covered and activities done (see Appendix B). Within the experimental group, teachers confirmed that ecological topics were integrated within all subjects. Ecological issues were taught for a minimum of 5 hours per week. In addition to the regular grade 6 natural science curriculum, children were taught the basics of an eco-system, endangered species and ways to respect/protect the ecology (i.e., "ecological recipes"). Teaching methods included the use of reading material, written and applied projects, formal lectures, and discussions. Forums were also occasionally used to debate actions taken or to be taken in response to specific environmental problems. The school's administration was also involved in the EEP. For example, boxes of papers were stored in the school's front entrance awaiting removal for recycling. Applied ecological projects comprised class recycling of paper, cardboard, plastic and aluminum with some classes also recycling coat hangers and batteries. Recycling was actively encouraged in the cafeteria as well as the use of reusable containers in lunch boxes. Teachers supervised a student based ecological club responsible for promoting sound ecological behaviors. One school (Buckingham) involved their students in a reforestation program. The other school (Aylmer) implemented a worm composting program. Children were also involved in the care of an outdoor garden as well as that of a pond located in a nearby park.

Teachers part of the control group reported that some ecological issues were taught. However, these topics were part of the regular grade 6 natural science curriculum and were superficially covered.

Natural science topics were taught approximately 1 hour per week. Topics covered included air (properties and characteristics), earth (use of soil and pollution), plants (flower reproduction, observation and classification of annuals, perennials, wild plants), electricity, and birds. Of note, the topic of earth was taught in April, a few weeks before the second wave of data collection. Teaching methods included the use of reading material, discussions, projects and lectures. Practical aspects involved occasional campaigns to clean up the school yard. Exceptionally, some children planted flowers in the spring. These schools did not encourage the use of reusable containers in lunches, recycling in the class, or the presence of an ecological club.

Children's Sources of Information

Children identified the relevancy of 6 possible sources of information both at Time 1 and Time 2. To re-iterate, sources of ecological information included parents, teachers, friends, television, private reading and school work. Children identified the frequency of using various sources of information on a 5 point scale.

Qualitative analysis. At Time 1, children in the experimental group primarily used television (M = 2.8, SD = 1.21) as a source of ecological information. In descending order, the use of other sources of information were: school work (M = 2.5, SD = 1.49), parents (M = 2.2, SD = 1.13), books (M = 2.2, SD = 1.09), teachers (M = 2, SD = 1.11), and friends (M = 1.3, SD = .92). At Time 2, the order was slightly modified with parents (M = 2.3, SD = 1.15) and school work (M = 2.3, SD = 1.22) becoming the primary sources of information followed closely by television (M = 2.2, SD = 1.03), teachers (M = 2.1, SD = 1.36), books (M = 2, SD = 1.09) and lastly friends (M = 1.4, SD = .75).

For children in the control group, television (M = 2.4, SD = 1.24) was also a main source of ecological information at Time 1 followed by books (M = 2, SD = 1.03), parents (M = 1.8, SD = .93), school work (M = 1.8, SD = .83), teachers (M = 1.4, SD = .71) and friends (M = 1.3, SD = .73). At Time 2, the order was similar in that television remained the main source of information (M = 2.1, SD = 1.17), followed closely

by school work (M =2, SD = .88), parents (M 1.8, SD = .90), books (M 1.8, SD = 1.07), teachers (M = 1.6, SD = .75) and lastly friends (M = 1.1, SD = .60).

Quantitative analysis. To determine statistical significance, a 2 (experimental, control) x 2 (Time 1, Time 2) multivariate repeated measures analysis was conducted on 5 sources of information. The item measuring friends was eliminated from this analysis as results indicated rare use of this source of information. With the use of Wilk's criterion, the combined dependent variables was significantly affected by group membership (F (5,169) = 7.34, p = .000; η^2 = 18) and time (F (5,169) = 5.37, p = .000; η^2 = .14) but not by their interaction (F (5,169) = 1.07, p > .05; η^2 = .03).

The main effect of group membership was further investigated by means of univariate F-tests with a Bonferroni adjusted p-value of .01. Results showed that the frequency of asking parents and teachers for ecological information differed significantly by group (parents: F (1, 173) = 13.33, p = .000, η^2 = 07; teachers: F (1,173) = 32.72, p = .000, η^2 = 16). Examination of means, collapsed over time, indicated that children in the experimental group asked more frequently their parents (M = 2.3) and their teachers (M = 2.0) for ecological information compared to children in the control group (M = 1.8 and M = 1.2 respectively). In addition, amount of school work on the ecology differed significantly by group (F (1,173) = 15.37, p = .000, η^2 = 08). Examination of means, collapsed over time, indicated that children in the experimental group reported doing more school work on the ecology (M = 2.4) compared to children in the control group (M = 1.9).

The main effect of the independent variable time was further investigated by means of univariate F-tests with a Bonferroni adjusted p-value of .01. Results revealed that the use of television (F (1, 173) = 17.87, p = .000, η^2 = 09) and of books (F (1, 173) = 7.20, p = .008, η^2 = 04) as sources of information changed over time. Examination of means, collapsed over groups, indicated that children reported watching more frequently televised ecology programs at Time 1 (M = 2.6) compared to Time 2 (M = 2.2).

Similarly, children reported reading more frequently ecological books at Time 1 (M = 2.1) than Time 2 (M = 1.9).

Summary: Descriptive Analyses

The purpose of these analyses was to ascertain that differences between the experimental group and the control group were salient at Time 2. Results of information obtained from teachers indicated that the experimental group differed notably for the control group at Time 2 in that they reported a greater: (a) integration of ecological topics across academic subjects; (b) amount of weekly hours devoted to ecological themes; (c) quantity and depth of topics covered; and (d) variety and frequency of ecological activities.

Results of the qualitative analyses of data obtained from children suggested that at Time 1, they obtained ecological information mainly from televised programs regardless of experimental condition. These results are in line with findings obtained in other studies (e.g., Lyons & Breakwell, 1994). At Time 2, children in the experimental group reported as main sources of information parents and school work followed closely by television. In contrast, television remained the principal source of information for children in the control group, followed closely by school work and parents. Results from the multivariate repeated measures analysis suggested that children in the experimental group asked more frequently their parents and teachers for ecological information compared to children from the control group. Interestingly, as a source of information teachers uniquely contributed 16% of the explained variance in predicting group membership. Lastly, children in the experimental group reported doing more school work on ecological issues than children in the control group. Thus, children in the experimental condition reported greater use of school based sources of information compared to children in the control condition. Together, these results suggest that schools in the experimental condition do distinguish themselves from the control condition by engaging more intensely and frequently in ecological activities.

Analyses of Variance of Child Variables

The first goal in the present study was whether the environmental education program influenced children. That is, do children, part of the Brundtland Green School Project, differ significantly from the control group in terms of ecological attitudes, motivation and behaviors? When enrolled in an EEP, do children attribute greater importance to ecological issues, express greater dissatisfaction towards the environmental situation, perceive themselves as more competent in accomplishing environmental behaviors and possess greater levels of ecological knowledge? Do children in the experimental group, report higher levels of self-determined motives (e.g., intrinsic motivation and identified regulation) and lower levels of non self-determined motives (e.g., external regulation and amotivation) underlining ecological behaviors? And lastly, do these children performed more frequently ecological behaviors?

To answer these questions, a series of MANCOVAs was performed to determine the existence of a differential impact of the Brundtland Green School project curriculum compared to the regular school curriculum. The MANCOVA procedure allows the investigation of post-test mean differences among groups based on a combination of dependent variables after adjustment for pre-test differences. Adjustment is provided by the use of covariates which statistically render intact groups more equivalent. A fairer comparison between groups is therefore possible. In addition, MANCOVA is generally considered a more rigorous statistical procedure for a pre/post-test control group design. The multivariate nature of the test protects against inflated Type 1 error. However, the inclusion of too many variables in one analysis diminishes the power of the procedure to detect significance (i.e., error variance is large; Stevens, 1992). To avoid this, simultaneous testing was restricted to variables representing similar constructs. Thus, separate MANCOVAs were conducted on children's ecological attitudes, motivation and behaviors.

Children's ecological knowledge and attitudes

A MANCOVA with one independent variable (experimental, control) was conducted on 4 dependent variables: importance, satisfaction, competence and knowledge. Adjustment was provided

by 5 covariates measured at Time 1. These included importance, satisfaction, competence, knowledge and self-determination. Self-determination was included as a covariate as this particular variable was found in the past to be the most proximate to the dependent variable of importance. We therefore wanted to control for its possible effect. Order of entry of the dependent variables was done from proximal to distal according to a previously tested model explicating their order of influence on motivation (e.g., Tuson & Pelletier, 1992). Thus, the dependent variable importance was first entered into the analysis followed by satisfaction, competence and knowledge.

A first MANCOVA yielded results indicating heterogeneity of the regression for the dependent variable of competence. A second MANCOVA was then conducted on the remaining dependent variables. Homogeneity of the regression hyperplanes having been established, results indicated a non significant effect of group membership at Time 2 (Wilk's $\underline{F}$ (3, 166) = 2.10, $\underline{p} > .05$, $\eta^2 = .04$). Investigation of the significance of covariates in adjusting the dependent variables was then conducted. At the multivariate level, the combined covariates provided significant adjustment to the combined dependent variables (Wilk's $\underline{F}$ (12, 444.78) = 10.57, $\underline{p} < .001$, $\eta^2 = .20$). At the univariate level, covariate adjustment was tested with a series of multiple regressions where covariates acted as multiple predictors for each dependent variable. Four of the five covariates provided significant adjustment. The exception was perception of competence at Time 1. To allow for possible gains in power, a third MANCOVA was then conducted without the covariate competence. Results again showed no significant differences between groups at Time 2 on the combined dependent variables of importance, satisfaction and knowledge (Wilk's $\underline{F}$ (3, 168) = 2.29, $\underline{p} > .05$, $\eta^2 = .04$). The multivariate test was followed by univariate F-tests. Multivariate F-tests are often less powerful than univariate tests so that statistical and substantial significance may be unnecessarily lost (Tabachnick & Fidell, 1989). With no correlations in excess of .30 observed between dependent variables, the use of Roy-Bargman stepdown analysis was determined as inappropriate (Tabachnick & Fidell, 1989). Therefore, examination of results from univariate F-tests with a Bonferroni

adjusted p-value of .017 was conducted. These tests also failed to reach significance for any of the remaining dependent variables.

In line with Tabachnick and Fidell's (1989) suggestion, a 2 (experimental, control) x 2 (Time 1, Time 2) repeated measures analysis was conducted on the dependent variable of perceived competence. Adjustment was provided by level of self-determination measured at Time 1. Homogeneity of regression was established for perceived competence at Time 1 (F (1, 178) = .06, p > .05) and at Time 2 (F (1, 178) = .06, p > .05). No significant difference in level of perceived competence was observed as a function of group membership (F (1, 176) = 2.96, p > .05, η^2 = .02). In addition, perceived competence was not significantly affected by time (F (1.177) = 1.73, p > .05, η^2 = .003) nor by an interaction between group membership and time (F (1, 177) = 1.86, p > .05).

Children's ecological motivation

Examination of group differences on children's reported level of motivation was analyzed by means of the self-determination index as well as by individual subtypes of motivation. The self-determination index is often used as to obtain a more parsimonious assessment of a motivational model. This approach was used in path analyses conducted for the present study. The use of motivational subtypes is favored in studies when researchers endeavor to investigate changes over time in people's motivational profile (Legault & Pelletier, 1995). Since the goal of the present study was to study the impact over the course of a school year of an EEP on children, it was deemed important to also examine possible group differences on motivational subtypes.

Self-determination index. An ANCOVA with one independent variable (experimental, control) was conducted on the dependent variable self-determination. Adjustment was provided by 2 covariates measured at Time 1. These included importance and self-determination. Importance was included as a covariate as this particular variable was found in the past to be the most proximate to the dependent variable of self-determination. We therefore wanted to control for its possible effect.

Results indicated a non significant effect of group membership at Time 2 (F (1,170) = .19, $p > .05$, $\eta^2 = .001$). Investigation of the significance of covariates in adjusting the dependent variable was then conducted. Both, self-determination (t (174) = 5.72, $p < .001$) and importance (t (174) = 2.12, $p = .036$) provided significant adjustment. Thus, no significant differences between the experimental and control groups were found in level of self-determination at Time 2.

However, interesting trends in unadjusted means could be observed. Children in the experimental group reported a higher level of self-determination at Time 1 (unadjusted M = 18.1, SD = 9.9) compared to children in the control group (unadjusted M = 13.1, SD = 10.6). This trend was also observed for Time 2 (experimental group unadjusted M = 16.2, SD = 10.2; control group unadjusted M = 12.9, SD = 10.6). Given that MANCOVA is sometimes be less powerful than repeated measures analyses, we felt that in this particular instance statistical and substantive significance may have been unnecessarily lost (Tabachnick & Fidell, 1989). To determine statistical significance, a 2 (experimental, control) x 2 (Time 1, Time 2) univariate repeated measures analysis was conducted on level of self-determination. Adjustment was provided by the covariate of importance measured at Time 1. Results showed a significant main effect of group membership on level of self-determination (F (1, 172) =4.22, $p <$ .05). Examination of means, collapsed over time, underlined that children in the experimental group (adjusted M = 22.66) demonstrated a significantly higher level of self-determination compared to children in the control group (adjusted M = 19.19). Level of self-determination was not significantly affected by time (F (1, 173) = 2.09, $p > .05$) nor by the multiplicative term of time by group membership (F (1, 173) = 1.39, $p > .05$).

Motivational subtypes. A MANCOVA with one independent variable (experimental, control) was conducted on 4 dependent variables: intrinsic motivation, identified regulation, extrinsic regulation, and amotivation. Adjustment was provided by 5 covariates measured at Time 1. These included intrinsic motivation, identified regulation, extrinsic regulation, amotivation, and importance. Importance was included as a covariate as this particular variable was found in the past to be the most proximate to the

dependent variables of motivational subtypes. We therefore wanted to control for its possible effect. Dependent variables were ordered from high to low levels of self-determination as stipulated in self-determination theory (Deci & Ryan, 1985). Thus, the dependent variable of intrinsic motivation was first entered in the analysis followed by identified regulation, extrinsic regulation, and amotivation.

Results of the MANCOVA indicated a significant effect of group membership at Time 2 (Wilk's $\underline{F}$ (4,164) = 2.56, $\underline{p} < .05$, $\eta^2 = .06$). Investigation of the significance of covariates in adjusting the dependent variables was then conducted. At the multivariate level, the combined covariates provided significant adjustment to the combined dependent variables (Wilk's $\underline{F}$ (20, 544.88) = 5.12, $\underline{p} < .001$, $\eta^2 = .13$). At the univariate level, covariate adjustment was tested with a series of multiple regressions wherein covariates acted as multiple predictors for each dependent variable. All five covariates provided significant adjustment. The multivariate test was followed by Roy-Bargman stepdown analysis as some correlations in excess of .30 were observed between dependent variables (Tabachnick & Fidell, 1989). F-tests results indicated that the multivariate effect was mainly due to the dependent variable of external regulation (stepdown $\underline{F}$ (1, 164) = 8.22, $\underline{p} < .01$, $\eta^2 = .05$). Examination of means indicated that children in the experimental group (adjusted $\underline{M}$ = 4.28) reported, at Time 2, a lower level of extrinsic regulation underlying ecological behaviors compared to children in the control group (adjusted $\underline{M}$ = 5.16).

Children's ecological behaviors

An ANCOVA with one independent variable (experimental, control) was conducted on the composite score of ecological behaviors. Adjustment was provided by 2 covariates measured at Time 1. These included the composite score of ecological behaviors and self-determination. Self-determination was included as a covariate as this particular variable was found in the past to be the most proximate to the dependent variable of ecological behaviors. We therefore wanted to control for its possible effect.

Results from the ANCOVA indicated a non significant effect of group membership at Time 2 ($\underline{F}$ (1, 165) = 1.56, $\underline{p} > .05$, $\eta^2 = .01$). Investigation of the significance of covariates in adjusting the dependent

variable was then conducted. Ecological behaviors (t (169) = 5.85, $p < .001$) but not self-determination (t (169) = 1.45, $p > .05$) provided significant adjustment. To allow for possible gains in power, a second ANCOVA was then conducted without the covariate self-determination. Results again showed no significant differences between groups on the dependent variable of ecological behaviors at Time 2 (F (1, 169) = 1.62, $p > .05$, $\eta^2 = .01$).

Summary: Analyses of variance of child variables

The first goal of the present study was to evaluate the effectiveness of a new EEP in sensitizing students to environmental issues compared to the impact of a normative school curriculum In general, no significant differences were found between experimental and control groups of children at Time 2. Analyses of variance results suggests an absence of group differences in ecological attitudes. Children in the experimental group, compared to children in the control group, did not at Time 2: (a) report higher levels of importance; (b) express less satisfaction with environmental conditions; (c) perceive themselves as more competent in performing environmental behaviors; (d) possess greater knowledge of ecological issues; and (e) report higher levels of ecological behaviors.

However, significant differences between groups were found on two variables. First, while ANCOVA results failed to find significant differences between experimental conditions on level of self-determination at Time 2, interesting trends were observed in children's scores which warranted further investigation. Thus, the more powerful statistical procedure of repeated measures analysis was used. Results revealed that children in the experimental group reported being more self-determined when engaging in ecological behaviors compared to children in the control group at both times. These results suggest that at Time 1, children in the experimental group already possessed higher levels of self-determination compared to children in the control group. In addition, higher levels of self-determination in the experimental group remained constant in time. No ceiling effects were observed. Second, results of the MANCOVA conducted on motivational subtypes revealed a significant multivariate difference

between groups with 6% of the variance explaining group membership. Further investigation at the univariate level underlined that extrinsic motivation was mainly responsible for multivariate group differences by uniquely contributing 5% of the explained variance in predicting group membership. These results suggest that at Time 2, children part of the experimental group engaged in ecological behaviors less for extrinsic motives than children part of the control group.

Analyses of Variance of Parental Variables

Part of the first goal in the present study was to investigate whether the environmental education children program also influenced parents. That is, do parents of children enrolled in schools part of the Brundtland Green School Project, differ significantly from parents in the control group in terms of knowledge, attitudes, perception of their child's ecological attitudes and behaviors, motivational profile, and frequency of ecological behaviors? Specifically, do these parents attribute greater importance to ecological issues, express greater dissatisfaction towards the environmental situation, perceive themselves as more competent in accomplishing environmental behaviors and possess greater levels of ecological knowledge? Do these parents perceive their children differently? Is the child perceived as attributing more importance to environmental issues and as more competent in doing ecological behaviors? Does their child seek more information on environmental issues as well as engage more frequently in ecological behaviors? How do parents perceive their child's interpersonal behaviors when interacting on environmental issues? Do parents perceive the child as autonomy supportive and as providing more ecological information? Do parents and their child involve themselves more frequently in environmental issues? Do parents in the experimental group report higher levels of self-determined motives (e.g., intrinsic motivation, integrated and identified regulation) and lower levels of non self-determined motives (e.g., introjected regulation, external regulation and amotivation) underlining ecological behaviors? And lastly, do these parents report a greater frequency of ecological behaviors? To explore these questions, a series of MANCOVAs was performed to determine if these differences existed between parents in the experimental group as compared to parents in the control group.

Parents' ecological knowledge and attitudes

A MANCOVA with one independent variable (experimental, control) was conducted on 4 dependent variables: importance, satisfaction, competence and knowledge. Adjustment was provided by 5 covariates measured at Time 1. These included importance, satisfaction, competence, knowledge and self-determination. Self-determination was included as a covariate as this particular variable was found in the past to be the most proximate to the dependent variable of importance. We therefore wanted to control for its possible effect. Order of entry of the dependent variables was done from proximal to distal according to a previously tested model explicating their order of influence on motivation (e.g., Tuson & Pelletier, 1992). Thus, the dependent variable importance was first entered into the analysis followed by satisfaction, competence and knowledge.

Results of the MANCOVA yielded a significant effect for group membership at Time 2 (Wilk's $\underline{F}$ (4, 109) = 2.82, $\underline{p} < .05$, $\eta^2 = .09$). Investigation of the significance of covariates in adjusting the dependent variables was then conducted. At the multivariate level, the combined covariates provided significant adjustment to the combined dependent variables (Wilk's $\underline{F}$ (20, 362.46) = 9.29, $\underline{p} < .001$, $\eta^2 = .29$). At the univariate level, covariate adjustment was tested with a series of multiple regressions where covariates acted as multiple predictors for each dependent variable. All five covariates provided significant adjustment. The multivariate test was followed by Roy-Bargman stepdown analysis. F-tests results indicated that the multivariate effect was mainly due to the dependent variable of satisfaction (stepdown $\underline{F}$ (1, 111) = 9.89, $\underline{p} < .05$, univariate $\eta^2 = .08$). Examination of means indicated that parents in the experimental group (adjusted $\underline{M}$ = 12.68) reported, at Time 2, lower levels of ecological satisfaction compared to parents in the control group (adjusted $\underline{M}$ = 14.48).

Parents' perception of children's ecological attitudes and behaviors

A MANCOVA with one independent variable (experimental, control) was conducted on 4 dependent variables: perception of the child's attributed importance to ecological issues, perception of

the child's felt competence in doing ecological behaviors, perception of interest in acquiring ecological information and perception of the child's frequency of ecological behaviors. Adjustment was provided by 5 covariates measured at Time 1. These included parents' perception of the child's attributed importance to ecological issues, felt competence, interest in ecological information, frequency engaging in ecological behaviors and the child's self-reported level of self-determination. The child's level of self-determination was included as a covariate as this particular variable was found in the past to be the most proximate to the dependent variables of information seeking and ecological behaviors. We therefore wanted to control for its possible effect. No order of entry of the dependent variables could be theoretically determined a priori.

Results of a first MANCOVA indicated a non significant effect of group membership at Time 2 (Wilk's $\underline{F}$ (4, 106) = .51, $\underline{p} > .05$, $\eta^2 = .02$). Investigation of the significance of covariates in adjusting the dependent variables was then conducted. At the multivariate level, the combined covariates provided significant adjustment to the combined dependent variables (Wilk's $\underline{F}$ (20, 352.51) = 8.12, $\underline{p} < .001$, $\eta^2 = .27$). At the univariate level, covariate adjustment was tested with a series of multiple regressions where covariates acted as multiple predictors for each dependent variable. Four of the five covariates provided significant adjustment. The exception was the child's self-reported level of self-determination measured at Time 1. To allow for possible gains in power, a second MANCOVA was then conducted without this covariate. Results again showed no significant differences between groups on the combined dependent variables at Time 2 (Wilk's $\underline{F}$ (4, 118) = .83, $\underline{p} > .05$, $\eta^2 = .03$). The multivariate test was followed by univariate F-tests. Multivariate F-tests are often less powerful than univariate tests so that statistical and substantial significance may be unnecessarily lost (Tabachnick & Fidell, 1989). With no set order of entry of the dependent variables, the use of Roy-Bargman stepdown analysis was determined as inappropriate (Tabachnick & Fidell, 1989). Therefore, examination of results from univariate F-tests with a Bonferroni adjusted p-value of .0125 was conducted. These tests also failed to reach significance for any of the dependent variables.

Parents' perception of children's interpersonal behaviors

A MANCOVA with one independent variable (experimental, control) was conducted on 3 dependent variables: perceptions of autonomy support, information and involvement. Adjustment was provided by 4 covariates measured at Time 1. These included the perceptions of autonomy support, information, involvement as well as parental level of self-determination. Self-determination was included as a covariate as this particular variable was found in the past to be the most proximate to the dependent variables of perceived interpersonal behaviors. We therefore wanted to control for its possible effect. No order of entry of the dependent variables could be theoretically determined a priori.

A first MANCOVA yielded a significant effect of group membership at Time 2 (Wilk's F (3, 100) = 2.76, $p < .05$, $\eta^2 = .07$). Investigation of the significance of covariates in adjusting the dependent variables was then conducted. At the multivariate level, the combined covariates provided significant adjustment to the combined dependent variables (Wilk's F (12, 275.45) = 7.76, $p < .001$, $\eta^2 = .23$). At the univariate level, covariate adjustment was tested with a series of multiple regressions where covariates acted as multiple predictors for each dependent variable. Four of the five covariates provided significant adjustment. The exception was parental level of self-determination at Time 1. To allow for possible gains in power, a second MANCOVA was then conducted without this covariate. Results again showed a significant difference between groups on the combined dependent variables at Time 2 (Wilk's F (3, 114) = 2.72, $p < .05$, $\eta^2 = .07$). With no order of the dependent variables established a priori but in the presence of correlations in excess of .30 between some dependent variables, results of univariate F-tests and of Roy-Bargman stepdown analysis were then examined (Tabachnick & Fidell, 1989). A Bonferroni adjusted p-value of .0167 was set for the univariate F-tests results. Results indicated a significant univariate effect of group membership on the dependent variable of information (F (1,116) = 6.39, $p = .013$, $\eta^2 = .05$). Roy-Bargman stepdown analysis indicated a significant univariate effect of group membership on information, over and above the variance explained in the interpersonal behaviors of autonomy support and involvement (stepdown F (1, 114) = 7.10, $p = .009$). Together, these results indicate that parents

reported obtaining, at Time 2, greater amounts of information from children in the experimental group (adjusted M = 16.12) compared to parents of children in the control group (adjusted M = 14.44).

Parents' ecological motivation

Examination of group differences on parents' reported level of motivation was tested by means of the self-determination index as well as by individual subtypes of motivation. The self-determination index is often used to obtain a more parsimonious assessment of the role of motivation in path analytical models. The use of motivational subtypes is favored in studies wherein researchers endeavor to investigate changes over time in people's motivational profile (Legault & Pelletier, 1995). Since the goal of the present study was to study the impact of an EEP on parents over the course of a school year, it was deemed important to also examine possible group differences on motivational subtypes.

Self-determination index. An ANCOVA with one independent variable (experimental, control) was conducted on the dependent variable self-determination. Adjustment was provided by 2 covariates measured at Time 1. These included parental self-reported levels of importance attributed to environmental issues and of self-determination. Importance was included as a covariate as this particular variable was found in the past to be the most proximate to the dependent variable of self-determination. We therefore wanted to control for its possible effect.

A first ANCOVA yielded a non significant effect of group membership at Time 2 (F (1, 111) = .23, p > .05, η^2 = .002). Investigation of the significance of covariates in adjusting the dependent variables was then conducted. At the univariate level, self-determination provided significant adjustment (t (115) = 7.42, p < .001) but not importance (t (115) = .59, p > .05). To allow for possible gains in power, a second ANCOVA was conducted without the covariate of importance. Again, results indicated a non significant effect of group membership on parents' level of self-determination at Time 2 (F (1,111) = .47, p > .05, adjusted R^2 = .004).

Motivational subtypes. A MANCOVA with one independent variable (experimental, control) was conducted on 6 dependent variables: intrinsic motivation, integrated regulation, identified regulation, introjected regulation, extrinsic regulation and amotivation. Adjustment was provided by 7 covariates measured at Time 1. These included intrinsic motivation, integrated regulation, identified regulation, introjected regulation, extrinsic regulation, amotivation, and importance. Importance was included as a covariate as this particular variable was found in the past to be the most proximate to the dependent variables of motivational subtypes. We therefore wanted to control for its possible effect. Dependent variables were ordered from high to low levels of self-determination as stipulated by self-determination theory (Deci & Ryan, 1985). Thus, the dependent variable of intrinsic motivation was first entered in the analysis followed by integrated regulation, identified regulation, introjected regulation, extrinsic regulation and amotivation.

Results of a first MANCOVA yielded results indicating heterogeneity of the regression for the dependent variable of identified regulation. A second MANCOVA was then conducted on the remaining dependent variables. Homogeneity of the regression hyperplanes having been established, results indicated a non significant effect of group membership at Time 2 (Wilk's F (5, 106) = .68, $p > .05$, $\eta^2 = .03$). Investigation of the significance of covariates in adjusting the dependent variables was then conducted. At the multivariate level, the combined covariates provided significant adjustment to the combined dependent variables (Wilk's F (35, 448.33) = 4.79, $p < .001$, $\eta^2 = .23$). At the univariate level, covariate adjustment was tested with a series of multiple regressions where covariates acted as multiple predictors for each dependent variable. Four out of six covariates provided significant adjustment. The exceptions were amotivation and importance measured at Time 1. To allow for possible gains in power, a third MANCOVA was then conducted without these covariates. Results again showed no significant differences between groups on the combined dependent variables at Time 2 (Wilk's F (5, 111) = .45, $p > .05$, $\eta^2 = .02$). The multivariate test was followed by univariate F-tests. With correlations in excess of .30 observed between dependent variables, the use of Roy-Bargman stepdown analysis was determined as

appropriate (Tabachnick & Fidell, 1989). This analysis also failed to reach statistical significance for any of the dependent variables.

In line with Tabachnick and Fidell's (1989) suggestion, a 2 (experimental, control) x 2 (Time 1, Time 2) univariate repeated measures analysis was conducted on the dependent variable of identified regulation. Adjustment was provided by level of importance measured at Time 1. Homogeneity of regression was established for level of identified regulation at Time 1 (F (1, 122) = 3.08, $p > .05$) and at Time 2 (F (1, 122) = 4.26, $p > .05$). No significant difference in level of identified regulation was observed as a function of group membership (F (1, 123) = .00, $p > .05$). In addition, identified regulation was not affected by time (F (1, 124) = .96, $p > .05$) nor by the multiplicative term of time by group membership (F (1, 124) = .03, $p > .05$).

Parents' ecological behaviors

An ANCOVA with one independent variable (experimental, control) was conducted on the composite score of ecological behaviors. Adjustment was provided by 2 covariates measured at Time 1. These included ecological behaviors and self-determination. Self-determination was included as a covariate as this particular variable was found in the past to be the most proximate to the dependent variable of ecological behaviors. We therefore wanted to control for its possible effect.

Results from the ANCOVA indicated a non significant effect of group membership at Time 2 (F (1, 89) = .04, $p > .05$, $R^2 = 0$). Investigation of the significance of covariates in adjusting the dependent variables was then conducted. Ecological behaviors (t (93) = 11.21, $p < .001$) but not self-determination (t (93) = .91, $p > .05$) provided significant adjustment. To allow for possible gains in power, a second ANCOVA was then conducted without the covariate self-determination. Results again showed no significant differences between groups on the dependent variable of ecological behaviors at Time 2 (F (1, 98) = .09, $p > .05$, $R^2 = 0$).

Summary: Analyses of variance of parental variables

Part of the first goal of the present study was to evaluate whether the environmental education children program influenced parents' ecological variables over and above the impact on parents of a normative school curriculum. In general, analyses failed to find, at Time 2, significant differences between the experimental and control groups in parents' perception of the child's: (a) importance attributed to environmental issues; (b) felt competence in engaging in ecological behaviors; (c) level of interest in ecological information; and (d) frequency of engaging in ecological behaviors. Likewise, results yielded similar motivational profile (self-determination, motivational subtypes) and frequency in ecological behaviors across both groups of parents.

Significant differences between groups were found in parental ecological attitudes and perceived children's interpersonal behaviors. Specifically, results of the MANCOVA conducted on parents' ecological attitudes revealed a significant multivariate difference between groups. Further investigation by means of Roy-Bargman stepdown analysis underlined that at the univariate level, parental level of ecological satisfaction was mainly responsible for the multivariate group difference by uniquely contributing 8% of the explained variance in predicting group membership. These results suggest that at Time 2, parents of children in the experimental group reported being significantly more dissatisfied with local environmental conditions compared to parents of children in the control group.

Results of analysis conducted on parental perception of children's interpersonal behaviors, found a significant multivariate difference between groups. Further investigation at the univariate level showed a significant group difference in level of information provided by children which uniquely contributes 5% of the explained variance in predicting group membership. These results appear to suggest that at Time 2, children enrolled in schools part of the Brundtland Green School Project provided their parents with more information on ecological issues and strategies compared to children enrolled in a normal curriculum.

Motivational Model of Ecological Behaviors

A second goal of the present study was to investigate the association between ecological attitudes, motivation and behaviors in an attempt to replicate a motivational model of ecological behaviors in the present sample of children and their parents (e.g., Tuson & Pelletier, 1992). A closely related goal was to determine the effects of an EEP on children and their parents. That is, does an EEP contribute to stronger associations observed between children's ecological knowledge, attitudes, motivation, and behaviors as compared to the same associations observed for children enrolled in schools offering the regular curriculum? Does an EEP contribute indirectly to stronger associations oberved between parents' ecological knowledge, attitudes, motivation, and behaviors as compared to the same associations observed for parents of children enrolled in schools offering the regular curriculum? Evidence of a stronger association between constructs in the experimental group compared to the control group would be observed by greater unstandardized beta weight values and a higher percentage of variance explained in the criterion variable (i.e., R^2)? To answer these questions, path analyses were considered the method of choice. In line with Pedhazur's protocol (1982), path analyses investigated an a priori model testing child and parental variables measured at Time 2. Model testing was conducted separately for the experimental (N = 81) and the control groups of children (N = 91) as well as for the experimental (N = 60) and the control groups of parents (N = 59). A total of 4 path analyses were conducted.

Results of this section are presented in the following order. In the first part, the proposed model is briefly summarized. The reader is reminded that theoretical support for the proposed associations is subsumed in the hypotheses subsection. The second part includes path analytical results of the child variables. The third part contains path analytical results of parental variables. Please note that beta weights reported in the text and in the figures are standardized. In addition, unstandardized beta weights are reported in the figures as recommended by Pedhazur (1982) when models are compared across groups. Amount of variance explained in each construct is reported in the text (i.e., R^2, adjusted R^2). The error term reported in figures represents the amount of variance left unexplained in the prediction of the

construct (i.e., $e = 1 - R^2$). Lastly, the use of the term "prediction" throughout this subsection refers strictly to statistical prediction based on an a priori model investigating the strength of associations between variables. As such, the use of statistical prediction does not imply causality.

Proposed Model. Past studies have successfully tested a sequence wherein ecological attitudes predicted level of self-determination which in turn, was associated to behavioral frequency (Green-Demers et al., 1995; Green-Demers & Pelletier, 1993; Green-Demers et al., 1997; Mageau et al., 1996; Tuson & Pelletier, 1992). The present model contains identical variables measured in the past with the exception of ecological knowledge. This last variable was added in the present study as a means to evaluate the impact of an EEP on people's levels of environmental satisfaction and of perceived competence. The proposed model predicts that ecological knowledge would be negatively related to environmental satisfaction and positively related to perceived competence in doing things for the environment. In line with past findings, a low level of environmental satisfaction and a high perception of competence should lead people to attribute greater importance to environmental issues. In turn, higher levels of perceived importance and of competence are hypothesized to favor a more self-determined motivational profile as measured by the self-determination index. Lastly, a higher level of self-determination should be associated with more frequent environmental behaviors. The proposed model is depicted in Figure 1.

Path analytical procedure. Using Pedhazur's protocol (1982), path analytical testing of the proposed model was conducted in five steps. In step one, the predictor variable of ecological knowledge was regressed onto the criterion variable of perceived competence. In step 2, the predictor variable of ecological knowledge was regressed onto the criterion variable of satisfaction. In step 3, the predictor variables of satisfaction and of competence were regressed onto the criterion variable of importance. In step 4, the predictor variables of importance and competence were regressed onto the criterion variable of self-determination. In the final step, the predictor variable of self-determination was regressed onto the criterion variable of ecological behaviors. This protocol was followed in all path analyses.

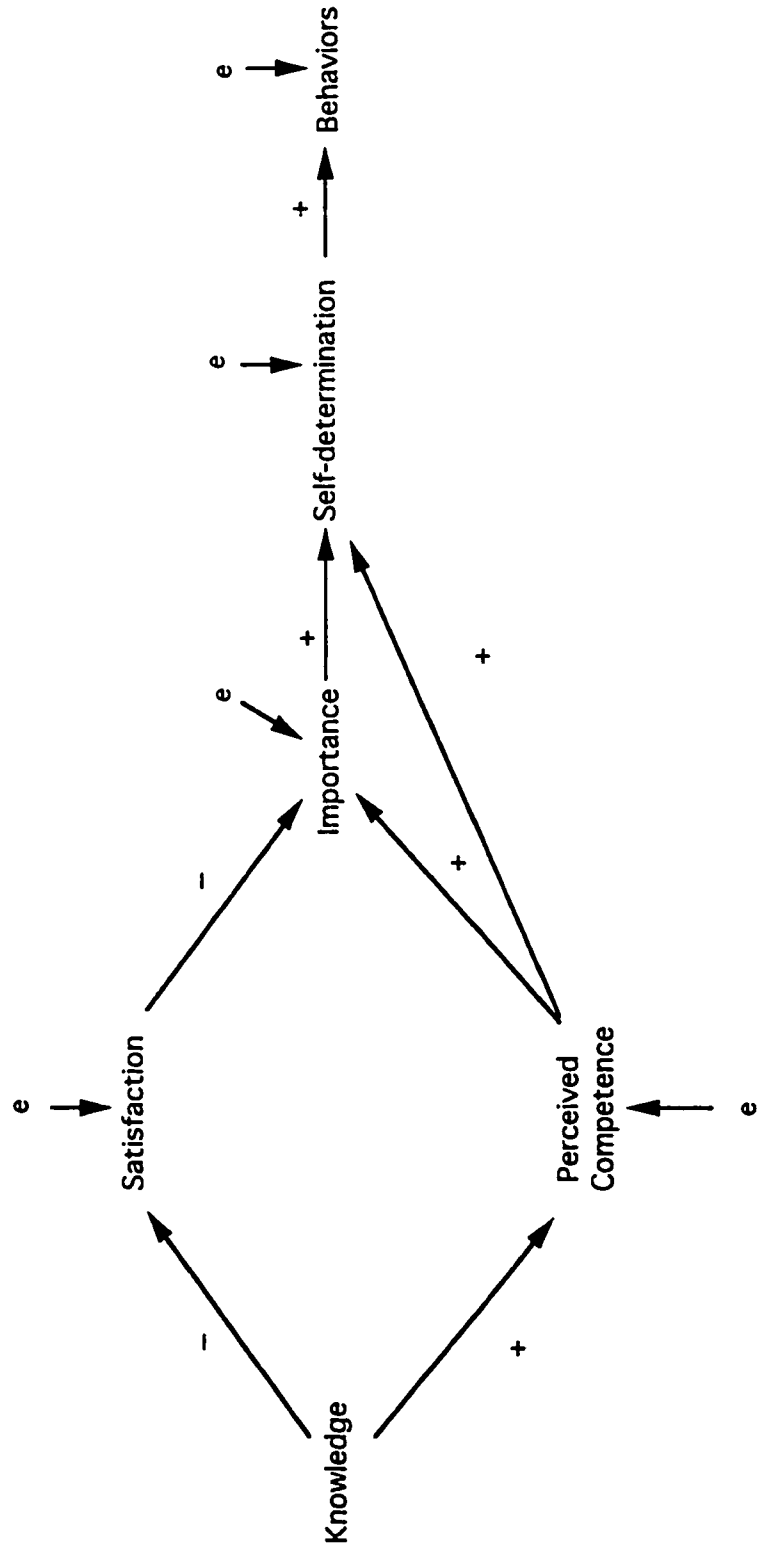


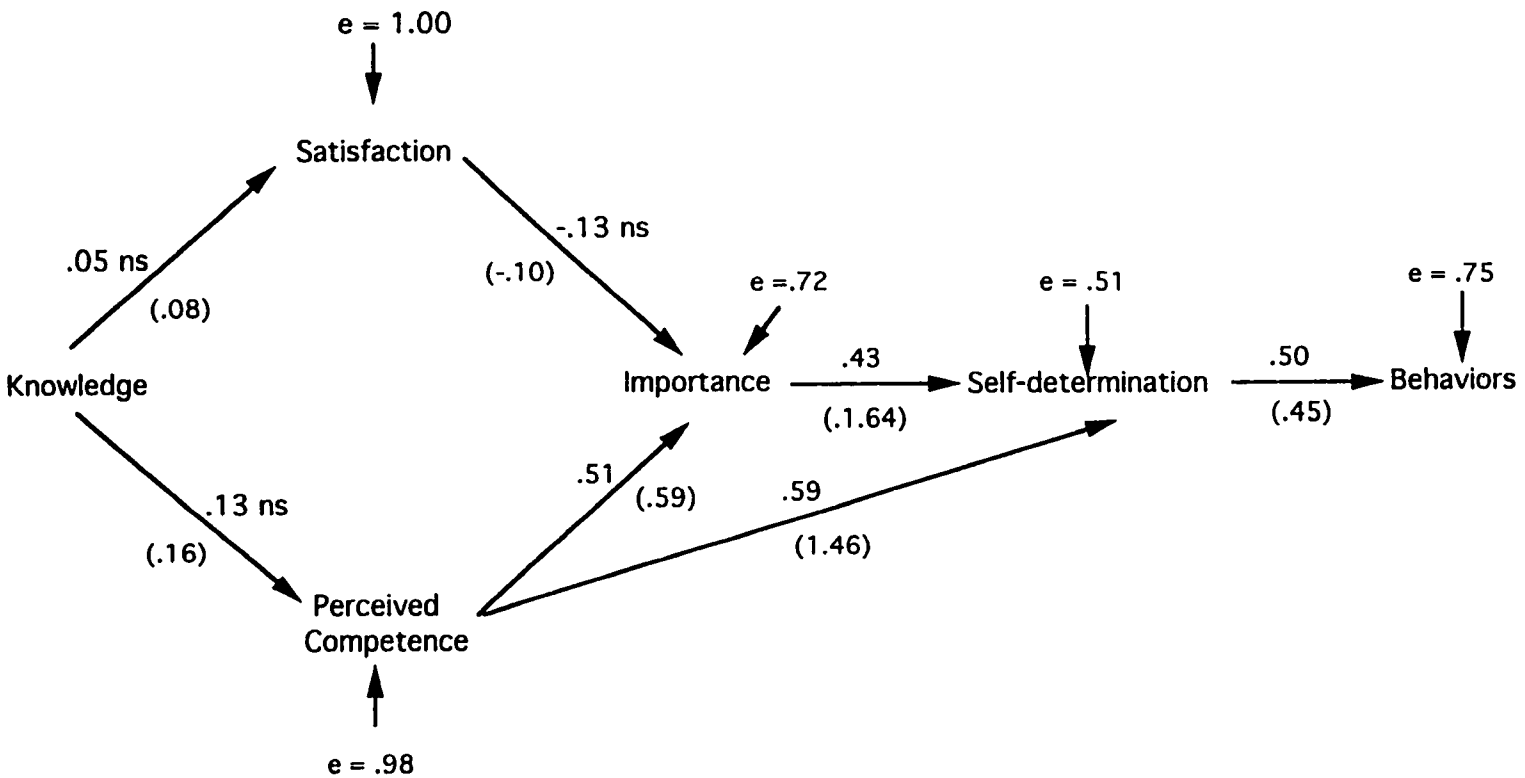
Figure 1. Proposed motivational model of ecological behaviors.

Path analysis results on child variables

Results for the experimental group revealed that ecological knowledge did not significantly predict level of satisfaction ($\beta = .05$, $F = .22$, $p > .05$; $R^2 = 0$) nor perceived competence ($\beta = .13$, $F = 1.56$, $p > .05$; $R^2 = .02$, adjusted $R^2 = 0$). In the third step, results showed that perceived competence significantly explained 28% of the variance contained in children's ecological importance ($\beta = .51$, $F = 31.15$, $p < .001$; adjusted $R^2 = .26$). However, level of satisfaction did not significantly predict ecological importance ($\beta = -.13$, $F = 1.40$, $p > .05$). In the fourth step, results suggested that both ecological importance ($\beta = .43$, $F = 23.35$, $p < .001$) and perceived competence ($\beta = .59$, $F = 17.66$, $p < .001$) significantly explained 49% of the variance contained in children's level of self-determination (adjusted $R^2 = .47$). Lastly, level of self-determination significantly explained 25% of the variance contained in children's ecological behaviors ($\beta = .50$, $F = 25.18$, $p < .001$; adjusted $R^2 = .24$). Path analysis results are presented in Figure 2.

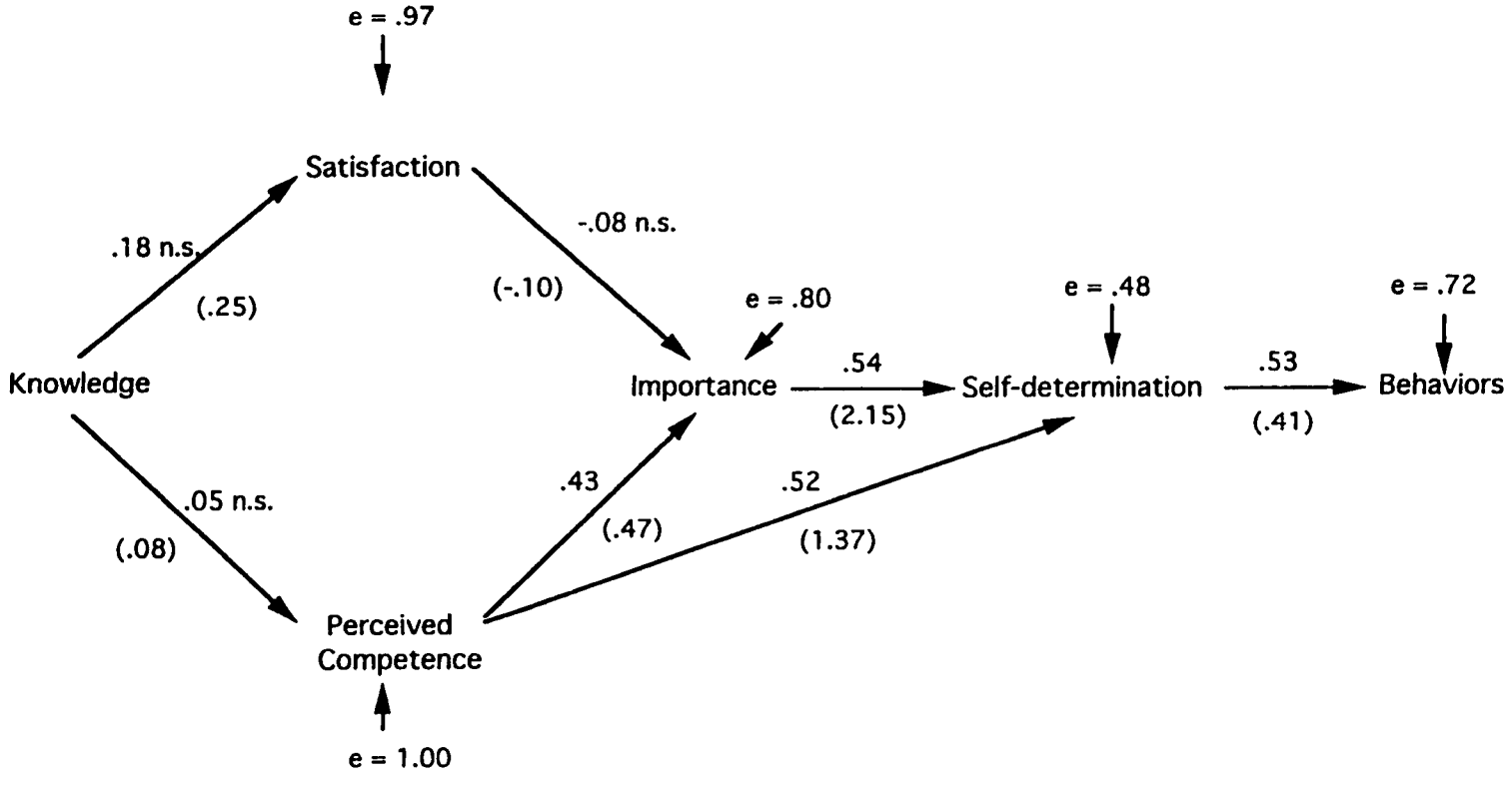
Results for the control group revealed that ecological knowledge did not significantly predict level of satisfaction ($\beta = .18$, $F = 3.13$, $p > .05$; $R^2 = .03$, adjusted $R^2 = .02$) nor perceived competence ($\beta = .05$, $F = .29$, $p > .05$; $R^2 = 0$). In the third step, results showed that perceived competence significantly explained 20% of the variance contained in children's ecological importance ($\beta = .43$, $F = 21.68$, $p < .001$; adjusted $R^2 = .18$). However, level of satisfaction did not significantly predict ecological importance ($\beta = -.08$, $F = .82$, $p > .05$). In the fourth step, results suggeseted that both ecological importance ($\beta = .54$, $F = 54.89$, $p < .001$) and perceived competence ($\beta = .52$, $F = 19.47$, $p < .001$) significantly explained 52% of the variance contained in children's level of self-determination (adjusted $R^2 = .51$). Lastly, results showed that self-determination significantly explained 28% of the variance contained in children's ecological behaviors ($\beta = .53$, $F = 41.35$, $p < .001$; adjusted $R^2 = .28$). Path analysis results are presented in Figure 3.

Figure 2. Path analysis results of motivational model on children in the experimental group.



Note. Standardized beta weights are all significant at .05 unless specified otherwise.
Unstandardized beta weights are presented between brackets.
Error term (e) represents amount of unexplained variance.

Figure 3. Path analysis results of motivational model on children in the control group.



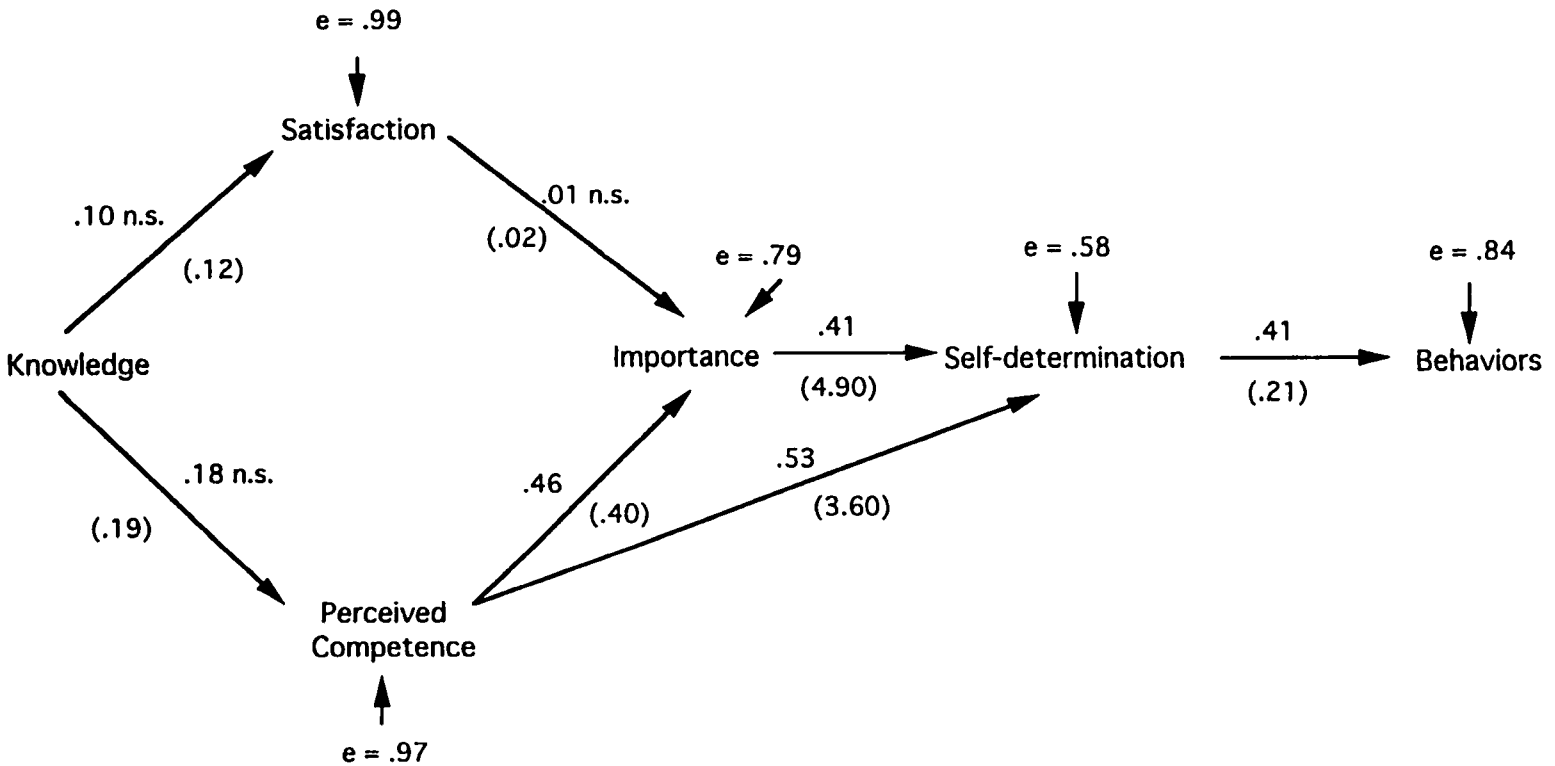
Note. Standardized beta weights are all significant at .05 unless specified otherwise.
Unstandardized beta weights are presented between brackets.
Error term (e) represents amount of unexplained variance.

Path analysis results on parental variables

Results for the experimental group revealed that ecological knowledge did not significantly predict level of satisfaction ($\beta = .10$, $F = .66$, $p > .05$; $R^2 = .01$, adjusted $R^2 = 0$) nor perceived competence ($\beta = .18$, $F = 2.28$, $p > .05$; $R^2 = .03$, adjusted $R^2 = .02$). In the third step, results showed that perceived competence significantly explained 21% of the variance contained in parents' ecological importance ($\beta = .46$ $F = 17.11$, $p < .001$; adjusted $R^2 = .19$). However, level of satisfaction did not significantly predict ecological importance ($\beta = .01$, $F = .05$, $p > .05$). In the fourth step, results suggested that both ecological importance ($\beta = .41$, $F = 14.48$, $p < .001$) and perceived competence ($\beta = .53$, $F = 10.41$, $p < .01$) significantly explained 42% of the variance contained in parents' level of self-determination (adjusted $R^2 = .40$). Lastly, results showed that self-determination significantly explained 16% of the variance contained in parents' ecological behaviors ($\beta = .41$, $F = 11.64$, $p < .001$; adjusted $R^2 = .15$). Path analysis results are presented in Figure 4.

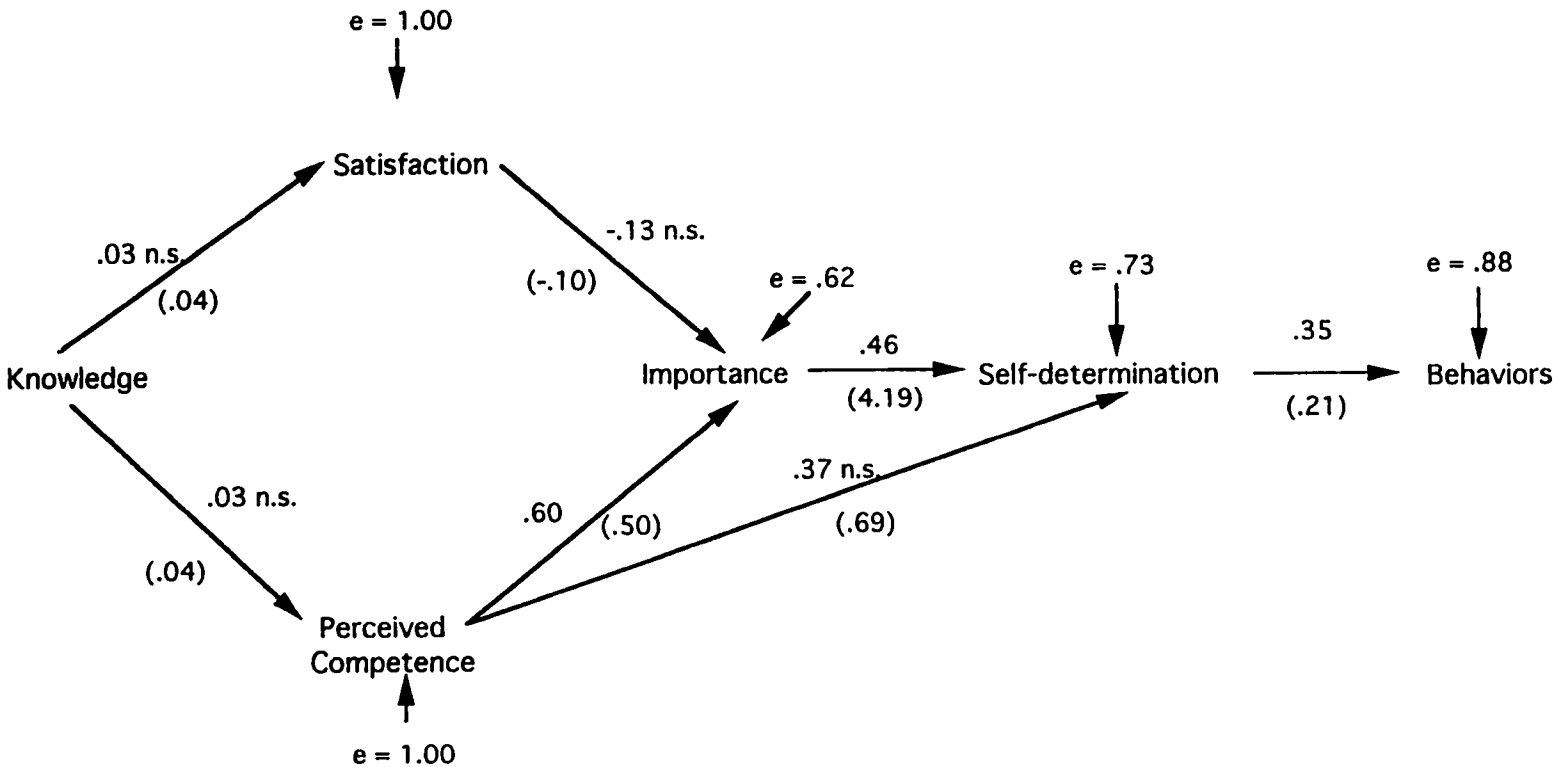
In the control group, ecological knowledge did not significantly predict level of satisfaction ($\beta = .03$, $F = .05$, $p > .05$; $R^2 = 0$) nor perceived competence ($\beta = .03$, $F = .07$, $p > .05$; $R^2 = 0$). In the third step, results revealed that perceived competence significantly explained 38% of the variance contained in parents' ecological importance ($\beta = .60$, $F = 43.53$, $p < .001$; adjusted $R^2 = .36$). However, level of satisfaction did not significantly predict ecological importance ($\beta = -.13$, $F = 1.99$, $p > .05$). In the fourth step, results showed that only ecological importance ($\beta = .46$, $F = 12.76$, $p < .001$) significantly explained 27% of the variance contained in parents' level of self-determination (adjusted $R^2 = .25$). Perceived competence was not significantly associated with parents' level of self-determination ($\beta = .37$, $F = .52$, $p > .05$). Lastly, results showed that self-determination significantly explained 12% of the variance contained in parents' ecological behaviors ($\beta = .35$, $F = 8.06$, $p < .01$; adjusted $R^2 = .11$). Path analysis results are presented in Figure 5.

Figure 4. Path analysis results of motivational model on parents in the experimental group.



Note. Standardized beta weights are all significant at .05 unless specified otherwise.
Unstandardized beta weights are presented between brackets.
Error term (e) represents amount of unexplained variance.

Figure 5. Path analysis results of motivational model on parents in the control group.



Note. Standardized beta weights are all significant at .05 unless specified otherwise.
Unstandardized beta weights are presented between brackets.
Error term (e) represents amount of unexplained variance.

Summary : Motivational Model of Ecological Behaviors

The second goal of the present study was to investigate the association between the constructs of ecological attitudes, motivation, and behaviors in an attempt to replicate past findings (e.g., Tuson & Pelletier, 1992). Results obtained in the present sample partially replicate past findings across the 4 groups (children/parents by experimental/control conditions). More importantly, the proposed model was successfully replicated in the younger population of children. In contrast to our hypotheses, ecological knowledge failed to significantly predict levels of satisfaction and of perceived competence. Similarly, level of satisfaction did not significantly contribute to higher ratings of ecological importance. Failure to find a significant association between satisfaction and importance is in contrast to past findings. In line with past findings and our own hypotheses, perceptions of competence favored greater levels of importance attributed to environmental issues. With the exception of the control group of parents, levels of importance and of perceived competence jointly contributed to heightened self-determined motives underlying ecological behaviors. Failure of perceived competence to significantly predict level of self-determination in the control group of parents resulted not only in a diminished amount of variance explained in level of self-determination but also indirectly affected the amount of variance explained in ecological behaviors. These findings suggest that people's adoption of self-determined motives appears to be significantly enhanced by both attributed importance to ecological issues and perception of competence in performing ecological behaviors. Lastly, higher levels of self-determination led to higher frequencies of ecological behaviors.

Part of this second goal was to determine the effects of an EEP on the proposed associations. Specifically, a direct effect of an EEP on children would be evidenced by higher beta weight values between all constructs as well as a greater amount of variance explained in the experimental group compared to the control group. Similarly, an indirect effect of an EEP on parents would be evidenced by higher beta weight values between all constructs as well as a greater amount of variance explained in the experimental group compared to the control group. Comparison of the model across the experimental

and control groups of children failed to demonstrate notable differences in beta weight values or in amount of variance explained. Comparison across the experimental and control groups of parents revealed one notable difference in beta weight values and amount of variance explained. The presence of a significant path between perception of competence and level of self-determination observed for parents in the experimental group may be particularly revealing. A possible explanation is that an EEP may have influenced parents' perceptions of competence through children's interpersonal behaviors. A child-parent model of an EEP on parental variables was therefore investigated.

Children-Parents Model

The third goal of this study was to investigate if children's interpersonal behaviors could influence parents' ecological attitudes, and motivation. The questions became: Do children enrolled in an EEP interact with their parents in a fashion that effects greater changes in parents' attitudes and motivation compared to parents in the control group? Specifically, are the associations between parents' attitudes and motivation stronger in the experimental group than in the control group as evidenced by greater unstandardized beta weight values and a higher percentage of variance explained in the criterion variable (i.e., R^2)?. To answer these questions, path analyses were considered, once again, the method of choice. In line with Pedhazur's protocol (1982), path analyses tested the proposed model with variables measured at Time 2, independently for the experimental ($N = 62$) and control groups of parents ($N = 69$).

The reader is reminded that theoretical support for the proposed associations is subsumed in the hypotheses subsection. Please note that beta weights reported in the text and in the figures are standardized. In addition, unstandardized beta weights are reported in the figures as recommended by Pedhazur (1982) when models are compared across groups. Amount of variance explained in each construct is reported in the text (i.e., R^2, adjusted R^2). The error term reported in figures represents the amount of variance left unexplained in the prediction of the construct (i.e., $e = 1 - R^2$). Lastly, the use of the term "prediction" throughout this subsection refers strictly to statistical prediction based on an a priori

model investigating the strength of associations between variables. As such, the use of statistical prediction does not imply causality.

Proposed Model. The tested model predicts that the perception of children's interpersonal behaviors would be negatively related to environmental satisfaction and positively related to perceived competence in doing things for the environment. For these analyses, the composite score of perceived children's interpersonal behaviors was used. Recall that this composite score includes the interpersonal dimensions of autonomy support, information, and involvement. Thus, parents' perception of children as autonomy supportive and as providing ecological information, as well as, child-parent involvement in ecological activities should lead parents: (a) to evaluate their immediate environmental conditions as less satisfying; (b) to perceive themselves as more competent to perform ecological behaviors. In turn, parental environmental dissatisfaction and perceived competence should lead parents to attribute greater importance to environmental issues. Lastly, higher levels of importance and of competence are hypothesized to favor a more self-determined motivational profile as measured by the self-determination index. The proposed child-parent model is depicted in Figure 6.

Path analytical procedure. A fully recursive path analysis was considered the appropriate method to explore the proposed paths (Pedhazur, 1982). Testing of the model was conducted in 4 steps. In the first step, the predictor variable of perceived children's interpersonal behaviors was regressed onto the criterion variable of parental level of satisfaction. In the second step, the predictor variable of perceived children's interpersonal behaviors was regressed onto the criterion variable of parents' perceived competence. The third step contained 3 predictor variables: level of satisfaction, perceived competence and perception of children's interpersonal behaviors. The criterion variable was parental level of ecological importance. The final step comprised 4 predictor variables: level of ecological importance, level of satisfaction, perceived competence, and perceived children's interpersonal behaviors. The criterion variable was parental level of self-determination. This protocol was followed in both path analyses.

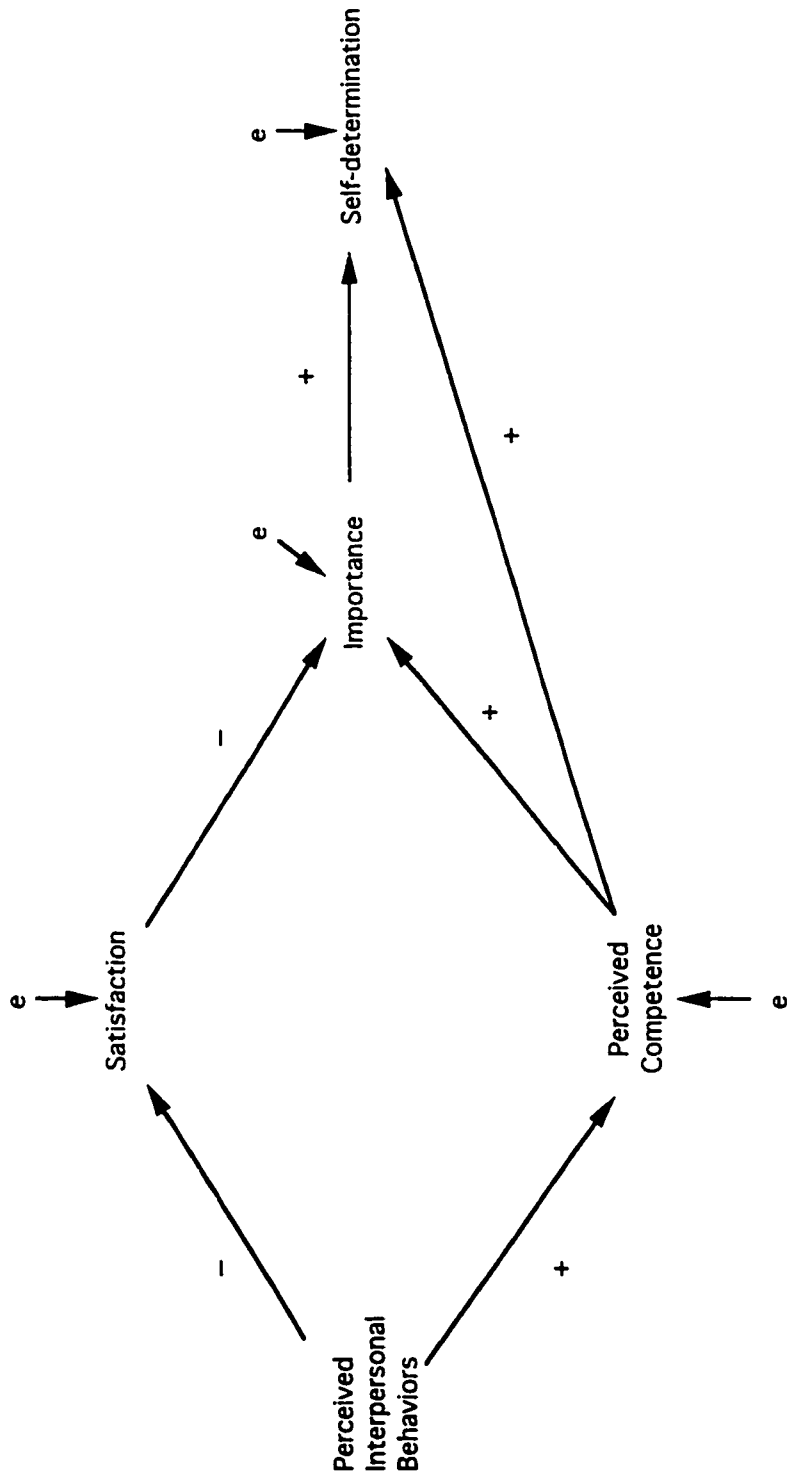


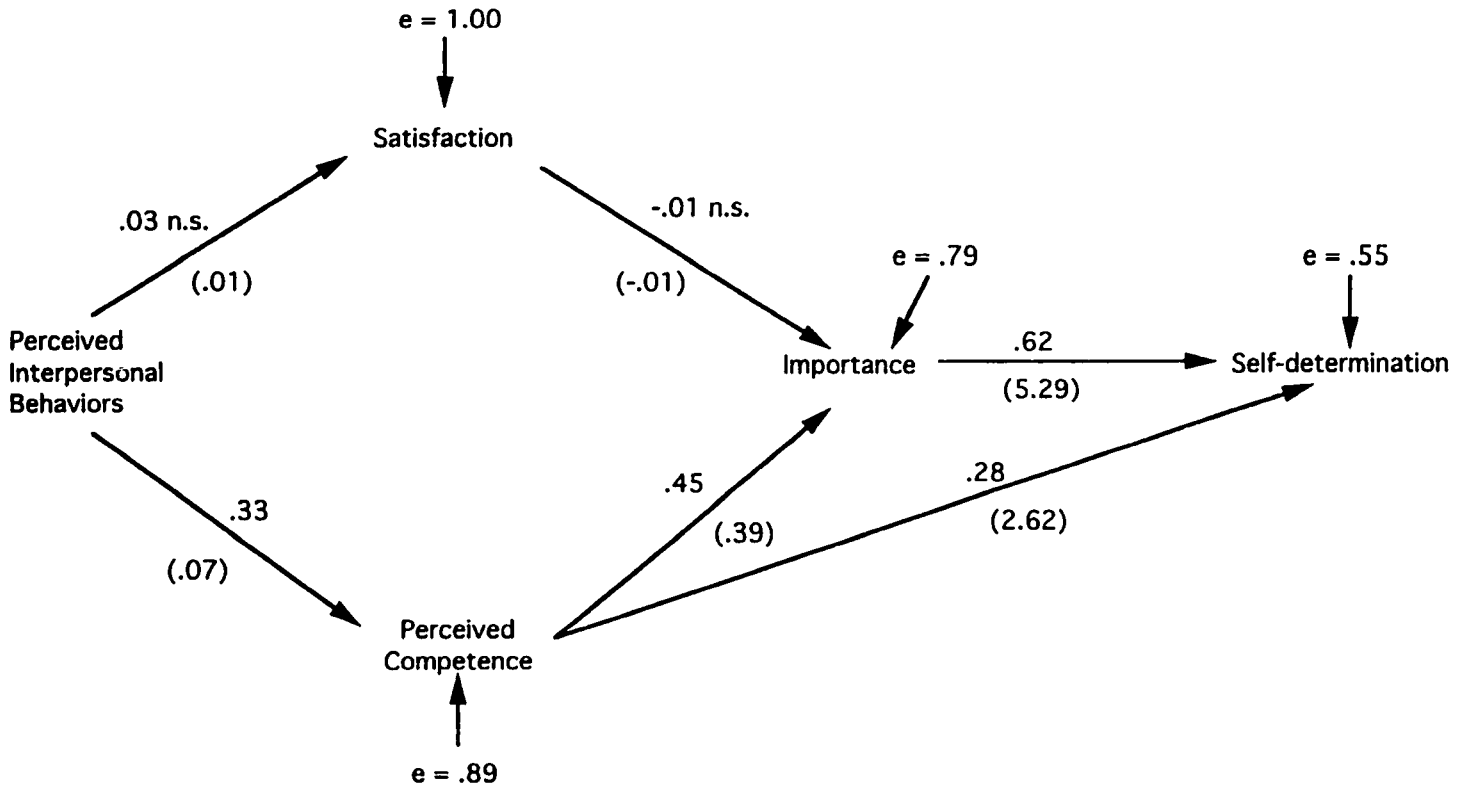
Figure 6. Proposed children-parents model

Path analysis results.

Results obtained for the experimental group failed to show a significant path between perception of children's interpersonal behaviors and parental satisfaction levels ($\beta = .03$, $F = .08$, $p > .05$; $R^2 = 0$). However, perceived children's interpersonal behaviors significantly predicted 11% of the variance contained in parents' perceived competence ($\beta = .33$, $F = 7.74$, $p < .01$; adjusted $R^2 = .09$). In the third step, results revealed that perceived competence significantly explained 21% of the variance contained in parents' attributed importance to the environment ($\beta = .45$, $F = 12.53$, $p < .001$; adjusted $R^2 = .17$). Level of satisfaction did not significantly predict ecological importance ($\beta = -.01$, $F = .04$, $p > .05$). In turn, the joint predictor variables of ecological importance ($\beta = .62$, $F = 20.09$, $p < .001$) and of perceived competence ($\beta = .28$, $F = 5.71$, $p < .001$) significantly explained 45% of the variance contained in parents' level of self-determination (adjusted $R^2 = .41$). Path analysis results are presented in Figure 7.

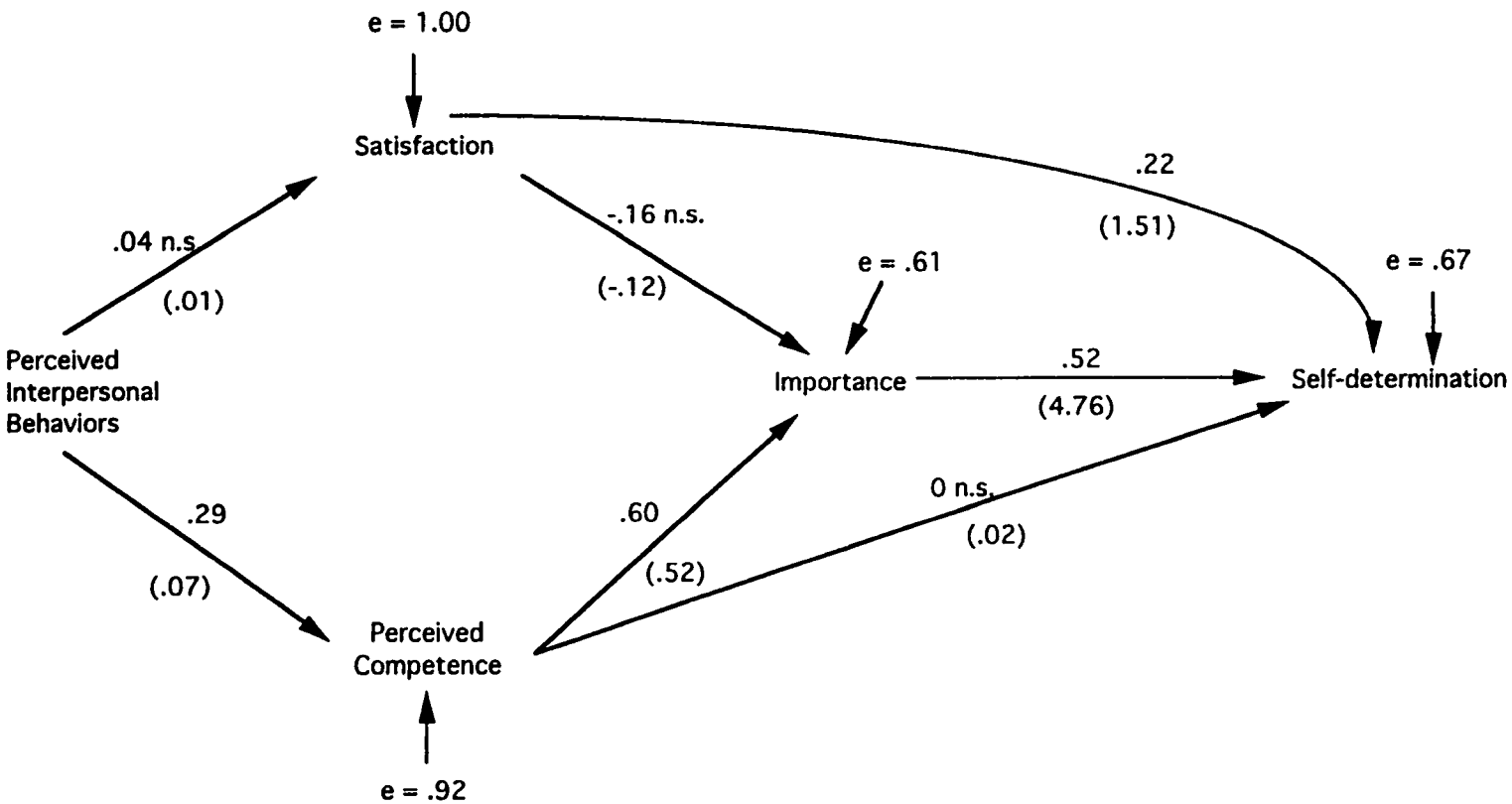
Results obtained for the control group failed to show a significant path between perception of children's interpersonal behaviors and parental satisfaction levels ($\beta = .04$, $F = .11$, $p > .05$; $R^2 = 0$). However, perceived children's interpersonal behaviors significantly predicted 8% of the variance contained in parents' perceived competence ($\beta = .29$, $F = 6.42$, $p < .01$; adjusted $R^2 = .07$). In the third step, results revealed that only perceived competence significantly explained 39% of the variance contained in parents' ecological importance ($\beta = .60$, $F = 40.01$, $p < .001$; adjusted $R^2 = .36$). In contrast, level of satisfaction did not significantly predict ecological importance ($\beta = -.16$, $F = 2.89$, $p > .05$). In the fourth step, the joint predictors of ecological importance ($\beta = .52$, $F = 15.75$, $p < .001$) and of environmental satisfaction ($\beta = .22$, $F = 5.71$, $p < .001$) significantly explained 33% of the variance contained in parents' level of self-determination (adjusted $R^2 = .29$). Lastly, perceived competence was not significantly associated with parents' levels of self-determination ($\beta = 0$, $F = .97$, $p > .05$). Path analysis results are presented in Figure 8.

Figure 7. Path analysis results of children-parents model in the experimental group.



Note. Standardized beta weights are all significant at .05 unless specified otherwise.
Unstandardized beta weights are presented between brackets.
Error term (e) represents amount of unexplained variance.

Figure 8. Path analysis results of children-parents model in the control group.



Note. Standardized beta weights are all significant at .05 unless specified otherwise.
Unstandardized beta weights are presented between brackets.
Error term (e) represents amount of unexplained variance.

Summary: Children-Parents Model

The third goal of this study was to investigate if children's interpersonal behaviors could influence parents' ecological attitudes and motivation. Path analyses results failed to offer strong empirical support for hypothesized differences between groups. In both groups, children's interpersonal behaviors did not significantly predict level of satisfaction, as anticipated. However, children's interpersonal behaviors significantly predicted perceptions of competence, as anticipated. In turn, perceptions of competence significantly predicted, as anticipated, level of ecological importance. In contrast to our initial hypothesis, level of satisfaction did not significantly influence ecological importance. Differences between the experimental and control groups were only observed in the prediction of parents' level of self-determination. Within the experimental group, levels of ecological importance and of perceived competence jointly predicted, as anticipated, level of self-determination. Within the control group, levels of ecological importance and of satisfaction significantly predicted level of self-determination. The positive path between level of satisfaction and self-determination are in direct contrast to past findings. However, the remaining results were consistent with findings obtained in path analyses conducted on parental variables presented in the previous section (e.g., Motivational model of ecological behaviors). Together, the above findings suggest that children, enrolled in an EEP, failed to transfer to their parents any benefits derived from their exposure to an environmental education program.

DISCUSSION

Past researchers have underlined that childhood is a time where ecologically sound attitudes and behaviors could become more easily internalized and thus integrated into one's lifestyle. One important source of influence on children's attitudes and behaviors is school. It follows that educational institutions can be an important source of ecological information favoring in children a keen awareness of the environment and a propensity to ecological action. Unfortunately, curriculum development and classroom implementation of an environmental education program (EEP) are fairly recent and exceptional. One notable exception is the recent implementation of an EEP, named the Brundtland Green School Project, in select schools within the province of Quebec. This new development has enabled us to evaluate the impact of a structured EEP on a group of children enrolled in this program for the first time. The Brundtland Green School Project's curriculum involved teaching children about environmental issues in multiple subjects (e.g., languages, mathematics and natural sciences). The program also included applied environmental activities (e.g., wide-ranging recycling; composting). A control group comprised children enrolled in schools where environmental issues were limited to select modules within the natural sciences curriculum.

The present thesis goals were threefold. The first goal was to evaluate the impact of an EEP on children's and parents' ecological knowledge, attitudes, motivation, and behaviors. The second goal was to investigate if a motivational model of ecological behaviors observed in adult populations could be replicated in the present sample of children and their parents. Part of this goal also included the comparison of the model across experimental conditions, independently for children and parents. The third goal was to identify more clearly what specific children's characteristics influenced parents' ecological attitudes and motivation. Included in this goal was the investigation of possible differences in the strength of associations observed between constructs in paths analyses separately conducted in the experimental and control groups of parents.

To accomplish these goals, analyses were conducted in four phases. In the first phase, a series of MANCOVAs was done on children's ecological variables. In the second phase, a similar series of MANCOVAs was conducted on parents' ecological variables. We hypothesized that children and parents who were part of the experimental condition when compared to children and parents who were part of the control condition, would: (1) be more knowledgeable about environmental issues; (2) report lower levels of satisfaction towards the environmental situation; (3) perceive themselves as more competent to perform ecological behaviors; (4) rate the environmental condition as more important; (5) report more self-determined motives underlying ecological behaviors; and (6) engage more frequently in environmental behaviors (e.g., recycle).

In the third phase, path analyses were conducted to test an a priori motivational model of ecological behaviors in an attempt to replicate past findings. To broaden the previously tested model, a measure of ecological knowledge was added to the sequence. We hypothesized that: (1) ecological knowledge would be associated with lower levels of environmental satisfaction and higher perceptions of competence in performing ecological behaviors; (2) environmental dissatisfaction and perceived competence would jointly foster higher ratings of environmental issues as important; (3) the combined higher ratings of importance attributed to environmental issues and perceptions of competence would be associated with a more self-determined motivational profile as measured by the self-determination index; and (4) higher levels of self-determination would be associated with increased frequency of ecological behaviors.

In the fourth phase, path analyses were used to test a proposed children-parents model wherein perceived interpersonal behaviors of children would influence parents' ecological attitudes and motivation. The composite score of parents' perception of children's interpersonal behaviors comprised the positive dimensions of autonomy support, provision of ecological information and parental involvement with their child in ecological activities. We hypothesized that: (1) perceived children's interpersonal behaviors would be associated with lower levels of parental satisfaction with environmental conditions and increased perceptions of competence in performing environmental behaviors; (2) parental

environmental dissatisfaction and perceptions of competence would be related to parental ratings of environmental issues as more important; (3) the combined higher ratings of importance attributed to environmental issues and perceptions of competence would be associated with a more self-determined motivational profile as measured by the self-determination index.

In sum, three principal questions are addressed in the present thesis. Can this environmental education program successfully foster in children and their parents pro-ecological knowledge, attitudes, motivation, and behaviors? Can a previously tested motivational model of ecological behaviors be replicated in the present sample of children and parents? Can children, enrolled in an EEP, act as social agents of change in parental ecological knowledge, attitudes, motivation, and behaviors?

Influence of an EEP on Children and Parents

Children

Significant differences between experimental conditions were found on two motivational variables. Overall, children in the experimental group reported being more self-determined when engaging in ecological behaviors compared to children in the control group. Higher levels of self-determination were evidenced in the experimental group from the beginning of the school year and remained constant in time. These results were found in the repeated measures analysis but not in the ANCOVA and thus, caution should be exercised in concluding a clear EEP effect. The MANCOVA results suggested that at Time 2, children enrolled in schools offering an EEP performed ecological behaviors for less extrinsic motives compared to children in the control group. Together, these results offer some indication of a beginning EEP effect. Specifically, the empirical evidence of diminished extrinsic motivation within the experimental group may be an important marker of motivational change. These children were constantly given new information on ecological issues and effective strategies. Repetition of this information may have served as powerful motivational stimulants or alternatively, served to maintain levels of motivation as observed by Leeming and colleagues (1997) in older children's attitudes.

However, results failed to reveal significant differences between experimental conditions. At Time 2, both groups of children showed similar levels of: (a) knowledge of ecological issues; (b) satisfaction with environmental conditions; (c) perceived competence in accomplishing environmental behaviors; (d) importance attributed to environmental issues; and (e) ecological behaviors. These results suggest the absence of an EEP impact on children's ecological knowledge, attitudes, and behaviors.

Parents

At Time 2, significant differences between experimental conditions were found on two variables. First, parents in the experimental group reported being significantly more dissatisfied with local environmental conditions compared to parents in the control group. Second, parents in the experimental group reported obtaining more information on ecological issues and strategies from children compared to parents in the control group. However, findings of a difference in amount of information obtained was significant at the univariate level but not at the multivariate level. In the absence of clear results, caution must be exercised in interpreting a definite effect of group membership on this last variable at Time 2.

Analyses failed to reveal significant differences between the experimental and control groups on other measured variables. At Time 2, both groups of parents perceived their child as similar in terms of: (a) importance attributed to environmental issues; (b) felt competence in engaging in ecological behaviors; (c) interest in acquiring ecological information; and (d) frequency of ecological behaviors. In essence, these results reflect those obtained in children's self-reported measures. Likewise, both groups of parents reported at Time 2, comparable levels of: (a) ecological knowledge; (b) perceived competence; (c) importance attributed to environmental issues; (d) motivation (self-determination as well as motivational subtypes); and (e) ecological behaviors.

Replication of Motivational Model of Ecological Behaviors

A motivational model of ecological behaviors was partially replicated across the 4 groups (children/parents x experimental/control condition; e.g., Mageau et al., 1996; Tuson & Pelletier, 1992). All analyses were conducted on variables measured at Time 2. Briefly, results showed that ecological knowledge was not significantly associated with levels of satisfaction or of perceived competence. Similarly, level of satisfaction with environmental conditions was not significantly associated with ratings of importance. However, perceptions of competence favored greater levels of importance attributed to environmental issues. With the exception of the control group of parents, levels of importance and of perceived competence jointly contributed to heightened levels of self-determination. In turn, higher levels of self-determination were significantly associated with an increased frequency of ecological behaviors. The above findings warrant further explanation.

The failure of ecological knowledge in all four groups to be significantly associated with environmental dissatisfaction and perceived competence in doing things for the environment is perhaps not surprising in view of the low knowledge level of participants in the study. Parents in the experimental group had a mean (collapsed over time) of 5.38 out of a possible 15 while parents in the control group obtained a mean of 4.81. Children didn't fare much better with a 4.80 mean (collapsed over time) observed in the experimental group and 4.94 in the control group. These results are not unlike previous survey findings underlining that the present state of knowledge in the general population is slight despite the amount of information available on environmental issues and strategies (e.g., Statistics Canada, 1991; Environment Canada, 1998).

The lack of an association between ecological knowledge and level of satisfaction with the environmental condition can be further explained. Dissatisfaction, by definition, is a perceived discrepancy between a desired state and an actual state (Diener, 1984). It follows then, that lack of knowledge with the state of the environment may hinder evaluations of a discrepancy. An additional consideration is that knowledge of environmental problems in one's immediate surroundings may be a more powerful source of ecological dissatisfaction than knowledge of global environmental problems.

More to the point, direct experience of the negative consequences of industrial waste or of any other ecological disaster may heighten in people perceptions of dissatisfaction (deHaven-Smith, 1988; Prester et al., 1987). For example, people living in St-Basil-le-Grand were not galvanized into action until there was a disastrous chemical fire at a local depot of used tires. Likewise, Kentucky residents did not become really concerned with environmental issues or sensitive to the interconnectedness between humans and the environment until they experienced, in 1988, severe water restrictions (Arcury and Christianson, 1990).

In line with past findings and our hypotheses, people who perceived themselves as competent tended to attribute greater importance to environmental issues. Specifically, perceptions of competence in a particular area are associated with higher evaluations of importance attributed to that area.

In contrast to past findings and our own hypotheses, a higher level of environmental dissatisfaction did not significantly influence level of importance attributed to environmental issues. These results were consistent across the 4 groups. The absence of a significant path suggests that perhaps people were relatively satisfied with current local environmental conditions. This contention is further supported by examination of the means obtained on the environmental satisfaction scale. The possible range of scores for the children's scale was 3 to 15. The observed mean (collapsed over time) was 9.54 in the experimental group and 10.29 in the control group. For adults, the possible range of scores was 3 to 21. The observed mean (collapsed over time) was 13 in the experimental group and 14.24 in the control group. Together, these scores represent a moderate or neutral level of satisfaction with environmental conditions. In previous studies that have found a significant association between level of satisfaction and importance, people reported being relatively dissatisfied with local environmental conditions (e.g., Pelletier, Blanchard, & Legault, 1996; Pelletier, Legault, & Tuson, 1996; Tuson & Pelletier, 1992). For example, a significant association between level of dissatisfaction and importance was found in surveyed Cornwall residents (N = 1,410; Pelletier, Hunsley, Green-Demers, & Legault, 1996). In this study, residents reported being dissatisfied with current environmental conditions (M =

7.95). Interestingly, these residents were quite aware of local environmental problems as evidenced by scores obtained on various measures of local issues (e.g., industrial and agricultural pollution). In addition, residents perceived industrial and agricultural pollution as posing greater health risks and reported higher ratings of concern or importance attached to these issues. In the present study, the relatively neutral position of environmental satisfaction reported by participants may have impeded their evaluation of local environmental conditions as important.

In line with past findings and our own hypotheses, the more people evaluated environmental conditions as important, the more they performed ecological activities for self-determined motives. Similarly, the more people perceived themselves as competent in performing environmentally-conscious behaviors, the more people tended to report engaging in ecological activities for self-determined motives. These results were consistently found across groups with the notable exception of parents in the control group. These adults reported higher levels of self-determined motives uniquely in response to greater importance attributed to environment issues. These last results appear, on the surface, to be in contrast to Deci and Ryan's (1985) proposition that competence is a necessary condition for feeling engaged and consequently, self-determined with respect to an activity. However, it was observed that while the strength of the relation between environmental importance and self-determination was similar across groups, the amount of variance explained in level of self-determination was greatly diminished in the control group of parents (adjusted $R^2 = .25$) compared to the experimental group of parents (adjusted $R^2 = .40$). Thus, people's adoption of self-determined motives appears to be significantly enhanced by both attributed importance to ecological issues and perceptions of competence in performing ecological behaviors.

Lastly, results indicated that the more self-determined people were, the more frequently they performed environmentally-conscious behaviors. These results are consistent with Deci and Ryan's (1985) theory as well as past findings. It is interesting to note that the amount of variance explained in ecological behaviors was slightly more elevated for parents in the experimental group (adjusted $R^2 = .16$) compared to parents in the control group (adjusted $R^2 = .10$). The difference in amount of variance

explained warrants further examination. A significant path between perception of competence and level of self-determination observed in the experimental group but not in the control group of parents seems to suggest that perceptions of competence may be positively, albeit indirectly, associated with higher frequencies of ecological behaviors.

In sum, a motivational model of ecological behaviors was partially replicated in the present samples of children and of parents. Comparison of children and parents across experimental conditions revealed generally non significant differences in paths or amount of variance explained with one notable exception. A significant path between perception of competence and level of self-determination was observed for parents in the experimental group but not for parents in the control group. The general absence of significant differences between the experimental and control groups suggest the absence of a direct EEP effect on children and of an indirect EEP effect on parents.

Children-Parents Model

Results offer partial empirical support for the proposed model independently tested in the experimental and control groups of parents. Briefly, parental perception of children's interpersonal behaviors was positively associated with parents' perceptions of competence but not with parents' dissatisfaction with environmental conditions. In turn, parents' perceptions of competence but not of environmental dissatisfaction, were associated with higher ratings of ecological importance by parents. However, differences in the experimental and control groups were observed in predictors of parental levels of self-determination. Within the experimental group, levels of ecological importance and of perceived competence were significantly associated with level of self-determination. Within the control group, levels of ecological importance and of satisfaction were significantly associated to level of self-determination.

Failure of perceived children's interpersonal behaviors to influence parents' level of satisfaction is consistent with findings in the previous section. Recall that ecological knowledge was not found to be a significant predictor of environmental satisfaction. Likewise, both the provision of autonomy support and

of information by children, as well as joint child-parent involvement in ecological activities were not associated with parents' level of environmental satisfaction. Examination of means indicated relatively low levels of ecological knowledge for both children and parents across experimental conditions. Low scores were observed despite evidence that children in the experimental group tended to seek more ecological information from parents, give more information to parents on ecological issues and strategies as well as perform more school work on ecological topics compared to the control group. In view of these considerations, three possibilities may explain the above findings. First, children may fail to transfer to parents information acquired at school. Second, there may be an actual lack of interest in the present sample of parents in acquiring ecological knowledge as noted in previous studies (e.g., Griffin, 1989). Third, results may suggest a certain stability in adults' evaluation of environmental conditions. In the absence of sudden negative changes in environmental conditions, adults may not invest the necessary mental effort required by a re-evaluation of a discrepancy between the actual and desired state of the environment.

As anticipated, the perceived provision of autonomy support and information by children, as well as child-parent involvement in ecological activities significantly enhanced parents' perceptions of competence in performing ecological activities. These results were found in both groups. These results provide further empirical support for Deci and Ryan's (1985, 1987) self-determination theory which posits that provision of autonomy support and information jointly enhance perceptions of competence. This association has also been found in environmental studies (e.g., de Young, 1996; de Young et al., 1993). In addition, parental involvement with the child in ecological activities may be an additional avenue to enhance people's perception of competence as noted in previous empirical investigations (e.g., Gonzales et al., 1988; Mageau et al., 1996).

In line with findings obtained in path analyses presented in the previous section, people who perceived themselves as competent tended to attribute greater importance to environmental issues. Similarly, adults in the experimental group tended to report more self-determined motives in response to higher perceptions of competence in performing ecological behaviors as well as ratings of importance

attributed to environmental issues. However, adults in the control group reported higher levels of self-determined motives in response to greater importance attributed to environment issues as well as satisfaction with environmental conditions. These last results differ from findings in path analyses of parents presented in the previous section and are in sharp contrast to our hypothesis as well as numerous previous findings (e.g., Mageau et al., 1996; Tuson & Pelletier, 1992). Theoretically, dissatisfaction with a specific state serves to motivate one to rectify the situation by taking appropriate actions. Thus, dissatisfaction with environmental conditions should motivate one to remedy the situation. Motivation in turn would lead one to actually perform behaviors with the goal of diminishing the discrepancy between the actual and the desired state. In the present sample, satisfaction with a specific state was positively associated with levels of self-determination.

Together, the above results offer little support for the hypothesis that an EEP may influence parental attitudes and behaviors indirectly through the children's interpersonal behaviors. Children's interpersonal behaviors affected only parental perception of competence. This effect was comparable in both groups as evidenced by the similar amount of variance explained in perception of competence as well as beta weights. Comparison with results obtained in path analyses presented in the previous section showed a small increment in amount of explained variance for perception of competence when children's interpersonal behaviors were used as an antecedent. Specifically, 2% of the adjusted variance of parental competence was explained by environmental knowledge in the experimental group whereas 0% was explained in the control group. When children's interpersonal behavior was used as the predictor, 9% of the adjusted variance contained in perceptions of competence was explained for parents in the experimental group compared to 7% for parents in the control group.

Limitations of the study

This first attempt in evaluating the Brundtland Green School Project influence on children and on their parents was not exempt from certain limitations. These possible limitations will be discussed in terms of methodological, statistical, and psychometric issues.

Methodological issues

The use of covariables in analyses of data obtained by means of a quasi-experimental design is controversial. The comparison of existing groups remains a central issue. The absence of randomization of participants to groups leaves open the possible causal effect of non controlled variables on dependent variables. While not directly involved in the conception and administration of the Brundtland Green School Project, we proceeded with analyses designed to assess the presence of the program's components. Globally, findings suggested that schools in the experimental condition differed from schools in the control condition. Information obtained from teachers underlined that the curriculum of the experimental group differed from the control group in several ways (i.e., greater integration of ecological topics across academic subjects; greater exposure of children to a wider variety of ecological activities). Results of a multivariate repeated measures analysis done on children's sources of information indicated that children in the experimental condition reported greater use of school based sources of information compared to children in the control condition. These children tended to ask teachers for more ecological information as well as reported doing more school work on ecological issues. Together, these findings suggest that the experimental and control schools differed on important curriculum based variables. In addition, the absence of significant differences in socio-demographic variables and dependent variables measured at Time 1 (e.g., motivation) offers some reassurance as to the homogeneity of the samples across experimental conditions.

Second, analyses using MANCOVAs showed no significant differences between experimental and control groups in children's self-reported ecological knowledge and attitudes. In addition, results from path analyses suggested the absence of both a direct EEP effect on children and an indirect EEP effect on parents. These findings may have resulted from the contamination effect of a confound variable. At Time 2, children in the control group had recently been taught a module on earth which included discussions on the proper use of soil and pollution issues. Although assured by teachers that these issues had been superficially covered, this brief exposure may have been sufficient to effect changes in

the control group similar to those observed in the experimental group. The last point applies perhaps more specifically to the absence of differences observed on the knowledge scale. Recall that items composing this particular measure were specifically chosen to reflect general knowledge in order to avoid biasing results in favor of the experimental group. The recent exposure of children in the control group to some ecological issues may have served to counterbalance the information received by children in the experimental group. In future research endeavors, a better control of the timing of the second wave of data collection may prove helpful in eliminating this alternative hypothesis.

Third, the use of only self-report measures is considered problematic. They remain subject to positive self-presentation biases. The inclusion of observed behaviors in addition to self-report measures, would improve the validity of this construct both within the experimental group and across groups. For example, prior consent of the appropriate authorities or participants could be obtained to measure the amount of material recycled in schools before and following implementation of an EEP program. Efforts to obtain average amounts of recycled material in the homeowners bins could also be made.

Lastly, self-selection of respondents, particularly of parents, raises questions as to the representativeness of the sample. In the present study, both groups were found comparable in terms of socio-economic status, gender and access to recycling programs. Nevertheless, there remains a possibility that adult respondents in both groups represented a higher proportion of ecologically oriented adults. In the present case, self-selection may have served to bias results in favor of the null hypotheses. The findings of significant differences between the experimental and control groups are therefore that much more revealing. A possible self-selection bias in children is considered less problematic. The choice of schools attended by children remained an administrative decision of the educational board. As such, children attended a particular school according to pre-determined residential criteria.

Statistical issues

The study of change is a controversial issue and remains an empirical challenge. The most popular methods used to assess relationships between predictors of change and the temporal evolution of outcome variables are fraught with problems. Cross-lag panel design modeling implies synchronicity and stability assumptions that are rarely met. Observed difference scores and residualized observed difference scores also have several serious limitations. For instance, these methods fail to account for measurement error. Likewise, covariates in analyses of variance should have high reliability values (r_{xx}) over time to eliminate possible measurement error. However, stability indicates by definition an absence of change. Thus, adjustment of covariates in analyses of variance may be ill-suited to test models of change (e.g., Bryk & Weisberg, 1976). Other means of evaluating stability in the measured constructs are suggested by Pedhazur and Pehadzur-Schmelkin (1991). For instance, examination of the factorial structure across time and groups constitutes a powerful means of assessing stability in measured constructs. Likewise, internal consistency values offer some indication that the measured construct is the same across time and groups. In the present case, the factorial structure of major constructs (e.g., motivation) proved stable across time and groups. Similarly, internal consistency values were assessed as satisfactory at both Time 1 and Time 2. It is important to consider that measurement error is not necessarily controlled for by high values of reliability over time. As observed by Pedhazur and Pehadzur-Schmelkin (1991), the use in MANCOVA of fallible covariates for purposes of control does not lead to bias in the estimates of adjusted means but adversely affects the power of the statistical analysis. The statistical procedure that best controls for measurement error without loss of power is the use of structural equation modeling (Cohen & Cohen, 1983; Huitema, 1980; Pedhazur & Pehadzur-Schmelkin, 1991). Unfortunately, the small sample size precluded the use of this procedure in the present study.

Second, response rates can be improved. The participation of a greater number of schools adhering to the Brundtland Green School Project should be sought. In the present study, this was not possible as this particular program was new in the province of Quebec. This state of affair prevented us

from obtaining a greater initial pool of participants. As the popularity of this program increases, greater numbers of participants could be more easily obtained. Timing of the second wave of data collection should also be done earlier in the spring to increase response rates. Late May beginning of June is a time of the year where adults may be too busy opening cottages and working outside to answer a questionnaire. In the present study, less than 50% of parents answered the questionnaire package at Time 2. In schools, teachers reported focusing on preparing students to pass provincial evaluations rather than teaching ecological matters. Lastly, children reported at Time 2 spending less time on indoor activities (i.e., television, reading). Thus, late spring appears to be a time when everyone becomes less involved in educational activities. A more accurate evaluation of the program's effect as well as enhanced participation could be accomplished if data were collected in early spring. A greater level of participation would allow the use of more rigorous statistical analyses such as structural equation modeling. In addition, a greater number of participants would enable testing of particular dimensions of perceived children's interpersonal behaviors so that their relative effectiveness could be established. This may allow a more precise identification of promising avenues that could maximize the effectiveness of an EEP.

Psychometric issues

Most scales used in the children's questionnaire proved to have satisfactory psychometric properties. In view of the majority of non-significant findings, one may suspect that items were not well understood by children. However, this is unlikely given the thorough pre-testing conducted and the reading of individual items to children during questionnaire completion. A more plausible alternative may be that items were not in themselves sensitive enough to detect subtle differences between the two groups. Specifically, ecological awareness and concern in children seem to emerge around the 6th grade (e.g., Evans et al., 1982; Horvat & Voelker, 1976). Future studies need to be done in order to investigate more in-depth the development of children's ecological attitudes and motivation with more sensitive measuring instruments. In the process, we may observe significant group differences as children age.

Second, the measure of Children's Interpersonal Behaviors Scale (CIBS) used in the parents' questionnaire needs to be further refined so that future research endeavors investigating parental perceptions of children's interpersonal behaviors include a version of the scale with satisfactory psychometric properties. Analyses conducted on the CIBS revealed positive correlations between the positive dimensions of autonomy support, information and involvement. However, the negative dimension of control was also positively associated to most subtypes of motivation. This finding is intriguing given past research findings, albeit conducted on adult populations.

Doubtless, child-parent interactions are complex. Both a positive and negative meaning appear to be found within all interactions. Several hypotheses may explain the obtained associations. Within the positive dimensions of interaction, parents may perceive autonomy support as positive coming from their child but also as a reminder that certain things must be done. Likewise, ecological information provided by others is normally perceived as positive. For parents, information originating from children may again be perceived as interesting yet elicit feelings of internal pressure such as guilt (e.g., I should be doing more). At another level, information arising from the child's school work may well be perceived as useful, yet the nature of the activity may comprise a subtle form of external pressure (e.g., I have to help my child with his/her school project). Lastly, involvement may be perceived as worthwhile in itself but may include feelings that one ought to do more for the environment.

Results regarding the negative dimension of control imply that parents may not perceive their child to be in a position to control them. The power structure is such, that parents' sense of choice, central in self-determination, is seemingly not threatened or even challenged by their child. Rather, the perception of choice remains intact. It follows then that the child's demand is perceived by the parent more as a request. Adults remain in a position of choosing to behave or not in accordance to the child's prompts. Overall, these arguments suggest that parents may behave out of a sense of compliance rather than of obligation. Without question, the above explanations remain highly conjectural. In addition, they could very well be sample specific and/or confined to interactions involving environmental issues.

However, findings showed that all dimensions of social interactions were significantly associated with parental constructs. Thus, children do appear to have some impact on parents' ecological attitudes, motivation and behaviors.

Concluding remarks

On the surface, the paucity of findings suggest that the impact of an EEP on children and their parents may be negligible. Children in the experimental group evidenced higher levels of self-determination and in particular, a diminished level of extrinsic motives underlying ecological behaviors. These results offer some hope that the EEP may eventually influence other variables central to the development of sustained ecological attitudes and behaviors. In past research, level of self-determination has been significantly linked to greater frequencies of behaviors and enduring ecological behaviors (e.g., de Young, 1996; Green-Demers et al., 1997). More importantly, extrinsic motives such as external regulation have been linked not only to infrequent ecological behaviors but also to a diminished frequency of ecological behaviors with increased behavioral difficulty (Green-Demers et al., 1997).

As for parents in the experimental group, heightened ratings of dissatisfaction with environmental conditions and greater access to ecological information may also be interpreted as potential markers of an EEP impact. Greater access to ecological information and diminished satisfaction with environmental conditions can serve not only to motivate people into doing something but may, eventually, lead to higher frequencies and a wider variety of ecological behaviors. Past studies have successfully demonstrated positive associations between information, dissatisfaction with environmental conditions, greater levels of motivation and higher frequency in ecological behaviors (e.g., Green-Demers et al., 1997).

Partial replication of a motivational model of ecological behavior in children is an important theoretical contribution. Identification of ecological antecedents in a younger population that reflect those found in an adult population broadens our understanding of mechanisms underlying ecological behaviors in children. At an applied level, these findings provide us with guidelines to improve an EEP's effectiveness in influencing children's environmental attitudes, motivation and behaviors. The

development and implementation of strategies that directly target important antecedent variables may contribute to the overall effectiveness of interventions. Kean (1989) observed that children can make observations and assessments of their immediate surrounding environment. They are also capable of decisions regarding conservation which may well prepare them to become active environmentalists. Thus, providing information that directs children's attention to environmental problems present in their neighborhood could initiate or intensify perceptions of dissatisfaction with environmental conditions. Teaching children simple strategies such as minimizing waste, turning off lights and recycling could enhance perceptions of competence. Teachers could also assign issues to groups of children designed to confront them with new knowledge as well as underline inconsistencies both within their own and with other's conceptions. The use of interpersonal controversies wherein the issue is debated may help children obtain a greater personal understanding of the issue as well as foster a different conception of the world (e.g., protection of the environment is important for one's health and safety; humans and the environment are interdependent; Ballantyne & Packer, 1996). In the process, children enrolled in an EEP, could become more effective agents of change in parents' ecological attitudes, motivation, and behaviors. As noted by Sutherland and Ham (1992), children are more likely to share information with their parents if they find it personally relevant and therefore, important.

Evidence obtained in path analyses suggested that children's interpersonal behaviors similarly affected parental perceptions of competence regardless of the experimental condition. These results may not be surprising since adults often experience greater difficulty in changing established habits. In addition, children may not be in a position of power to exert significant influence on their parents. Adults can choose to use or not to use information provided by their offspring. However, these considerations do not negate the possibility that children, part of an EEP, can positively influence parental ecological attitudes and behaviors. Observation of a global effect of children on their parents despite their weak position of power is in itself revealing. At a theoretical level, these results provide preliminary evidence that, as a group, children's interpersonal behaviors may effect changes in parental attitudes and motivation. At an applied level, these results suggest that the provision of autonomy support and

information by children in conjunction with joint child-parent involvement in ecological activities may heighten perceptions of competence in parents. In view of the above findings, it is important to continue investigating the association between parental attitudes and motivation in response to their perceptions of children's interpersonal behaviors in an independent sample.

Recommendations

The present thesis attempted to offer a glimpse of the complex world of everyday life. The haven of laboratory controls was therefore sacrificed in favor of ecological validity. The paucity of significant findings obtained in this study may suggest that the Brundtland Green School Project could be improved so as to bolster its effect on children and parents alike. A number of means identified in the present study and other studies offer interesting avenues of influencing ecological variables.

1. *Information should focus on current and relevant environmental issues.*

The provision of relevant information would enable children and their parents to make a personal connection between their well-being and the state of the environment (Environment Canada, 1998). As urgent as global issues are, people perceive them as too remote and complicated to have any hope in doing something to bring about positive changes (Bardwell, 1991). By contrast, issues that relate to one's own life are harder to ignore. The NIMBY (not-in-my-backyard) phenomenon exemplifies people taking action in part because the issue is personalized to the point that it is meaningful, personal, and therefore, motivating (Freudenberg, 1984). A sense of personal connection created by ecological knowledge that is both relevant in a direct and personal way may also serve to heighten dissatisfaction with the environmental condition.

Information provided need not only be relevant but also involve exemplars of successful resolution of problems. Bardwell (1991) convincingly argues that information saturated with dire consequences may only serve to overwhelm the recipient and favor perceptions of futility or

helplessness. It is easier to leave the problems for someone else to take care of when one is convinced that his/her own actions will not make a difference. In contrast, information that favors personal responsibility (i.e., This concerns me!), perceptions of competence (i.e., I can do this!) and response efficacy (i.e., I can make a difference!) may be more effective in motivating people to perform ecological behaviors. In adults, this type of information may serve to counterbalance the perceived personal costs (i.e., time and effort) of performing environmental behaviors as well as anticipated real or imagined lower levels of personal comfort.

For children, the fostering of perceptions of competence has been a major component of successful EEPs. For example, children are taught about environmental issues and the necessary skills to perform environmental strategies within the IITA curriculum. That is, children chose an ecological issue that had personal relevance, investigated this issue, developed an action plan destined to resolve the issue, subsequently evaluated the plan's effectiveness and if desired implemented the action plan (Ramsey & Hungerford, 1989; Ramsey, 1993). Children in the Brundtland Green School Project also experienced applied environmental strategies. Although the extent of the applied component is unknown, providing children and their parents with many opportunities to apply acquired environmental action skills may successfully bolster perceptions of environmental concern, competence, and self-determination. These ecological attitudes and motivations have been shown to be influential in promoting environmentally responsible behaviors (Ramsey & Hungerford, 1989; Sia et al., 1985-86; see also the literature review by Hungerford & Volk, 1990). The importance of educating children about effective yet simple ecological activities should therefore not be underestimated in schools.

2. *Children and parents should jointly be involved in school based ecological activities*

Greater child- parent involvement in ecological activities should be a central part of an effective EEP. In adults, past findings have emphasized that the main predictor of environmental behaviors are early outdoor experiences in a relative pristine environment and subsequent exposure to environmental

catastrophes (deHaven-Smith, 1988; Finger, 1994; Peterson & Hungerford, 1981; Tanner, 1980). In addition, past findings have emphasized that direct and sustained experience with ecological issues served to promote ecological importance and responsible environmental behaviors in adults (Hungerford & Volk, 1990). Chawla (1998) reviewed the literature on the precursors of environmental concern/interest and subsequent adulthood ecological behaviors. She concluded that adults' recollections of childhood experiences not only included positive experiences of natural environments but also the positive influence of adult role models, education, and media as well as people's negative experience of the degradation of once pristine environments. In children, Harvey (1989) observed that access to a varied vegetation in school grounds contributed to a heightened sense of connectedness with nature and lower support of the philosophy of human dominance over nature. Teachers have also reported that activities requiring active participation (e.g., caring for trees and plants) were most effective in influencing children's ecological knowledge and awareness compared to more passive activities (e.g., guest speakers). At another level, past researchers have hypothesized that direct learning experiences may also engender greater interest in learning more about the natural environment (e.g., Keen, 1991). In this study, support for this contention is found with children in the experimental group reporting higher frequencies of asking ecological information from parents and teachers.

The results of the present thesis suggest that these same observations apply to parents' involvement with their children in ecological activities. Evidence of lowered levels of environmental satisfaction experienced in the experimental group of parents suggests this possibility. If educational institutions are to be important sources of influence on the development of environmental values, concern, and motivation then, greater access to positive experiences in the environment may contribute to achieve this goal. Within the school grounds, positive direct experiences can be achieved by incorporating such features as bird feeders, container plants, log piles, pets and compost heaps (Harvey, 1989). More importantly, joint child-parent involvement in positive environmental experiences may become the basis of fond memories tied to the environment. In other words, the association of positive child-parent interactions with ecological settings may stimulate the perception of the environment as

valuable, heighten positive ecological attitudes and subsequently, bolster the frequency of environmental actions.

Thus, the provision of information directly relevant to people, successful exemplars, and examples of simple yet effective intervention strategies may prove effective in favoring positive attitudes and bolstering the frequency of ecological behaviors. More importantly, joint child-parent involvement in ecological activities can be central to the development of positive environmental attitudes. Hopefully, the concerted impact of the above recommendations may foster the development of positive ecological attitudes, self-determination and sustained ecological behaviors in both children and their parents.

Future research endeavors

Methodological and statistical improvements. Assessment of the long-term impact of an EEP requires following children and their parents over the course of several years. Adults are notorious for being set in their habits which by definition, require energy to change. In addition, people appear to adapt themselves to the condition of their surroundings. As they are less sensitive to indications of deterioration, greater discrepancies between the ideal and the actual situation are needed before behavioral changes are stimulated (Evans et al., 1982). A longitudinal analysis would allow for a more time-grained analysis of the time-course of change using a within-subject design. This design would allow enhanced control of possible a priori individual differences in attitude, motivation and behavior. In doing so, we may be in a position to examine the process of change. A longitudinal research design may also be crucial to: (a) identify key variables facilitating changes and integration into children's lifestyle of ecologically-oriented habits; (b) assess the impact of the continued provision of information emanating from an EEP on children's and their parents' attitudes and motivation; (c) determine the stability of changes in attitudes and motivation; and (d) maximize child-parent transfer to bring about sustained changes in parents' knowledge, attitudes, motivation, and behaviors.

Additional measures. Contents of the curriculum should be more directly assessed so as to identify effective components. This additional information is needed to reinforce and extend the magnitude of an EEP's overall effects. A more precise evaluation of the program's impact on children and their parents could be achieved by obtaining a detailed outline of the curriculum. This would include learning objectives, methods of evaluation, topics covered, and detailed information on the applied component. Parents should also be questioned as to their level of involvement in helping their children with assignments (i.e., papers, reading) as well as in school administered ecological activities (i.e., reforestation).

The measurement of ecological knowledge is delicate. In the present study, ecological knowledge items were specifically selected to ensure they were not content based. This was done so as not to favor the experimental group. This general measure of knowledge is not uncommonly used by other researchers when the goal of the study is the comparison across groups (e.g., Keen, 1991; Leeming et al., 1995; Musser & Malkus, 1994). It is likely that larger effect size would have been found if the measurement of knowledge had been tied to curriculum based topics. But this approach presents certain limits. When assessment of ecological knowledge is tied to the curriculum, comparison across groups becomes difficult. In addition, it requires substantive time, effort, and cooperation from teachers in order to develop proper measuring instruments. Lastly, an ecological knowledge scale tied to a curriculum impedes the proper assessment of newly acquired knowledge through channels other than formal classroom material. Past findings have underlined that some discussion of children's acquired ecological knowledge did occur in experimental families (Sutherland & Ham, 1992). Children enrolled in an EEP were also more interested in further broadening their ecological knowledge (e.g., Monroe & Kaplan, 1988). Thus, participation in environmental activities as well as discussions in experimental families may serve to stimulate acquisition of at least some new knowledge (Leeming et al., 1997). However, if the goal of the study is to better assess the impact of an EEP then ecological knowledge items should directly assess topics addressed in the curriculum. This is the route taken by Hungerford and his colleagues

(1989) in their assessment of the impact of an IITA curriculum on children's ecological knowledge, concern and behaviors. Subsequent studies investigating the impact of the Brundtland Green School Project should develop an ecological knowledge scale incorporating both general knowledge and curriculum tied knowledge. This would give a better indication of the amount of knowledge transferred from children to their parents as well as provide evidence that the curriculum stimulates the acquisition of new knowledge by children and parents.

Measurement of parents' ecological behaviors was confined to self-reported behaviors presently executed by parents. The inclusion of observable behaviors would improve the validity of this measure. Measures of future behavioral intentions could also provide valuable information particularly in cases where substantial investment of money or time is concerned. For example, parents may plan to eventually invest in conservation devices such as better house insulation or buying an energy efficient furnace. They may also plan to start composting during the following summer. Intentions to act are important to consider as with intentions comes an increased probability that the person will act. Hungerford and Volk (1990) noted that this variable is probably related to both competence in engaging in the behavior as well as the belief that actions will lead to desirable results. Past findings have found a significant association between intentions and ulterior ecological behaviors (e.g., Hamid & Cheng, 1995). Thus intentions appear to be valid indicators of future behavior.

Lastly, measurement of teachers' involvement level would be wise. Practical experience obtained in the present study indicates that this particular variable would be important to consider. Teachers that were more directly affected by pollution (e.g., asthmatic) proved to be more forceful in transferring knowledge of ecological issues and strategies. They also appeared to be more committed to the implementation of the full Brundtland Green School Program in their class and throughout the school curriculum. The level of teachers' commitment to an EEP may prove a valuable factor in explaining differences between classes in level of ecological proficiency exhibited by children. Hungerford and Volk (1990) observed that teachers who were themselves sensitive and willing to act served as influential role

models to children. In their follow-up, teachers, who were most successful in fostering continued environmental involvement of former EEP students, showed the greatest interest in environmental issues. These teachers also invested more time in environmental and education organizations. Thus, highly interested teachers may communicate greater enthusiasm to their students in the environmental cause (Hungerford & Volk, 1990).

In sum, the present study was designed to assess the effects of an EEP on children and parents over and above the effects arising from a regular curriculum. It is important to note that although the present results offer promising guidelines for applied intervention, these recommendations remain at best preliminary. The exploratory nature of this study precludes drawing definite conclusions of causality. Much more applied research is needed to validate these suggestions and to identify optimal approaches to enhancing the efficacy of an EEP. Future studies should address and build on the present findings. The suggested changes in methodology and the addition of measures could provide researchers with information allowing a better evaluation of the effects of the Brundtland Green School Project. For example, does the paucity of significant differences in parental variables result from low child-parent transfer of information, lack of parental interest, or from an EEP shortcomings. Furthermore, additional measures would allow a more thorough evaluation of the quality and quantity of information emanating from an EEP intervention. In the process, we may also be in a better position to determine the short and long-term impact of an EEP on children's and parents' ecological attitudes, motivation, and behaviors. In the end, we may yet find effective interventions to foster in people the development of a sense of personal responsibility and self-determination that may jolt them to action.

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APPENDIX A

Curriculum of Brundtland Green School Project

Formulaire d'inscription pour l'obtention du statut

ÉCOLE VERTE BRUNDTLAND

Nom de l'école : _____

Adresse : _____

_____ Code postal : _____

No de tél. : _____ No du télécopieur : _____

Nom de la personne responsable de l'école : _____

Nom du syndicat : _____

Nom de la commission scolaire : _____

Date d'obtention du statut « école verte Brundtland » : Mai 1994 ☐ Mai 1995 ☐

Nous désirons inscrire notre école pour l'obtention du statut « École verte Brundtland »

Signatures : _____ _____
Direction de l'école Déléguée ou délégué de l'école

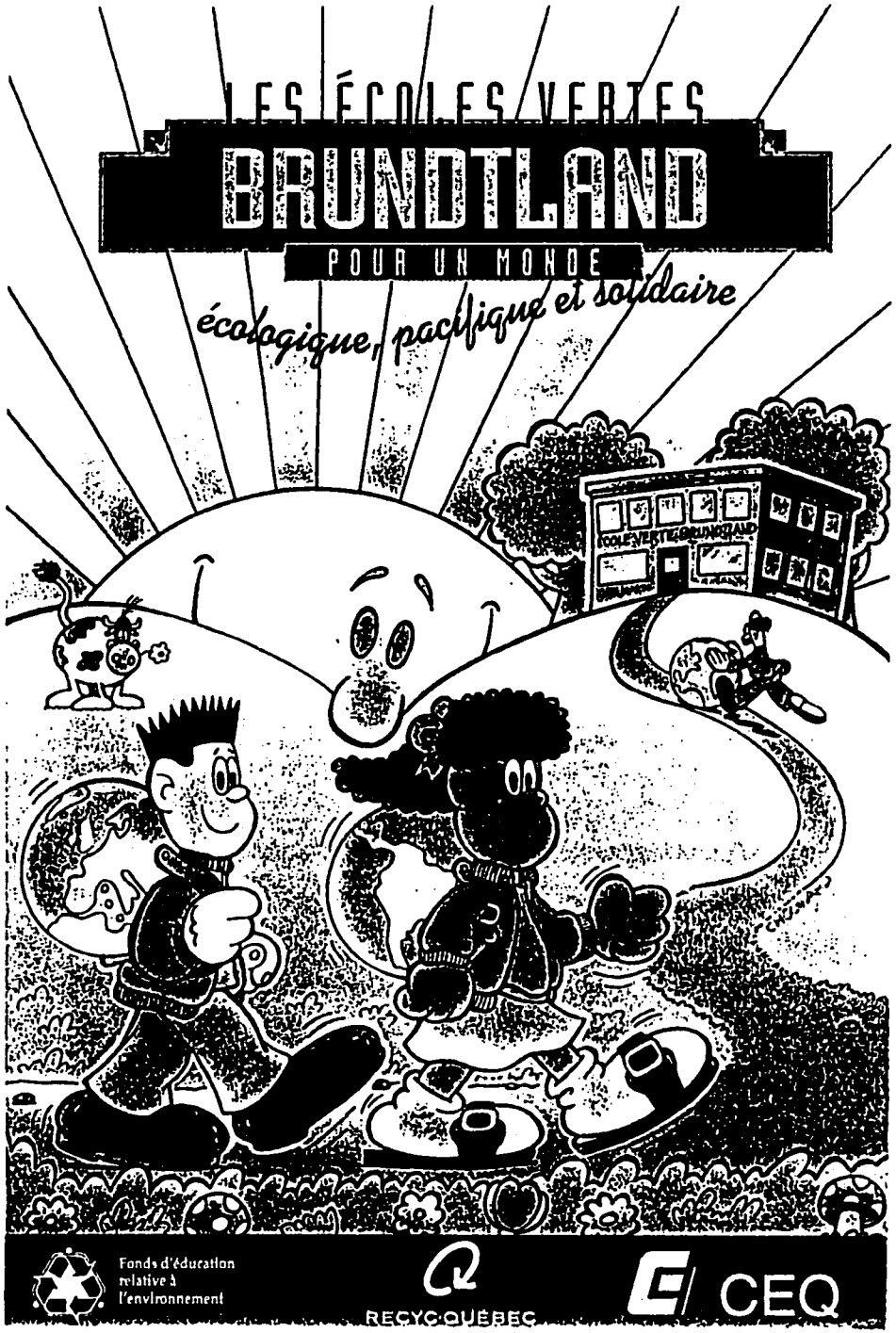
Coût de l'inscription 10 $.

Retournez votre chèque et votre formulaire avant le 28 février 1994 ou le 28 février 1995 (selon la date d'obtention du statut dans votre école) à :

ÉCOLE VERTE BRUNDTLAND
Centrale de l'enseignement du Québec
1170, boul. Lebourgneuf, bureau 300
Québec (Québec)
G2K 2G1

Téléphone : (418) 627-8888 Télécopieur : (418) 627-9999

Communications CEQ JANVIER 1994 - D9957-1



Assurer une continuité en éducation relative à l'environnement (ERE)...

Pour donner suite à son engagement en éducation relative à l'environnement, le **Fonds d'éducation relative à l'environnement (FERE)**[1] lançait, en 1990, une trousse pédagogique intitulée « Ensemble, récupérons notre planète ». Cette démarche suscite, depuis lors, des milliers d'actions dans les établissements scolaires du Québec. Les jeunes, en continuant d'agir concrètement en ERE, prouvent que l'école constitue une force sociale importante en vue d'un avenir meilleur sur la planète.

Toutes les actions touchant, entre autres, la réduction, le réemploi, la récupération, le recyclage (4R), la conservation des ressources, la solidarité et le développement doivent s'intégrer progressivement au vécu scolaire quotidien au Québec. C'est le principal objectif que poursuit le Fonds d'éducation relative à l'environnement (FERE) et ses membres associés, dont RECYC-QUÉBEC, en instaurant le statut **école verte Brundtland.**

Les gestes posés par les jeunes doivent améliorer bien sûr la qualité de vie dans la nature. Mais, en plus d'être « verte », l'école, pour devenir « Brundtland », s'attaque à « certains » défis lancés par le rapport de la Commission mondiale sur l'environnement et le développement en posant des gestes concrets en vue de la promotion du partage des ressources, du développement durable, de la paix et de la solidarité. C'est en liant toutes leurs actions à ces objectifs que les écoles obtiendront le statut **école verte Brundtland.**

Une « école verte Brundtland » ? Mais qu'est-ce que c'est?

En 1983, l'assemblée générale des Nations Unies constituait la Commission mondiale sur l'environnement et le développement, dirigée par madame **Gro Harlem Brundtland**, premier ministre de Norvège. Son mandat était de réexaminer les grands problèmes planétaires de l'environnement et du développement, de formuler des propositions réalistes pour les résoudre et d'assurer que le progrès de l'humanité sera maintenu par un **développement durable**[2].

Ce rapport, intitulé « **Notre Avenir à tous** », insiste aussi sur le fait que l'éducation relative à l'environnement (ERE) doit permettre aux jeunes et aux adultes de connaître la situation **globalement** afin qu'ils puissent **agir localement.**

ici

En instaurant le projet « École verte Brundtland », le Fonds d'éducation relative à l'environnement (FERE) veut **innover, mobiliser** et pousser à l'**action** dans le milieu scolaire afin de créer un espoir de changement dans la société. Ce type de développement implique une transformation progressive de l'économie et de la société car il doit tenir compte, à la fois, des besoins de tous les humains et des ressources limitées de la Terre. La seule ressource inépuisable sur notre planète est l'intelligence humaine. **Cessons les discours! Agissons!** La qualité de notre futur passe d'abord par l'éducation et par l'action: voilà le sens profond de la présente invitation qu'envoie le FERE à chaque établissement scolaire du Québec.

Une **école verte Brundtland** c'est donc une école qui agit, qui devient une force de transformation sociale et qui s'inscrit à l'intérieur d'un « geste de société ». En effet, le statut **école verte Brundtland** s'obtient grâce à l'engagement de plusieurs jeunes et adultes en ERE à l'école... et en dehors de l'école. C'est une école qui pose des gestes concrets, quotidiens, mesurables et continus en vue d'améliorer la qualité de l'environnement et afin de contribuer à créer « **un monde pacifique, écologique et solidaire** ». Nous offrons ainsi aux adultes et aux jeunes de chaque école l'opportunité d'agir en assumant leurs responsabilités respectives pour la construction d'un monde meilleur.

Pour atteindre ces objectifs, l'école s'inspire des critères suggérés par le FERE afin de passer à l'action en vue d'un meilleur avenir sur la planète pour toutes et tous. Ces réalisations se mènent grâce à une collaboration concrète des adultes du milieu scolaire (la génération actuelle) et des jeunes (la génération future).

Confirmer l'engagement d'une école pour la protection de l'environnement et pour la promotion du développement durable

Dans la suite du rapport de la Commission mondiale sur l'environnement et le développement de l'ONU, un programme de reconnaissance des écoles engagées dans la cause de l'environnement est donc mis sur pied par le Fonds d'éducation relative à l'environnement (FERE). Le statut **école verte Brundtland** accorde une **reconnaissance sociale** à une école qui s'engage en ERE. Il vise aussi à **valoriser** les professions de celles et de ceux qui oeuvrent en éducation tout en créant chez les jeunes un **intérêt** plus grand face à l'école.

Les écoles doivent respecter des conditions minimales inhérentes au projet **école verte Brundtland** et mettre en oeuvre un certain nombre de mesures, certaines **obligatoires** d'autres **facultatives.**

Mesures communes (au moins trois)

L'engagement de l'administration de l'école dans la réduction de l'utilisation des ressources et de l'énergie

L'administration de l'établissement scolaire favorise la **réduction des déchets** par une ou des actions visibles et mesurables contribuant à la réduction à la source, au réemploi et au recyclage. **L'économie d'énergie** pourra être mise en oeuvre par des programmes de sensibilisation et des gestes concrets avec la collaboration des jeunes.

L'intégration de l'ERE aux pratiques pédagogiques

Le personnel de l'éducation doit intégrer l'éducation relative à l'environnement (ERE) dans ses pratiques pédagogiques en utilisant des exemples ou des sujets environnementaux comme support aux programmes d'études.

L'implantation de la récupération en milieu scolaire

L'établissement scolaire ou le Comité Brundtland (comité de jeunes) initie ou consolide un projet de **récupération** à l'école. L'école accepte d'assumer le coût du service mis en place sur le principe de service donné, service payé. Elle fait affaire avec un récupérateur pour la mise en marché de la matière.

La formation ou consolidation au sein de l'école d'un comité Brundtland pour les jeunes

Le Conseil d'administration du Comité doit être composé de jeunes et peut être parrainé par des adultes de l'école.

Des moyens facultatifs, visibles et mesurables au choix de l'établissem

L'école et son projet éducatif

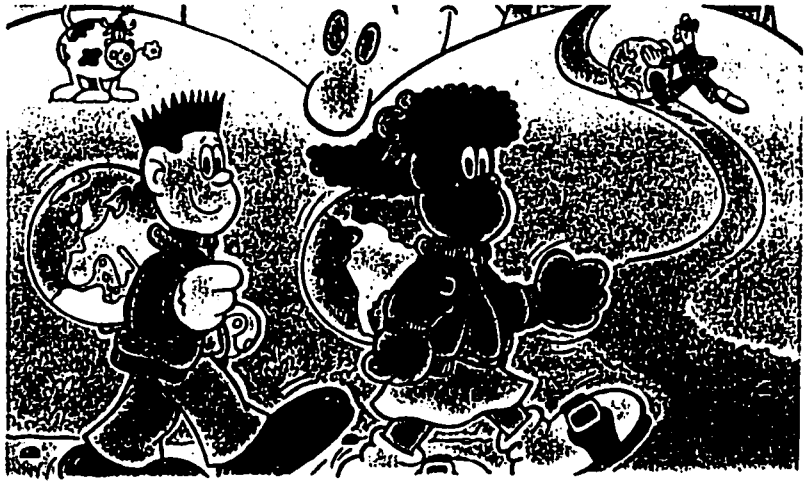
Toutes les intervenantes et les intervenants d'une école doivent avoir le souci d'inclure dans leur projet d'établissement au moins **deux objectifs** touchant à l'éducation relative à l'environnement et prendre les moyens nécessaires à leur atteinte.

L'école et le milieu

L'école ou le Comité Brundtland élabore en collaboration avec des organismes du milieu (village, quartier) un **projet d'amélioration de la qualité de vie**, par exemple le nettoyage des berges d'un cours d'eau, l'aménagement d'espaces verts ou encore la plantation d'arbres.

L'école et la population locale

L'école ou le Comité Brundtland peut être un agent de **transformation sociale**, en identifiant un ou des groupes locaux (familles, retraitées et retraités...) qui, par leurs actions, témoignent du respect de l'environnement. À titre d'exemples, les membres du groupe font des achats en vrac (réduction), utilisent des couches de coton, achètent des pneus rechapés (réemploi), participent au recyclage (collecte sélective), font du compostage de leurs déchets de cours (feuilles, déchets de cuisine...), économisent de l'énergie, etc. Ces groupes font état de leurs actions aux milieux scolaire et municipal et pourront faire l'objet de reportages par les jeunes et/ou par les médias locaux.



œuvre des mesures suivantes :

colaire (au moins deux actions)

Une activité de sensibilisation et/ou de solidarité au développement national ou international en lien avec l'environnement

L'école ou le Comité Brundtland (comité de jeunes) s'implique de façon concrète à une activité de sensibilisation et/ou de solidarité avec une problématique de développement national ou international. À titre d'exemples, collecte de vêtements pour les sans-abri, financement d'un projet dans le Tiers monde, etc.

Une politique environnementale visant le développement durable

En concertation avec les étudiantes et les étudiants, le personnel de l'éducation, l'administration et le Comité de parents, l'école se dote d'une politique environnementale adaptée aux aspirations du milieu.

Une démarche avec les élus

L'école ou le Comité Brundtland, dans le cadre d'école nature ou d'une sortie dans le milieu, fait l'inventaire des « laideurs » et des aspects positifs du milieu ambiant, en fait rapport lors d'une réunion avec les élus municipaux et établit une stratégie d'action pour améliorer la qualité de vie.

Mois de l'environnement, Semaine de la conservation, Semaine de l'arbre, Jour de la terre, Semaine de la paix, Semaine du développement international, etc.

L'école ou le Comité Brundtland réalise une activité dans le cadre de ces événements.

N.B. Chaque milieu est responsable de la décision de proposer sa candidature au FERE en tenant compte des particularités de chaque établissement. Ce projet ne vise surtout pas à instaurer une compétition entre les établissements, mais plutôt à développer une reconnaissance sociale des actions des jeunes et des adultes en éducation relative à l'environnement.

RECYC-QUÉBEC

Commanditaire principal de l'opération d'éducation relative à l'environnement menée dans le milieu scolaire québécois depuis 1990.

Déclaration de Rio

La Déclaration de Rio énumère les vingt-sept principes selon lesquels la planète devrait être gérée. En voici quelques-uns :

- les êtres humains ont droit à une vie saine et productive en harmonie avec la nature;
- le droit au développement doit tenir compte de l'environnement et des besoins des générations présentes et futures;
- la protection de l'environnement doit faire partie intégrante du processus de développement et ne peut être considérée isolément;
- les États doivent coopérer à l'élimination de la pauvreté, condition indispensable au développement durable;
- pour assurer un développement durable et une qualité de vie plus élevée pour tous, les États devraient réduire et éliminer les modes de production et de consommation non viables et promouvoir des politiques démographiques appropriées;
- la paix, le développement et la protection de l'environnement sont interdépendants et indissociables.

1 **FERE: Fonds d'éducation relative à l'environnement**, un organisme composé de la FCSQ (Fédération des commissions scolaires du Québec), de la CEQ (Centrale de l'enseignement du Québec), du MENVIQ (ministère de l'Environnement), de la Commission scolaire de Victoriaville et de membres associés, dont RECYC-QUÉBEC.

2 **Le développement durable** est un développement qui répond aux besoins du présent sans compromettre la capacité des générations futures de répondre aux leurs. **« Notre Avenir à tous », Commission mondiale sur l'environnement et le développement**, Éditions du Fleuve - Publications du Québec, 1989, p. 51.

APPENDIX B

Teachers' questionnaire

CURRICULUM

Cours théoriques - thèmes abordés:

- l'électricité
- pollution
- oiseau
- autres thèmes?

Thèmes environnement intégrés dans tous les cours?

Cours écologique: heures/semaine?

Pédagogie employée: discussion? projets? lectures? cours magistrales?

Apports pratiques:

- boîte de recyclage dans les classes? papier seulement?; inclus plastique, cintres, etc.?
- tonneau de recyclage à l'étage?
- recyclage à la cafétéria?
- contenants ré-utilisables encouragés dans les dîners?
- campagne planter fleurs?
- jardinage? parc écologique?
- vermicompostage à l'école?
- club écologique composé d'élèves?

Autre chose?

*Identifiez dans les pages suivantes les composantes propres au programme Brundtland endosser par l'école. ****included uniquely for experimental schools******

Mesures communes (au moins trois)

L'engagement de l'administration de l'école dans la réduction de l'utilisation des ressources et de l'énergie

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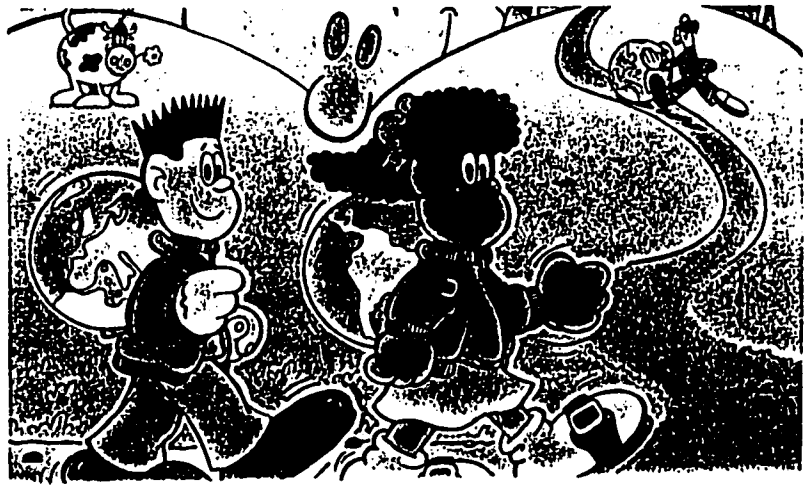

euvre des mesures suivantes :

:colaire (au moins deux actions)

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APPENDIX C

Example of parental consent form

Le 11 octobre 1996

Cher(e) Monsieur/Madame:

Une équipe de recherche de l'École de Psychologie de l'Université d'Ottawa, sous la supervision du Dr. Luc G. Pelletier, effectue présentement un sondage sur les perceptions vis-à-vis l'environnement. La direction de l'école de votre enfant a accepté de participer à ce projet. L'étude comprend deux parties: un sondage auprès des parents et un sondage auprès des enfants. Nous sollicitons votre participation ainsi que celle de votre enfant.

Vous trouverez ci-joint deux documents:
1) un sondage destiné au(x) parent(s) que nous vous demandons de bien vouloir compléter et de nous retourner dans l'enveloppe qui vous a été fournie à cet effet.
2) un formulaire de consentement que nous vous demandons de compléter et de nous retourner en même temps que l'enveloppe contenant votre questionnaire.

Le tout doit être retourné à l'école au plus tard le jeudi, le 17 octobre 1996.

La participation de votre enfant, en répondant au sondage, consistera à évaluer ses attitudes et ses comportements en matière d'environnement. Étant donné que ce sondage requiert la participation d'enfants mineurs, nous devons solliciter le consentement écrit d'un ou des parents/tuteurs de l'enfant.

Répondre au sondage devrait prendre à votre enfant environ 20 minutes. Il n'y a aucun risque ou désagrément lié à répondre aux questions. Votre enfant devra répondre à deux sondages en classe: un premier sondage au mois d'octobre et un deuxième sondage à la fin de l'année scolaire. La participation de votre enfant est volontaire et il/elle a le choix de se retirer en tout temps. De plus, seulement les chercheurs(es) responsables de ce sondage auront accès aux informations contenues dans les questionnaires. Les enseignants(es) et la direction de l'école n'auront accès qu'aux résultats globaux du sondage. Si vous désirez une copie des résultats, veuillez entrer en communication avec l'un d'entre nous au 562-5800 (poste 4179).

Si vous avez des questions ou des commentaires concernant notre requête, n'hésitez pas à nous contacter. Nous nous ferons un plaisir de répondre à vos questions. Nous vous remercions à l'avance de votre participation.

Sincèrement,

Luc Pelletier, PhD et Louise Legault

École de Psychologie
Université d'Ottawa
Tél.: 562-5800 (poste 4179)

FORMULAIRE DE CONSENTEMENT

J'ai pris connaissances des informations portant sur l'étude conduite sous la direction du Dr. Luc G. Pelletier de l'École de Psychologie de l'Université d'Ottawa sur les attitudes et comportements écologiques.

Je suis d'accord pour que mon enfant _____ participe à un sondage sur l'écologie.

_____ _____

Signature du ou des parent(s)/tuteurs

Je ne désire pas que mon enfant _____ participe.

_____ _____

Signature du ou des parent(s)/tuteurs

_____

Date

École Euclide-Lanthier

APPENDIX D

Children's questionnaire package

Sondage pour l'élève

Directives:

Nous effectuons présentement une recherche pour mieux comprendre tes attitudes et tes comportements envers l'environnement. Dans les pages qui suivent tu trouveras différentes questions sur ton expérience vis-à-vis l'environnement.

Ce n'est pas un test. Il n'y a donc pas de bonnes ou de mauvaises réponses. La seule chose qui nous intéresse, c'est de connaître ce que tu penses vraiment et les comportements écologiques que tu effectues.

Les questions qui te sont demandées vont servir uniquement à la recherche. Toutes tes réponses **resteront confidentielles**. Tu peux arrêter en tout temps ta participation à ce sondage.

Luc Pelletier, Ph.D. et Louise Legault

Ecole de Psychologie
Université d'Ottawa

Les chiffres de ton adresse:_____

Jour/Mois/Année
date de naissance:_____/_____/_____

POURQUOI FAIS-TU DES CHOSES POUR L'ENVIRONNEMENT?

Nous aimerions savoir pourquoi tu fais des choses pour l'environnement. Coche la case qui est la réponse la plus vraie pour toi.

Je fais des choses pour l'environnement parce que:

Intrinsic motivation

1. J'ai du plaisir à trouver de nouvelles façons d'améliorer l'environnement.

   ❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

2. Je me sens bien quand je fais des choses pour l'environnement.

   ❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

4. J'ai du plaisir à faire des choses pour protéger l'environnement.

   ❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

Identified regulation

5. Je trouve que ces comportements sont des bons moyens qui peuvent améliorer l'environnement.

   ❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

6. Ce sont les moyens que j'ai choisis pour construire un meilleur environnement.

   ❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

10. Je pense que c'est une bonne idée de faire quelque chose pour l'environnement.

    ❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

External regulation

3. Je ne sais pas vraiment, je ne sais pas ce que cela me donne.

   ❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

8. Je veux que les autres m'apprécient.

   ❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

9. Les autres m'obligent à faire des comportements écologiques.

   ❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

Amotivation

7. Les autres ne seront pas contents si je ne fais rien.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

11. Je ne sais pas; j'ai vraiment l'impression que je perds mon temps en faisant des choses pour l'environnement.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

12. Je ne sais pas; je ne vois pas comment mes efforts améliorent la situation de l'environnement.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

****

QUE FAIS-TU?

Quelles sont les activités que tu as faites pour l'environnement? Coche la réponse qui est la plus près du nombre de fois que tu fais en général l'activité.

General environmental behaviors

1. Je m'implique dans des programmes pro-écologiques (ex: ramasser les déchets dans le parc avec un groupe de personnes, planter des arbres, etc.).

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

2. Je participe à un club (ou autre) pro-écologique.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

3. Je mets des choses au recyclage sans qu'on me le demande.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

4. Je ramasse les déchets dans la rue et la cours de l'école.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

Purchasing environmentally friendly behavior

5. Je demande à mes parents d'acheter des produits bons pour l'environnement comme:

shampoing biodégradable

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

savon biodégradable

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

kleenex recyclé

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

papier de toilette recyclé

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

15. Quand j'achète des choses, je m'assure qu'il y ait le moins d'emballage possible.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

Conserving behaviors

6. Je demande à avoir des contenants ré-utilisables dans mes lunchs.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

7. Je demande un sac/boîte à lunch en matériel (tissu) ou en plastique ré-utilisable.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

8. Je demande d'avoir un thermos dans mon lunch.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

9. Je ferme les lumières lorsque je quitte une pièce dans la maison.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

10. Je ferme la télé ou la radio lorsque j'ai terminé de l'écouter.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

Information seeking

11. Je demande de l'information au sujet de l'environnement à:

mes parents

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

mon enseignant(e)

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

mes amis(es)

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

12. Je regarde des programmes écologiques à la télé.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

13. Je lis sur l'environnement en plus des travaux demandés à l'école.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

14. A l'école, je fais des projets sur la situation de l'environnement.

❒ rarement ❒ parfois ❒ souvent ❒ très souvent ❒ presque toujours

****

QUE PENSES-TU?

Pense à la qualité de l'eau, au niveau de bruit et à la pollution de l'air, dans ton quartier. Coche la réponse qui est la plus près de ce que tu penses.

Environmental Satisfaction Scale (state of the environment subscale)

1. Les conditions environnementales dans mon quartier sont bonnes.

pas du tout	pas tellement	moyennement	assez	complètement
❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord

2. Jusqu'à présent, je suis satisfait(e) de l'état de l'environnement dans mon quartier.

pas du tout	pas tellement	moyennement	assez	complètement
❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord

3. Si je pouvais changer certaines choses dans la condition de l'environnement de mon quartier, je ne changerais presque rien.

pas du tout	pas tellement	moyennement	assez	complètement
❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord

Perceived importance of the environment

4. Je prends vraiment à coeur la situation écologique.

pas du tout	pas tellement	moyennement	assez	complètement
❒ d'acccrd	❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord

5. Je suis inquiet(e) de la situation écologique.

pas du tout	pas tellement	moyennement	assez	complètement
❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord

6. Je trouve important de faire quelque chose pour l'environnement.

pas du tout	pas tellement	moyennement	assez	complètement
❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord

Perceived environmental competence scale

7. Je me sens capable de faire des choses pour l'environnement.

pas du tout	pas tellement	moyennement	assez	complètement
❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord

8. Je pense que je suis aussi bon qu'un autre pour aider l'environnement

pas du tout	pas tellement	moyennement	assez	complètement
❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord

9. Je ne me sens pas bon à faire des choses pour l'environnement.

pas du tout	pas tellement	moyennement	assez	complètement
❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord	❒ d'accord

LE SAVEZ-VOUS?

Les questions ci-dessous se rapportent à divers sujets concernant l'environnement. Il n'y a qu'UNE BONNE réponse par question. Veuillez cocher la réponse que vous croyez être la bonne.

Ecology knowledge scale

1. Les scientifiques prétendent qu'il y a un trou dans la couche d'ozone:

   a) Au-dessus de l'Artique
   b) Au -dessus de l'Antartique
   c) Ni au-dessus de l'Artique ni de l'Antartique
   d) Au-dessus de l'Artique et de l'Antartique

2. Lequel des produits suivants n'est pas bon pour l'environnement

   a) L'amoniaque
   b) Le vinaigre
   c) Le javex
   d) Le Borax

3. Qu'est-ce qui prend le plus de place dans les poubelles des maisons?

   a) La nourriture
   b) Le plastique
   c) Le papier
   d) Les déchets de jardin

4. L'utilisation de savon à lessive contenant des phospates conduit auquel des problèmes suivants:

   a) La pollution de notre air et de notre eau par des dioxines et du furane
   b) Les pluies acides
   c) La prolifération d'algues dans nos lacs qui tue la vie marine
   d) Le réchauffement de la planète

5. Qu'est-ce qui n'est pas recyclable?

   a) La vaisselle
   b) Le papier
   c) Le plastique
   d) Les canettes d'aluminium

6. Quel pourcentage approximatif des espèces du monde vivent dans les forêts tropicales humides?

   a) 5%
   b) 10%
   c) 75%
   d) 90%

7. Environ combien de litres d'eau les toilettes utilisent-elles en moyenne chaque fois qu'on tire la chasse d'eau?

   a) 5 litres
   b) 10 litres
   c) 20 litres
   d) 35 litres

8. Au Québec, quel pourcentage des érablières produisant le sirop d'érable a été affecté par les pluies acides?

   a) 5%
   b) 20%
   c) 50%
   d) 80%

9. Laquelle de ces maladies respiratoires est liée à la pollution atmosphérique et aux pluies acides?

   a) L'asthme
   b) Le rhume de poitrine
   c) La pneumonie
   d) Toutes ces maladies

10. Lequel des produits suivants, utilisés en hiver dans les entrées pour empêcher de glisser est terriblement polluant?

    a) La litière pour chats
    b) Le sable
    c) Le sel
    d) Aucun de ces produits n'est vraiment polluant.

11. Quelle est la cause principale de l'effet de serre?

    a) Le gaz carbonique dégagé par les voitures et les usines
    b) Le trou dans la couche d'ozone
    c) L'utilisation de pesticides en agriculture
    d) Les PBC

12. Quel est l'aliment de base des populations de la plupart des pays en voie de développement?

    a) Le lait
    b) La viande
    c) Les céréales
    d) Les fruits et les légumes

13. Lequel des animaux suivants n'est pas en voie de disparition?

    a) Le béluga
    b) Le faucon pèlerin
    c) Le Cougar de l'Est
    d) L'oie blanche

14. Parmi les éléments suivants, lesquels ne sont pas compostables?

    a) Les cheveux
    b) Les coquilles d'oeufs
    c) La graisse
    d) Les résidus de café

15. Les déchets radioactifs des centrales nucléaires demeurent radioactifs pendant combien de temps?

    a) 25 ans
    b) 100 ans
    c) 1000 ans
    d) Des dizaines de milliers d'années

****

DEMOGRAPHIC INFORMATION

Garçon: ❐ Fille: ❐

Quel âge as-tu?:_____

A la maison, vous parlez:

français ❐ anglais ❐ autre (précise) ❐

Combien d'enfants êtes-vous dans votre famille?_____

Dans ta famille tu es:

Le plus vieux ❐ Le plus jeune ❐ autre (précise)_____.

MERCI BEAUCOUP!

APPENDIX E

Parents' questionnaire package

Example of cover letter at Time 2

Le 4 juin, 1997

Chers parents:

Au début de l'année scolaire, vous avez eu l'amabilité de répondre à un premier sondage. Ce sondage visait à connaître vos opinions envers la situation de l'environnement, vos habitudes de vie et votre expérience personnelle avec votre enfant. Votre participation au premier sondage à été des plus appréciée. Nous vous avons récemment encourager à répondre à un deuxième sondage dans le cadre de la même étude. Nous vous encourageons à nouveau à poursuivre votre implication en voulant bien répondre à ce deuxième appel. **Il est important pour la réussite de cette étude que nous connaissions vos attitudes et comportements écologiques à ce moment-ci. Sans ces connaissances, l'utilité du premier sondage est limitée.**

Nous sommes conscients que le temps requis pour remplir ce sondage est précieux. Nous vous serions infiniment reconnaissants si vous vouliez bien nous accorder ce temps. Si vous avez des questions ou désirez connaître les résultats de cette étude, nous vous prions de nous rejoindre au 562-5800 (poste 4179).

Merçi de votre collaboration,

Louise Legault et Luc Pelletier, Ph.D.
Ecole de Psychologie
Université d'Ottawa

Sondage pour les Parents/Tuteurs

Directives:

Une équipe de recherche de l'Université d'Ottawa, sous la direction du Dr. Luc Pelletier, effectue présentement une recherche pour mieux comprendre les comportements et attitudes des personnes vis-à-vis l'environnement. Notre but est d'évaluer l'impact sur les élèves et leurs parents de programmes écologiques présentement offert dans les écoles primaires et secondaires de l'Outaouais. Ce sondage a été approuvé par l'administration et les enseignants(es) de votre école.

Dans les pages qui suivent, nous vous demandons de répondre à des questions portant sur vos opinions envers la situation de l'environnement, vos habitudes de vie et votre expérience personnelle avec votre enfant. Il est important de noter qu'il n'y a pas de bonnes ou de mauvaises réponses. Nous vous demandons simplement de répondre ce que vous pensez ou faites vraiment. Dans la mesure du possible, veuillez répondre à toutes les questions. Bien entendu, vous pouvez retirer votre participation au sondage en tout temps. Au bas de la page, nous vous demandons d'indiquer la date de naissance de votre enfant ainsi que les chiffres de votre adresse civique. Cette information est nécessaire afin de nous permettre de jumeler votre questionnaire à celui de votre enfant. Toutes les informations receuillies serviront uniquement à des fins de recherche. Toutes les réponses resteront absolument confidentielles. L'école et les enseignants(es) n'auront pas accès à vos réponses et celle de votre enfant.

Si vous avez participer au premier sondage du mois d'octobre 1996, nous vous remercions beaucoup. Nous vous encourageons à continuer votre participation en voulant bien répondre au deuxième sondage. Si vous n'avez pas répondu au premier sondage, vous êtes invités à participer au présent sondage si vous le désirez. Répondre aux questions ne devrait pas prendre plus de 30 minutes de votre temps. Nous aimerions aussi poser quelques questions à votre enfant. Etant donné que cette étude implique des enfants de moins de 18 ans, nous devons obtenir le consentement écrit des parents afin que votre enfant puisse participer à ce sondage. Si ce n'est pas déjà fait et que vous acceptez que votre enfant participe au sondage, veuillez signer le formulaire de consentement ci-joint. Nous vous prions de retourner le formulaire de consentement dès demain par l'intermédiaire de votre enfant.

Nous sommes conscients que le temps requis pour remplir ce questionnaire est précieux et nous vous remercions de bien vouloir nous accorder ce temps. Si vous désirez plus d'informations ou si vous avez des questions sur cette étude, vous pouvez nous rejoindre à l'adresse ou au numéro de téléphone ci-dessous. Nous ferons parvenir les résultats de cette étude à votre école au courant de l'automne 1997.

Merci de votre collaboration.

Luc Pelletier, Ph.D. et Louise Legault
Ecole de Psychologie
Université d'Ottawa
Tel: 562-5800 (poste 4179)

Afin de pouvoir jumeler votre questionnaire à celui de votre enfant, veuillez indiquer:

la date de naissance de votre enfant _____ (jour/mois/année)
les chiffres de votre adresse civique_____

POURQUOI EFFECTUEZ-VOUS DES COMPORTEMENTS ÉCOLOGIQUES?

Il y a une multitude de comportements qui peuvent être effectués dans le but de préserver notre environnement. Par exemple, on peut recycler les vieilles bouteilles ou les papiers journaux, maintenir la température dans la maison plus basse au cours de l'hiver, etc. Les phrases suivantes sont des raisons possibles pour lesquelles vous pourriez faire des choses pour l'environnement. Veuillez nous indiquer sur l'échelle de 1 à 7, à quel point ces raisons représentent pourquoi VOUS faites des choses pour l'environnement.

	Ne correspond pas du tout					Correspond modérément	Correspond exactement
Intrinsic motivation							
1. Pour le plaisir que j'éprouve lorsque je trouve de nouvelles façons d'améliorer la qualité de l'environnement.	1	2	3	4	5	6	7
2. Parce que j'aime le sentiment que j'éprouve lorsque je fais des choses pour l'environnement.	1	2	3	4	5	6	7
5. Pour le plaisir que je ressens lorsque je contribue à la préservation de l'environnement.	1	2	3	4	5	6	7
Integrated regulation							
11. Parce que prendre soin de l'environnement fait partie de ma vie.	1	2	3	4	5	6	7
14. Parce qu'être conscient de l'environnement est devenu une partie fondamentale de qui je suis.	1	2	3	4	5	6	7
15. Parce que ça fait partie de la façon dont j'ai choisi de vivre ma vie.	1	2	3	4	5	6	7
Identified regulation							
6. Parce que ces comportements constituent des stratégies raisonnables qui peuvent améliorer l'environnement.	1	2	3	4	5	6	7
7. Parce que ce sont les moyens que j'ai choisis afin de contribuer à un meilleur environnement.	1	2	3	4	5	6	7
16. Parce que je pense que c'est une bonne idée de faire quelque chose à propos de l'environnement.	1	2	3	4	5	6	7

	Ne correspond pas du tout					Correspond modérément	Correspond exactement
Introjected regulation							
4. Parce que j'ai des remords quand je ne fais rien pour l'environnement.	1	2	3	4	5	6	7
10. Parce que je me sentirais mal à l'aise si je ne faisais rien pour l'environnement.	1	2	3	4	5	6	7
13. Parce que je me sentirais coupable si je ne faisais pas ces comportements pour l'environnement	1	2	3	4	5	6	7
External regulation							
8. Parce que les autres seront contrariés si je ne fais rien.	1	2	3	4	5	6	7
9. Pour la reconnaissance que les autres auront envers moi.	1	2	3	4	5	6	7
12. Parce que les autres insistent pour que je fasse ces comportements écologiques	1	2	3	4	5	6	7
Amotivation							
3. Je ne sais pas vraiment, je ne vois pas ce que j'en retire.	1	2	3	4	5	6	7
17. Honnêtement, je ne sais pas; j'ai vraiment l'impression que je perds mon temps en faisant des choses pour l'environnement.	1	2	3	4	5	6	7
18. Je ne sais pas; je ne vois pas comment mes efforts pour être conscient de l'environnement améliorent la situation environnementale.	1	2	3	4	5	6	7

VOUS ET L'ENVIRONNEMENT

Nous sommes intéressés à savoir ce que vous pensez de la situation de l'environnement dans votre quartier. En répondant aux questions suivantes, pensez à la qualité de l'eau, au bruit, à la pollution de l'air dans votre quartier.

	Ne correspond pas du tout			Correspond modérément			Correspond exactement
Environmental Satisfaction Scale (state of environment subscale)							
1. Les conditions environnementales dans mon quartier sont, dans la plupart des cas, presque idéales.	1	2	3	4	5	6	7
2. Jusqu'à présent, je suis satisfait (e) de l'état de l'environnement dans mon quartier.	1	2	3	4	5	6	7
3. Si je pouvais changer certains aspects de la condition de l'environnement dans mon quartier, je ne changerais presque rien.	1	2	3	4	5	6	7
Perceived importance of the environment							
4. Il me semble que la gravité de la situation écologique est complètement exagérée.	1	2	3	4	5	6	7
5. Je suis vraiment inquiet(e) de l'impact que la situation écologique actuelle peut avoir sur les générations futures.	1	2	3	4	5	6	7
6. Il me semble que l'on doit faire des choses aujourd'hui pour aider la situation écologique.	1	2	3	4	5	6	7
Perceived environmental competence							
7. Je pense que j'en sais autant que n'importe qui au sujet de la question environnementale.	1	2	3	4	5	6	7
8. Je pense que je peux aider l'environnement de façon efficace.	1	2	3	4	5	6	7
9. Je pense que j'en sais assez pour être efficace lorsqu'il s'agit d'aider l'environnement.	1	2	3	4	5	6	7

VOTRE ENFANT ET VOUS

Veuillez indiquer à quel point les énoncés des pages suivantes correspondent à ce que vous pensez et à ce que vous ressentez lorsque votre enfant et vous interagissez ensemble au sujet de l'environnement.

MON ENFANT...

	Ne correspond pas du tout					Correspond modérément	Correspond exactement
Control							
1. Me fait sentir coupable si j'oublie de faire des comportements écologiques.	1	2	3	4	5	6	7
5. Me pousse à faire des choses pour l'environnement.	1	2	3	4	5	6	7
6. Me critique quand je ne fais pas des choses pour l'environnement.	1	2	3	4	5	6	7
7. Me reprend lorsque j'oublie de faire des choses pour l'environnement.	1	2	3	4	5	6	7
10. Insiste beaucoup pour qu'on contribue à protéger l'environnement.	1	2	3	4	5	6	7
Autonomy support							
3. M'encourage à faire des comportements écologiques.	1	2	3	4	5	6	7
8. M'aide à en faire plus pour l'environnement.	1	2	3	4	5	6	7
9. M'encourage à ne pas arrêter de faire des choses pour l'environnement.	1	2	3	4	5	6	7
11. Se montre fier de moi quand je fais des choses pour l'environnement.	1	2	3	4	5	6	7
12. Apprécie ce que je fais pour l'environnement.	1	2	3	4	5	6	7
Involvement							
2. Et moi prenons plaisir à travailler ensemble pour améliorer la situation écologique.	1	2	3	4	5	6	7

	Ne correspond pas du tout					Correspond modérément	Correspond exactement
4. Est enthousiaste pour entreprendre des projets écologiques avec moi.	1	2	3	4	5	6	7
13. Aime jaser avec moi de l'environnement.	1	2	3	4	5	6	7
14. Aime bien faire des comportements écologiques avec moi.	1	2	3	4	5	6	7
15. Veut que l'on s'implique dans des programmes écologiques.	1	2	3	4	5	6	7

Information

16. M'informe sur comment en faire plus pour l'environnement.	1	2	3	4	5	6	7
17. Me parle des nouvelles stratégies écologiques apprises à l'école.	1	2	3	4	5	6	7
18. M'informe sur de nouveaux projets écologiques.	1	2	3	4	5	6	7
19. Me suggère plusieurs nouvelles façons de faire plus attention à mon environnement.	1	2	3	4	5	6	7
20. M'apprend beaucoup de choses sur l'environnement.	1	2	3	4	5	6	7

****

MON ENFANT ET L'ENVIRONNEMENT

Dans la prochaine section, nous aimerions connaître ce que vous croyez être les attitudes et les comportements pro-écologiques de votre enfant. Indiquez, s'il-vous-plaît, jusqu'à quel point chacune des questions suivantes correspondent à votre enfant.

MON ENFANT...

	Ne correspond pas du tout					Correspond modérément	Correspond exactement
Perception of children's ecological behaviors							
1. Fait de lui-même des comportements écologiques.	1	2	3	4	5	6	7
2. Me demande d'acheter des produits écologiquement favorables.	1	2	3	4	5	6	7

	Ne correspond pas du tout					Correspond modérément	Correspond exactement
3. S'implique dans des clubs écologiques.	1	2	3	4	5	6	7
4. S'implique de lui-même dans le recyclage.	1	2	3	4	5	6	7
5. Agit de façon à faire une différence au niveau de l'environnement.	1	2	3	4	5	6	7
Perception of environmental importance for the child							
6. Prend vraiment à coeur la question de l'environnement.	1	2	3	4	5	6	7
7. Trouve important de faire quelque chose pour l'environnement.	1	2	3	4	5	6	7
8. Se montre inquiet de la situation écologique.	1	2	3	4	5	6	7
Perception of information-seeking by the child							
9. Me demande de l'information au sujet de la situation écologique.	1	2	3	4	5	6	7
10. Regarde des programmes écologiques à la télé.	1	2	3	4	5	6	7
11. Lit des choses sur l'environnement non reliées aux travaux d'école.	1	2	3	4	5	6	7
Perception child's sense of competence							
12. Se sent capable de faire des choses pour l'environnement.	1	2	3	4	5	6	7
13. Se considère aussi efficace qu'un autre pour aider l'environnement.	1	2	3	4	5	6	7
14. Ne se sent pas bon pour faire des choses pour l'environnement.	1	2	3	4	5	6	7

VOUS ET L'ENVIRONNEMENT

Dans les questions suivantes, nous vous demandons de simplement cocher les réponses qui s'appliquent à vous. Nous vous demandons de répondre honnêtement. Veuillez noter qu'il n'y a pas de bonnes ou de mauvaises réponses.

Waste management

1. Au cours du mois passé, en moyenne combien de fois avez-vous sorti votre bac à recyclage

   a) moins d'une fois par mois ____
   b) environ une fois par mois ____
   c) environ deux fois par mois ____
   d) deux à quatre fois par mois ____
   e) à chaque semaine ____
   f) jamais ____

La semaine dernière, avez-vous recyclé? oui ____ non ____

Pouvez-vous nous dire approximativement quelle quantité de produits à recycler vous avez sorti la semaine dernière?

   a) moins de la moitié d'un bac ____
   b) entre un quart et la moitié du bac ____
   c) Entre la moitié et un bac complet ____
   d) Un bac à un bac et demi ____
   e) Un bac et demi à deux bacs ____

2. Allez-vous porter les produits toxiques de votre maison à des centres spécialisés dans leur recyclage? (ex: peintures, huile à moteur, batteries, PBC, insecticides, etc.)

Jamais			Souvent			Toujours
1	2	3	4	5	6	7

3. La semaine dernière, quelle quantité de vidanges (poubelles) avez-vous sorti?

   a) moins d'un sac ____
   b) un sac ____
   c) deux sacs ____
   d) trois sacs ____
   e) plus de quatres sacs (précisez) ____

4. Avez-vous un système de compostage à la maison? Oui ____ Non ____

Si oui, combien de fois avez-vous mis des déchets dans votre bac à compostage la semaine dernière?

a) Moins d'une fois ____
b) Une ou deux fois ____
c) Trois ou quatre fois ____
d) Cinq à sept fois ____
e) Plus de sept fois (précisez) ____

Purchasing trends

5. Pour les lunchs de vos enfants, utilisez-vous:

		Jamais					Souvent	Toujours
a)	une sac/boîte à lunch en matériel (tissus) ou en plastique.	1	2	3	4	5	6	7
b)	des thermos.	1	2	3	4	5	6	7
c)	des boîtes de jus jetables.	1	2	3	4	5	6	7
d)	des contenants en plastique ré-utilisables.	1	2	3	4	5	6	7
e)	des sacs de plastique type "ziploc".	1	2	3	4	5	6	7
f)	des aliments pré-emballés (ex: pudding, jello, "lunchables").	1	2	3	4	5	6	7

6. Lorsque vous faites l'épicerie, en moyenne combien de fois cherchez-vous à acheter:

		Jamais					Souvent	Toujours
a)	des produits avec peu d'emballage.	1	2	3	4	5	6	7
b)	des produits biodégradables.	1	2	3	4	5	6	7
c)	des produits recyclés (papier, essui-tout).	1	2	3	4	5	6	7
d)	les produits en spéciaux.	1	2	3	4	5	6	7
e)	la marque favorite de la famille.	1	2	3	4	5	6	7

Conservation habits

7. Votre maison est-elle équipée de:

a) minuteurs (timers) sur les lampes ____
b) minuteurs pour les lumières extérieures ____
c) minuteurs sur les thermostats ____
d) Economiseurs d'eau sur les douches ____
e) Economiseurs d'eau sur les robinets ____
f) Ampoules électriques économique en énergie ____

8. Si vous avez à quitter la maison le jour, fermez-vous toutes les lumières?

Jamais			Souvent			Toujours
1	2	3	4	5	6	7

9. En hiver, baissez-vous la température de votre maison durant la journée lorsque vous n'êtes pas là?

Jamais			Souvent			Toujours
1	2	3	4	5	6	7

En hiver quelle est la température ambiante de votre maison durant le jour? ____

10. En hiver, baissez-vous la température de votre maison pour la nuit?

Jamais			Souvent			Toujours
1	2	3	4	5	6	7

Quelle est la température ambiante de votre maison durant la nuit? ____

Modes of transportation

11. Si vous travaillez à l'extérieur de la maison, à quelle fréquence utilisez-vous à chaque semaine les moyen de transports suivants:

		Jamais			Souvent			Toujours
a)	ma propre automobile	1	2	3	4	5	6	7
b)	l'autobus	1	2	3	4	5	6	7
c)	co-voiturage	1	2	3	4	5	6	7
d)	la bicyclette	1	2	3	4	5	6	7
e)	la marche	1	2	3	4	5	6	7

Level of activism

12. Etes-vous présentement impliqué(e) dans un organisme écologique?
oui____ non ____

Si oui, veuillez spécifier:_____

LE SAVEZ-VOUS?

Les questions ci-dessous se rapportent à divers sujets concernant l'environnement. Il n'y a qu'UNE BONNE réponse par question. Veuillez cocher la réponse que vous croyez être la bonne.

Ecological knowledge scale

1. Les scientifiques prétendent qu'il y a un trou dans la couche d'ozone:

   a) Au-dessus de l'Artique
   b) Au -dessus de l'Antartique
   c) Ni au-dessus de l'Artique ni de l'Antartique
   d) Au-dessus de l'Artique et de l'Antartique

2. Lequel des produits suivants n'est pas bon pour l'environnement

   a) L'amoniaque
   b) Le vinaigre
   c) Le javex
   d) Le Borax

3. Qu'est-ce qui prend le plus de place dans les poubelles des maisons?

   a) La nourriture
   b) Le plastique
   c) Le papier
   d) Les déchets de jardin

4. L'utilisation de savon à lessive contenant des phospates conduit auquel des problèmes suivants:

   a) La pollution de notre air et de notre eau par des dioxines et du furane
   b) Les pluies acides
   c) La prolifération d'algues dans nos lacs qui tue la vie marine
   d) Le réchauffement de la planète

5. Qu'est-ce qui n'est pas recyclable?

   a) La vaisselle
   b) Le papier
   c) Le plastique
   d) Les canettes d'aluminium

6. Quel pourcentage approximatif des espèces du monde vivent dans les forêts tropicales humides?

   a) 5%
   b) 10%
   c) 75%
   d) 90%

7. Environ combien de litres d'eau les toilettes utilisent-elles en moyenne chaque fois qu'on tire la chasse d'eau?

a) 5 litres
b) 10 litres
c) 20 litres
d) 35 litres

8. Au Québec, quel pourcentage des érablières produisant le sirop d'érable a été affecté par les pluies acides?

a) 5%
b) 20%
c) 50%
d) 80%

9. Laquelle de ces maladies respiratoires est liée à la pollution atmosphérique et aux pluies acides?

a) L'asthme
b) Le rhume de poitrine
c) La pneumonie
d) Toutes ces maladies

10. Lequel des produits suivants, utilisés en hiver dans les entrées pour empêcher de glisser est terriblement polluant?

a) La litière pour chats
b) Le sable
c) Le sel
d) Aucun de ces produits n'est vraiment polluant.

11. Quelle est la cause principale de l'effet de serre?

a) Le gaz carbonique dégagé par les voitures et les usines
b) Le trou dans la couche d'ozone
c) L'utilisation de pesticides en agriculture
d) Les PBC

12. Quel est l'aliment de base des populations de la plupart des pays en voie de développement?

a) Le lait
b) La viande
c) Les céréales
d) Les fruits et les légumes

13. Lequel des animaux suivants n'est pas en voie de disparition?

a) Le béluga
b) Le faucon pèlerin
c) Le Cougar de l'Est
d) L'oie blanche

14. Parmi les éléments suivants, lesquels ne sont pas compostables?

a) Les cheveux
b) Les coquilles d'oeufs
c) La graisse
d) Les résidus de café

15. Les déchets radioactifs des centrales nucléaires demeurent radioactifs pendant combien de temps?

a) 25 ans
b) 100 ans
c) 1000 ans
d) Des dizaines de milliers d'années

****

DEMOGRAPHIC INFORMATION

Sexe: Féminin_____ Masculin:_____ Age:_____

Langue maternelle: Français_____ Anglais_____ Autre:_____

Etes-vous étudiant(e)? temps plein_____ temps partiel_____

Etes-vous sur le marché du travail? temps plein_____ temps partiel_____

Nombre de personnes résidant dans votre foyer la semaine dernière?_____

Quel âge ont-ils?_____

Quel est le revenu annuel de votre foyer avant impôt?

moins de 20,000$ ❒
21,000-30,000$ ❒
31,001-40,000$ ❒
41 000-50,000$ ❒
51,000-65,000$ ❒
66,000-80,000$ ❒
80,000$ et plus ❒

Où demeurez-vous? À la campagne_____ À la ville_____ En banlieue_____

Etes-vous propriétaire de votre domicile? Oui_____ Non_____

Est-ce que vous avez accès à un programme de recyclage à domicile? Oui_____ Non_____

Est-ce que vous avez accès à un programme de recyclage au travail? Oui_____ Non_____

MERCI BEAUCOUP!

Appendix F
Summary statistics of child variables

Table F.1.

Summary statistics for children's ecological attitudes at Time 1 and Time 2.

Variables	Mean	Standard deviation	Kurtosis	Skewness
Experimental group				
Time 1				
Importance	10.35	2.97	-.53	-.30
Satisfaction	9.77	1.86	.53	-.49
Competence	11.96	2.90	1.51	-1.33
Knowledge	4.69	2.59	-.57	-.44
Time 2				
Importance	10.55	2.78	.13	-.66
Satisfaction	9.30	1.96	-.93	.28
Competence	12.01	2.74	.25	-1.31
Knowledge	4.90	2.72	-.67	-.33
Control group				
Time 1				
Importance	9.73	2.67	.09	-.47
Satisfaction	10.50	1.60	.81	-.59
Competence	12.09	2.59	.77	-.94
Knowledge	4.34	2.32	-.50	-.52
Time 2				
Importance	9.89	2.94	-.30	-.42
Satisfaction	10.28	1.79	.70	-.29
Competence	11.55	2.75	.91	-1.02
Knowledge	5.54	2.62	.47	-.76

Table F.2.

Summary statistics for children's ecological motivation at Time 1 and Time 2.

Variables	Mean	Standard deviation	Kurtosis	Skewness
Experimental group				
Time 1				
Intrinsic motivation	9.72	3.00	-.35	-.23
Identified regulation	11.50	2.81	.08	-.74
External regulation	4.54	1.99	2.51	1.59
Amotivation	4.71	2.03	3.05	1.63
Self-determination index	17.01	10.99	1.03	-.87
Time 2				
Intrinsic motivation	9.56	3.06	-.83	-.24
Identified regulation	10.90	2.81	.20	-.79
External regulation	4.38	1.69	1.86	1.40
Amotivation	5.18	2.21	6.02	2.06
Self-determination index	15.38	10.84	1.20	-.95
Control group				
Time 1				
Intrinsic motivation	8.84	2.76	-.53	.05
Identified regulation	10.32	2.80	-.29	-.32
External regulation	4.71	1.98	1.28	1.30
Amotivation	5.09	2.40	3.95	1.73
Self-determination index	13.17	10.54	1.15	-.86
Time 2				
Intrinsic motivation	8.74	2.74	-.51	.16
Identified regulation	10.14	2.69	-.60	-.18
External regulation	5.38	2.42	.81	1.11
Amotivation	5.25	2.52	2.17	1.50
Self-determination index	11.70	11.73	.74	-.61

Table F.3.

Summary statistics for children's ecological behaviors at Time 1 and Time 2.

Variables	Mean	Standard deviation	Kurtosis	Skewness
Experimental group				
Time 1				
Sources of information	16.28	5.79	-.10	.76
Purchasing	4.60	2.73	3.85	2.04
Recycling/reusing	11.96	4.39	-.85	-.03
Composite score	33.89	9.82	.24	.54
Time 2				
Sources of information	16.17	5.74	-.11	.74
Purchasing	5.09	2.82	1.28	1.40
Recycling/reusing	12.64	4.12	-.85	.05
Composite score	34.87	9.76	.19	.37
Control group				
Time 1				
Sources of information	13.36	3.65	.60	.94
Purchasing	4.39	2.28	4.80	2.17
Recycling/reusing	11.76	4.64	-1.24	.01
Composite score	30.52	8.80	.12	.62
Time 2				
Sources of information	13.61	4.37	.84	1.12
Purchasing	4.51	2.85	4.60	2.24
Recycling/reusing	11.76	4.51	-1.01	.01
Composite score	30.81	9.92	.60	.94

Table F.4.

Summary statistics for children's sources of information at Time 1 and Time 2.

Variables	Mean	Standard deviation	Kurtosis	Skewness
Experimental group				
Time 1				
Parents	2.14	1.13	.07	.91
Teachers	1.92	1.11	.84	1.23
Friends	1.43	.92	6.49	2.56
Television	2.76	1.21	-.76	.30
Reading	2.20	1.09	.01	.75
School work	2.57	1.49	-1.25	.47
Time 2				
Parents	2.23	1.15	-.68	.55
Teachers	2.05	1.36	-.22	1.05
Friends	1.43	.75	1.92	1.64
Television	2.29	1.03	.72	.97
Reading	1.97	1.09	.81	1.18
School work	2.37	1.22	-.36	.71
Control group				
Time 1				
Parents	1.81	.91	.13	.97
Teachers	1.27	.59	5.73	2.36
Friends	1.26	.73	14.81	3.70
Television	2.26	1.13	-.15	.72
Reading	1.94	1.01	1.08	1.16
School work	1.75	.68	.15	.56
Time 2				
Parents	1.80	.89	1.58	1.27
Teachers	1.40	.62	4.45	1.81
Friends	1.23	.60	8.72	2.92
Television	2.06	1.15	.59	1.12
Reading	1.67	.974	3.66	1.88
School work	1.97	.868	.85	.88

Appendix G
Summary statistics of parental variables

Table G.1.

Summary statistics for parents' ecological attitudes at Time 1 and Time 2.

Variables	Mean	Standard deviation	Kurtosis	Skewness
Experimental group				
Time 1				
Importance	11.05	2.17	-.81	-.24
Satisfaction	13.41	4.04	-.27	-.35
Competence	13.38	3.14	-.41	.36
Knowledge	5.78	3.39	-.86	-.33
Time 2				
Importance	10.97	2.51	-.22	-.57
Satisfaction	12.58	3.29	-.38	.14
Competence	13.20	2.87	-.28	.03
Knowledge	4.98	4.24	-1.06	.20
Control group				
Time 1				
Importance	11.08	2.74	-2.96	-.99
Satisfaction	14.09	3.89	-.38	-.32
Competence	13.38	3.24	-.35	-.05
Knowledge	5.37	3.43	-.66	-.31
Time 2				
Importance	10.81	2.72	.03	.69
Satisfaction	14.39	3.73	-.11	-.21
Competence	13.68	3.42	-.15	.01
Knowledge	4.24	3.99	-1.14	.30

Table G.2.

Summary statistics of parents' perception of children's ecological attitudes and behaviors at Time 1 and Time 2.

Variables	Mean	Standard deviation	Kurtosis	Skewness
Experimental group				
Time 1				
Perceived importance	14.02	3.95	-.62	-.22
Perceived competence	9.50	2.39	-.60	.18
Perceived information seeking	11.81	3.81	-.16	.11
Perceived ecological behaviors	20.88	5.44	-.13	.08
Time 2				
Perceived importance	14.11	4.25	.10	-.67
Perceived competence	9.73	2.60	.60	-.66
Perceived information seeking	11.27	3.98	-.64	-.15
Perceived ecological behaviors	20.86	5.57	-.40	-.25
Control group				
Time 1				
Perceived importance	12.20	4.53	-.54	-.36
Perceived competence	8.92	2.88	-.25	-.31
Perceived information seeking	10.37	4.20	-.76	-.05
Perceived ecological behaviors	18.28	6.05	-.37	-.25
Time 2				
Perceived importance	12.01	4.67	-.65	-.10
Perceived competence	8.75	2.92	-.21	-.43
Perceived information seeking	10.24	4.72	-.45	.30
Perceived ecological behaviors	18.05	6.69	-.24	.32

Table G.3.

Summary statistics for parents' perception of children's interpersonal behaviors at Time 1 and Time 2.

Variables	Mean	Standard deviation	Kurtosis	Skewness
Experimental group				
Time 1				
Autonomy support	14.16	4.42	-.64	-.44
Informational	16.80	5.55	-.24	-.32
Involvement	18.61	4.90	-.66	-.07
Composite score*	49.15	12.86	-.70	-.09
Time 2				
Autonomy support	13.66	4.00	-.38	-.36
Informational	17.62	5.61	-.10	-.62
Involvement	17.81	4.67	-.56	-.28
Composite score*	48.63	12.94	-.31	-.57
Control Group				
Time 1				
Autonomy support	12.20	4.23	-.20	-.47
Informational	14.11	6.21	-.91	-.05
Involvement	16.35	5.07	-.43	-.42
Composite score*	42.83	14.13	-.33	-.30
Time 2				
Autonomy support	11.99	4.21	-.62	-.08
Informational	13.25	6.26	-.84	.25
Involvement	15.96	5.63	-.51	-.11
Composite score*	41.19	14.92	-.63	.10

* Composite score consists of the summation of the autonomy support, informational and involvement subscales.

Table G.4.

Summary statistics parents' ecological motivation at Time 1 and Time 2 (experimental group).

Variables	Mean	Standard deviation	Kurtosis	Skewness
Time 1				
Intrinsic motivation	15.10	3.44	-.69	-.07
Integrated regulation	15.01	4.39	-.31	-.62
Identified regulation	16.75	3.05	-.42	-.55
Introjected regulation	10.82	4.94	-.62	.17
External regulation	5.68	3.64	2.16	1.56
Amotivation	5.36	3.28	1.92	1.53
Self-determination index	53.59	30.68	.14	-.60
Time 2				
Intrinsic motivation	15.40	3.55	-.22	-.22
Integrated regulation	14.59	3.95	-.59	-.36
Identified regulation	16.81	3.00	.35	-.66
Introjected regulation	11.49	4.61	-.63	.34
External regulation	5.56	3.70	2.74	1.73
Amotivation	13.48	2.87	1.35	1.46
Self-determination index	56.22	28.64	.91	-.69

Table G.5.

Summary statistics of parents' ecological motivation at Time 1 and Time 2 (control group).

Variables	Mean	Standard deviation	Kurtosis	Skewness
Time 1				
Intrinsic motivation	15.38	3.47	-.57	-.03
Integrated regulation	14.91	4.15	-.68	-.47
Identified regulation	16.92	2.77	-.24	-.53
Introjected regulation	12.35	4.77	-.87	-.08
External regulation	5.77	3.23	.14	1.06
Amotivation	5.31	3.22	2.65	1.70
Self-determination index	53.02	25.34	-.64	-.45
Time 2				
Intrinsic motivation	15.38	3.09	-.63	-.01
Integrated regulation	15.25	4.52	-.09	-.69
Identified regulation	16.92	3.05	-.43	-.40
Introjected regulation	12.57	5.17	-.99	.01
External regulation	5.88	3.28	-.35	.90
Amotivation	5.20	2.80	2.11	1.51
Self-determination index	54.39	24.94	-.39	-.28

Table G.6.

Summary statistics of parents' ecological behaviors at Time 1 and Time 2.

Variables	Mean	Standard deviation	Kurtosis	Skewness
Experimental group				
Time 1				
Waste management	12.75	5.55	-.58	.03
Purchasing	39.82	8.68	.38	-.48
Conservation hardware	1.96	1.36	1.02	.96
Energy conservation	17.36	4.03	.40	-1.08
Transportation	3.18	2.91	-.84	-.72
Composite score	75.39	14.46	.22	-.17
Time 2				
Waste management	13.29	5.19	-.29	.02
Purchasing	41.34	8.49	-.34	.07
Conservation hardware	1.892	1.27	-.79	.13
Energy conservation	17.49	4.03	1.12	-1.28
Transportation	3.04	3.13	-.95	-.72
Composite score	77.31	13.95	.37	-.14
Control group				
Time 1				
Waste management	13.36	4.51	.38	-.54
Purchasing	40.47	8.96	-.04	-.18
Conservation hardware	2.29	1.48	-.25	.29
Energy conservation	17.80	3.75	-.13	-1.03
Transportation	3.82	2.92	.01	-1.22
Composite score	77.57	12.68	-.01	-.34
Time 2				
Waste management	13.68	4.24	.40	.02
Purchasing	39.87	8.78	-.19	-.60
Conservation hardware	1.96	1.51	-.45	.41
Energy conservation	16.72	4.48	-.24	-.87
Transportation	3.53	3.10	-.59	-.95
Composite score	76.79	14.40	-.28	-.14