Factors Influencing Adults' Environmental Attitudes and Behaviors and the Role of Environmental Schools in Influencing their Communities

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Abstract

The present study revisits the field of research regarding Significant Life Experiences (SLE) that can potentially influence development of environmental attitudes and behaviors. It is tangential to and diverges from this body of research both methodologically and conceptually. The study also examines questions related to the relationships between environmental schools and urban communities as sources of formative influences on parents of school children. The research was carried out in a population of parents to children aged 11–15.The findings of the study indicate that attitudes and behaviors are influenced by different processes and that the same influencing experiences affect different types of people in differing ways. The results indicate that there is a need to focus research efforts on the ways in which the inner self ("personality") organizes and gives meaning to all other formative influences, since this variable was found to be in high interaction with all other influencing variables. Finally, urban environmental schools and their communities in Israel interact with each other and influence the attitudes and behaviors of students' parents. They are more effective in directly influencing behaviors than in influencing attitudes. No such findings were obtained with regard to non-environmental schools and their communities.

Keywords: significant life experiences, intergenerational influence, environmental influence, environmental education influence

In his address to the United Nations (UN), the previous Secretary-General Kofi Annan announced (Annan, 2001): *"*Our biggest challenge in this new century is to take an idea that seems abstract – sustainable development - and turn it into reality for all the world's people". This call carries with it major implications regarding education. During the past three decades, Annan's challenge has been undertaken by researchers and practitioners, operating primarily under the guidance of three major fields of education – environmental education (EE), education for sustainable development (ESD), and education for sustainability (EfS). Two important milestones of this endeavor include: (a) Agenda 21 and (b) the declaration of the United Nations Decade of Education for Sustainable Development. The Agenda 21 milestone refers to the dedication of chapter 36 of the UN's action plan Agenda 21 (one of the major outcomes of the United Nations Conference on Environment and Development, which was held in Rio de Janeiro in 1992) to education for sustainable development (UNCED, 1992). Chapter 36 refers to education as "a major process by which human beings and societies can reach their fullest potential" (UNCED, 1992, Ch. 36.3). A major objective that derives from this notion is the need "to **promote broad public awareness as an essential part of a global education** effort to strengthen attitudes, values and actions which are compatible with sustainable development" (Ch. 36.9). The second important milestone took place in December 2002, when the United Nations General Assembly adopted resolution 57/254, which declared the decade between 2005 and 2014 as the Decade of Education for Sustainable Development (DESD), and designated the UN Educational, Scientific and Cultural Organization (UNESCO) as lead agency for the promotion of the Decade.

UNESCO developed an International Implementation Scheme for DESD with the following five objectives: (1) enhancing the role of education in the pursuit of sustainable development; (2) facilitating networking among relevant stakeholders; (3) promoting all forms of learning and public awareness to further sustainable development; (4) fostering increased quality of teaching about sustainable development; and, (5) developing strategies at every level to strengthen capacity in education for sustainable development (UNESCO, 2005).

The two milestones mentioned above reflect worldwide efforts that have been undertaken in the past three decades to advance environmental education institutionally as well as in research. A major issue that has received much research attention concerns the development of positive attitudes and behavior towards the environment and the relationships between pro-environmental attitudes and behavior (Ajzen & Fishben, 1980; Allen & Ferrard, 1999; Ballantyne, Connel, & Fien, 2006; Hines, Hungerford & Tomera, 1987; Hungerford & Volk, 1990; Kaiser, Woelfing & Fuhrer, 1999). Other major research concerns and debates involve defining the roles, goals and scope of environmental education, as well as investigating the relationships between environmental education and newly emerging forms of education for sustainability (e.g. Hopkins & McKeown, 2002; Posch, 1999; Sterling, 2010).

Within the latter field of research, a subfield of research into environmental-education-related Significant Life Experiences (SLE) emerged in the 1980s. This stream of research aims to uncover the sources of pro-environmental attitudes and behaviors. It was initiated by the work of Tanner (1980), who conducted a retroactive study among a group of environmental activists who were asked to recall significant experiences that

influenced their life's calling. One of the underlying assumptions in this research approach is that if we can unveil significant experiences that lead to development of environmental stewardship, then perhaps it will be possible to implement these experiences in educational programs and thus enhance the goals of environmental education.

The work of Tanner was followed by international research that was carried out in many countries and among various groups (e.g. Chawla, 1999; Hsu, 2009; Myers, 1997; Palmer & Suggate, 1996; Palmer, Suggate, Bajd, Hart, et al., 1998; Palmer, Suggate, Robottom, & Hart, 1999). Significant life experiences (SLE) that were identified include the following: Education, child/adult natural experiences, work, people, media and others (Palmer et al., 1999).

In 1999, the journal *Environmental Education Research* (Volume 5, Issue 4) published a special issue devoted entirely to the debate regarding SLE research and methodology. Among the many issues that were debated in the above journal and in other publications , two critical questions arose: (a) What are the appropriate methodologies for SLE research? (Chawla, 1998b; Chawla, 2001; Dillon, Kelsey, & Duque-Aristizabal, 1999; A. Gough, 1999; N. Gough, 1999; Payne, 1999) (b) Can past childhood experiences of adults today be used as a basis for creating influencing experiences for today's children (A. Gough, 1999; N. Gough, 1999)? The latter question has become particularly relevant in our increasingly technological and urbanized society, in which children are exposed to environments that are disparate from the childhood environments of older generations. Many children nowadays grow up in dense urban communities. Compared with their parents, they have much less opportunity for non-structured

encounters with nature or for other environmental experiences, since urban dwellings are characterized not only by remoteness from nature, but also by more structured time and more time spent indoors (Kahn & Kellert, 2002; Louv, 2005). These changing circumstances can cause children in urban communities to be more dependent on pre-organized influencing environmental experiences. Under such conditions, it becomes worthwhile to focus attention on the role of schools in urban communities as providers of significant environmental experiences.

Environmental Schools as Sources of Influence on Their Communities

Since the introduction of Agenda 21, there have been growing international initiatives to develop national and international frameworks for implementation of environmental education within school programs. These initiatives include the following: Foundation for Environmental Education (FEE) International Eco-schools, China's Green Schools Project, New Zealand's Enviroschools program (Gough, 2006), the European COMENIUS III network, "School Development Through Environmental Education" (SEED) (Elliott, 1998; OECD/CERI, 1995; Posch & Mair, 1997), and many more.

Environmental schools can be generally defined as schools in which a substantial part of the curriculum is devoted to constructing an environmental worldview and stewardship. The pedagogy of environmental education can be roughly categorized into two opposing approaches. On the one extreme is the "behavior modification" approach, which is more target-oriented and in which the desired outcomes are measurable, usually in the form of reducing one's "ecological footprint". On the other extreme is a "process"-focused approach, focusing on the individual's and the social's construction of skills. According to this approach, the final outcomes of the learning process cannot be foreseen

(Fien & Tilbury, 2002; Mayer, 2004; Mogensen & Mayer, 2005). Another mode of distinguishing between environmental schools relates to the disciplinary focus of the schools' programs. Whereas in some environmental schools, problems are analyzed from scientific and technical perspectives regarding humans' interactions with the environment, in other schools environmental problems are perceived as societal problems, in which no discipline is irrelevant in providing tools and perspectives for analysis (Breiting, Mayer, & Mogensen, 2005; Fien & Tilbury, 2002; Mogensen & Mayer, 2005).

Regardless of differences in approaches among the various environmental schools, most environmental schools make efforts to interact with their communities with regard to the environment (Mogensen & Mayer, 2005). Furthermore, a study commissioned by the Education and Training Policy Division of the OECD (2003) stated unequivocally that it is "now universally accepted in OECD countries that schools must relate well to their surrounding communities if they are to be effective" (OECD, 2001, p.42). A number of studies demonstrated the potential contribution that school students can make in addressing social and environmental problems within their local communities (Firman, Gelfand, & Ventura, 1983; Jensen, Kofoed, Uhrenholdt, & Vognsen, 1995; OECD, 1991; Parsons, 1988; Ventura-Merkel, Liederman, & Ossofsky, 1989). Interactions between environmental schools and their communities within cities can be of particular importance in promoting advancement towards sustainability. This is due to the nature of urban problems, which are particularly complex and are characterized by high interconnectedness between environmental, political, economic and social dimensions. Local initiatives to resolve one problem can lead to new problems elsewhere

and can conflict with policies at national or regional levels (Commission of the European Communities, 2006). Interactions between environmental schools and their urban communities can facilitate development of personal and social skills required for dealing with the complex issues of urban sustainability, and are therefore beneficial to all stakeholders involved in the process. When considering significant life experiences in urban communities, it is important to analyze the role of environmental schools from the perspective of their interactions with their communities. These interactions can be highly significant in producing an overall influence on environmental attitudes and behavior.

The following sections aim to contribute to the discussion regarding significant life experiences from new perspectives as outlined in what follows.

Research Objectives

The present study is tangential to and diverges from the body of research on SLE both methodologically and conceptually. It also examines new questions that have not previously been dealt with in SLE research, regarding the relationships between environmental schools and urban communities as sources of formative influences on parents of school children.

The following sections introduce the main claims and aims of the present study. Further elaboration will be presented in what follows.

Distinguishing Influences on Attitudes from Influences on Behavior

Previous SLE research did not differentiate between formative influences (Referred to as "variables") on attitudes and those affecting behavior (regarding each participant in a given study), neither in the designs of the studies nor in their analyses and results. Similar

formative influences were found for both attitudes and behaviors despite the well-accepted notion regarding differences between the two traits. Research in the field has taught us that responsible environmental behavior (REB) and attitudes belong to different cognitive compartments and are not directly interrelated (Abelson, 1972; Doyle, 1997; Hines et al., 1987; Hungerford & Volk, 1990; Marcinkowski, 2004; McGuire, 1985; Wallace, Paulson, Lord, & Bond, 2005; Wicker, 1969). This inconsistency calls into question the sensitivity of the applied methodologies. It is expected that if attitudes are acquired independently from (or not in direct correlation with) environmental behavior, then the variables influencing the two distinct traits will not be identical.

Derived from this concept is the objective to analyze formative influences on attitudes separately from formative influences on behavior.

Identifying Meaningful Interactions between Formative Influences

We assume that the interaction between formative environmental experiences is at least as important as each individual experience on its own, if not more so. Since none of the previously identified formative influences on its own can explain development of environmental stewardship, it is important that any further research on this issue focus on the interactions between the variables rather than on identifying discrete variables.

Derived from this notion is the objective to identify variables that have strong interactions with each other to the degree that they can be grouped together to form categories (factors) of influence on attitudes and categories of influence on behavior.

Classifying Populations in Accordance to Responsiveness to Formative Influences

It is possible to assume that different people will react differently to the same formative influences (A. Gough, 1999; Hsu, 2009; Payne, 1999). It is worthwhile to differentiate

between groups of people according to the differences in their reactions to a given set of formative environmental influences.

Derived from this notion is the objective to identify clusters of people, within the sample, who exhibit similarities in their reactions to potentially influential experiences. The analysis needs to be done separately for formative influences on attitudes and for formative influences on behaviors.

Identifying the Role of Personality

The arena in which all influencing variables meet and interact is the inner self. While most other formative variables can theoretically be manipulated and measured using experimental methods, the variable of the "self" or "personality" (as it is termed in the present article) is mostly unknown vis-a-vis the present context. If we seek to understand the relative impact of various formative influences, there is a need to gain some understanding regarding the function of the "personality" in constructing and organizing formative environmental experiences.

Derived from this concept are the following objectives: (a) To find out which influencing variables the variable "personality" interacts with most strongly; and (b) to identify the relative impact of "personality". The analyses need to be carried out separately for influences on attitudes and influences on behaviors. (For clarification regarding the above variables, please refer to the Methods section, "The Questionnaire", clause B).

The Influence of Environmental Schools on Parents

In Israel and worldwide, more and more schools in urban communities and elsewhere are becoming environmental schools. Ballantyne et al. (2006) drew attention to the "untapped potential of [EE] school pupils to act as catalysts and drivers of environmental

change in their communities". If these processes do take place, it is reasonable to expect environmental schools to become one of the formative influences on parents of children who study in these schools.

Derived from this notion is the objective to analyze the relative impact that environmental schools in urban communities have as formative influences on students' parents, in comparison to the relative impact of non-environmental schools on their students' parents.

Formative Influences as an Outcome of Interactions between Schools and Communities

There is a growing interest in environmental education as a means of producing a wholesome educational experience in which schools and communities interact together to produce an influencing effect on environmental literacy (Armstrong & Bottomley, 2003; Ballantyne et al., 2006; Hopkins & McKeown, 2002; OECD, 2001; UNESCO, 2005; VCAA, 2005). If such effective relationships do exist, they are expected to influence the parents of children who study in urban environmental schools.

Derived from this notion is the objective to analyze the extent of interaction between the variables "my child's school" and "my community" with regard to influences on attitudes and influences on behavior of parents of school children. For comparison, the analysis will be carried out among adults whose children study in environmental schools and among adults who live in the same urban communities and whose children study in regular, not environmental, schools. (For clarification regarding the above variables, please refer to the Methods section, "The Questionnaire", clause B.)

Methodological Approach

This section presents the methodological approach applied in our research in relation to previous Significant Life Experiences (SLE) research approaches. Positioning our methodology in this way allows our approach to emerge as a response to previously applied methodologies, thus creating a "discussion" between the various approaches. Our methodological approach is distinguished by the following two main characteristics:

Developing Categories based on the level of Interactions between Variables as a posteriori Outcome rather Than A-Priori Forming Discrete Categories

In previous SLE research, the most commonly applied methodology was the formation of categories of formative influences by the researcher and allocation of participants' statements to the categories (Arnold, Cohen, & Warner, 2009; Chawla, 1998b; Hsu, 2009; Palmer, 1993; Palmer, Suggate, Bajd, Hart, et al., 1998; Palmer et al., 1999; Peterson, 1982; Sward, 1999; Tanner, 1980). Following are some examples of the commonly applied methodologies in SLE research: (a) Tanner (1980) used an open-ended survey. Environmental activists were requested to provide autobiographical written statements that identified the formative influences that led them to choose conservation work, the approximate duration of the influence, and a résumé of conservation activities (Chawla, 1998a). The obtained reports were used in order to derive categories of significant experiences. (b) Sward (1999) studied experiences that influenced development of environmental sensitivity among environmental professionals. The researcher used structured interviews from which she derived categories of significant experiences. The frequency of experiences in each category was calculated. (c) Palmer et al. (1998) used a similar methodology of open-ended questionnaires in a comparative

study among environmental educators from nine countries. The aim of the study was to examine significant influences on knowledge and concern for the environment. These studies and others all used similar methods among various groups and for analyzing various aspects of environmentalism (e.g. sensitivity, activism, awareness, etc.). The common approach was that, on the basis of the answers they obtained, the researchers developed discrete categories, and the frequency of experiences pertaining to each category was then calculated in a disconnected manner.

This a-priori approach to the data is qualitatively mediated by the researcher. Its main drawback is that the formed categories are relatively rigid and do not provide information regarding relationships between the variables that form the categories. In the present study, the allocation of variables into categories is done a posteriori by applying a statistical method of factor analysis to participants' responses. By applying this method, it becomes possible to form categories (factors) that are based on the levels of correlation between the variables. Each variable in the analysis is a formative influence, and each factor is composed of formative influences that are interconnected.

Analyzing Differences between People in Their Responsiveness to Formative Experiences Rather Than Differences in Exposure to Experiences

Most previous SLE research focused on analyzing results that were obtained from predefined samples of environmental activists or educators (Chawla, 1998b; Chawla, 1999; Corcoran, 1999; James, 1993; Palmer, 1993; Palmer & Suggate, 1996; Palmer, Suggate, Bajd, Hart, et al., 1998; Palmer, Suggate, Bajd, & Tsauki, 1998; Palmer et al., 1999; Sward, 1999; Tanner, 1980). Hsu (2009) moved beyond this approach and compared environmental activists to non-activists by a-priori differentiating between the

two groups. Following the partition, the two groups were compared on the basis of their rankings regarding the extent of impact of 24 variables, each presenting a significant formative experience. The results of the comparison indicated that the set of significant experiences could effectively distinguish environmentally committed people from others.

As an alternative to the above approach, the present study diverts the attention from the actual experiences to the people who were exposed to the experiences, or, more precisely—to the different ways in which different people respond to a given set of experiences. The SLE literature reports similar significant experiences in most of the studies. These include experiences such as: extended time spent outdoors in natural areas (often in childhood), adult role models, education and others. These experiences on their own are not unique in the course of many people's lives. We can assume that many people who did not grow up to be environmental activists spent many hours of childhood outdoors or were exposed to adult role models. A characteristic distinguishing these people from others who became activists might be the different ways in which they responded to these experiences. This underlying assumption directed the development of an alternative methodological approach that seeks to find out how people in a non-predefined group are distributed with regard to their responses to a given set of experiences. The sample in the present study is composed of participants whose environmental attitudes and behaviors are not known in advance. To analyze how the same formative influences can have different effects on different people, we applied a method of cluster analysis (the method is described below). Unlike factor analysis, which allocates variables into categories, cluster analysis allocates participants into categories,

thus allowing us to differentiate groups of respondents according to their responsiveness to a given set of experiences.

Methods

Participants

The research was carried out in Israel, in two cities with similar population density. The first city is Haifa, the core city of the northern metropolitan area. Haifa's population size is 265,000, and its urban density is 4183.2 people per km^2 (Israel Central Bureau of Statistics, 2009). The second city is Raanana, located at the middle ring of the central metropolitan area of Tel Aviv. Raanana's population size is 70,000, and its urban density is 4046.5 people per km^2 (Israel Central Bureau of Statistics, 2009). Data for the research were collected during the years 2009–2010.

The sample was composed of 95 adults whose environmental attitudes and behaviors were not known in advance. Gender distribution of participants was 64% females and 36% males. Two groups of adults comprised the sample. One group, consisted of parents to students who were attending environmental schools (ENV; $N = 67$), and the other group, consisted of parents to students who did not attend environmental schools (N-ENV; $N = 28$) but rather attended regular schools located in the same types of neighborhoods with the same population characteristics as those of the ENV schools. The parents in the ENV group are not necessarily more environmentally oriented compared with the N-ENV group, since most of the parents in the ENV group enrolled their children in an environmental school on the basis of their vicinity to the school and not by parents' choice.

The difference in the sizes of the two samples is a consequence of differences in data collection methods (see below more details regarding data collection).

In order to control for demographic variables that could influence environmental attitudes and behaviors, we attempted to choose a homogeneous sample, thus ensuring that differences between participants could be attributed mostly to personal characteristics, rather than to differences in socio-economical or cultural background. For the purposes of the analyses, we used only questionnaires that were filled in by participants who complied with the following criteria: (a) ages range from 30 to 50 years; (b) have an academic education; (c) are parents to children in the ages of 11–15 years; and (d) living in secular Jewish communities with a cluster membership of 8-9 in the socio-economic index (Israel Central Bureau of Statistics, 2006). Parents were requested to fill in questionnaires containing a request for demographic data. We used these data to select suitable participants from the pool of respondents.

Data Collection from the ENV Group

Data collection from the ENV group was done by distributing questionnaires to parents of children in two environmental schools, one in Haifa and one in Raanana. The questionnaires were handed out to the students at schools. Students were asked to deliver the questionnaires to their parents and return them completed. Most of the returned questionnaires were filled in by students' mothers rather than by their fathers. We distributed 580 questionnaires to students; 157 questionnaires were filled in by the parents and returned, and 67 questionnaires were compatible with the above criteria for participation and were used for analyses.

Data Collection from the N-ENV Group

Data collection for the N-ENV group was carried out through two methods as follows:

A. Emailing questionnaires to adults whose children do not attend environmental schools, who are known to meet the sample criteria listed above, and who live in either of the two urban communities we investigated;
B. Handing out questionnaires to parents of students who live in either of the above two cities and whose children attend non-environmental schools. These schools were located in similar neighborhoods to the environmental schools. The questionnaires were handed out to the parents directly as they were coming out of parents' meetings at schools.

We distributed 150 questionnaires to parents, either personally or by email. Parents filled in and returned 87 questionnaires. Only 28 questionnaires were compatible with the above criteria for sampling and were used for analyses.

The Questionnaire

The written questionnaire to participants was composed of two parts. The first part included a request for demographic details. The second part included three questions, as follows:

Question 1: Self-ranking of environmental attitudes and behavior.

Participants were asked to rank on a Likert scale between 1 (very low) to 5 (very high) the following two statements: (a) "The degree of importance I attribute to environmental issues is…"; and (b) "The degree to which I consider my behavior as environmentally friendly is…".

Question 2: Sources of influence on attitudes.

Question 2 was phrased as follows: "Following is a list of possible sources of influence. Please rank the degree of influence of each source on the development of your attitudes regarding the environment." Participants were asked to rank on a Likert scale ranging from 1 ("no influence") to 5 ("very influential") the following items: books; newspapers; television; internet; movies; the school in which my child studies; conversations, meetings and interactions with people; the schools in which I have studied; certain teacher(s); my personality; a leader / a guide; a group activity; parents and family; my child(ren); time spent in nature or certain experiences that are related to nature; youth movements; academic studies or continuation studies; work / occupation; the community in which I live; political or institutional formats; constitutive experience; being a parent; other.

Question 3: Sources of influence on behaviors.

Question 3 was phrased identically to question 2 above, with one difference: Parents were asked to rank the sources of influence on their behaviors towards the environment.

Data Analyses, Results and Conclusions

Participants' Self-Ranking of Environmental Attitudes and Behaviors

The background information that was requested from participants included self-reported rankings of their levels of environmental attitudes and pro-behavior (see above section, "Question 1"). We applied descriptive statistics to the data.

Figure 1 presents the distribution of participants' self-reported environmental attitudes and behaviors. Rankings of environmental attitudes were obtained from 46 participants. The rankings of attitudes ranged between "low" (1 case) to "very high" (18

cases). The majority ranked “high” (22 cases). Rankings of environmental behavior were obtained from 44 participants. The rankings of behaviors ranged between “low” (1 case) and “very high” (8 cases). The majority ranked “high” (24 cases).

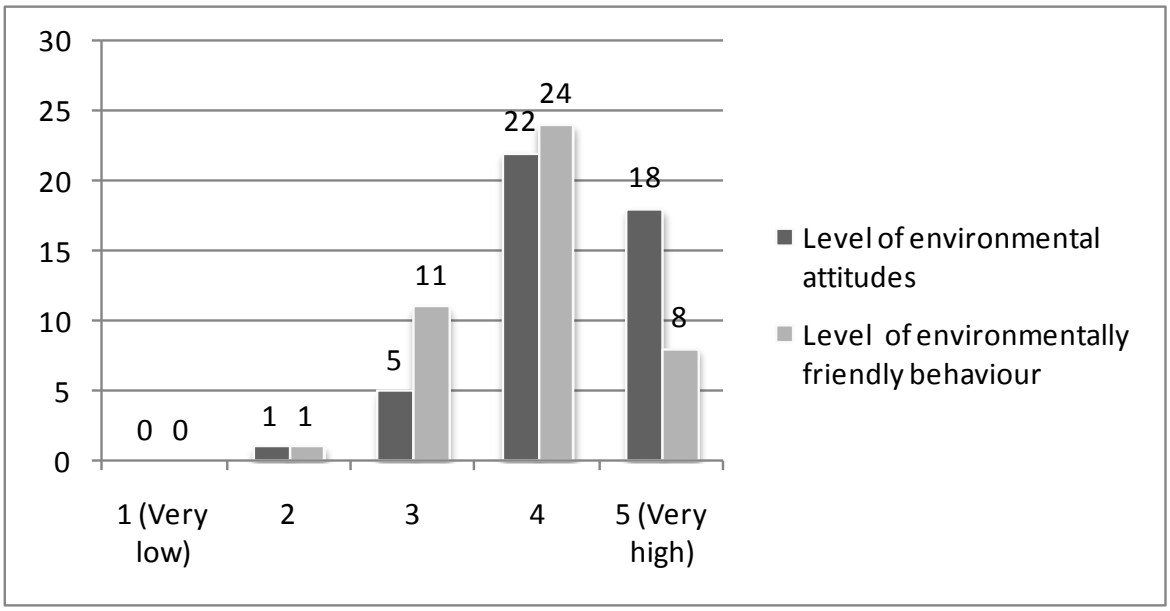

Figure 1. Distribution of participants’ self reported levels of pro-environmental attitudes and behaviors

The results seem to be compatible with and reflective of the relatively high socio-economic status of the participants and their high level of education. Previous research has established the connection between increased level of education and increased level of concern about the environment (The New South Wales Environment Protection Authority (NSWEPA), 1994, pp. 18–19).

Analysis of Categories of Influences on Attitudes and on Behavior, by Factor Analysis

To analyze formative influences on attitudes and formative influences on behavior, we applied two sets of factor analysis. The first set analyzed factors influencing attitudes (for data source, see question 2 to participants, above), and the second set analyzed factors influencing behaviors (for data source, see question 3 to participants, above). The analyses were applied to the total sample comprising the ENV and N-ENV groups pooled together (only valid cases were included; $N = 65$).

Factor analysis is a statistical test that explores relationships among data elements. The test explores which variables in a data set are most related to one another. In particular, it seeks to discover if the observed variables can be explained largely or entirely in terms of a much smaller number of variables called *factors* (Gorsuch, 1983). The variables that interact strongly with one another are grouped together to form factors. The factors are an a posteriori product of the analysis procedure.

Following are the results of the analyses, including the title of each factor, the variables it comprises, and the factor's influence (presented as percent of variance). Table 1 presents the analysis of influences on attitudes, and Table 2 presents the analysis of influences on behavior. A glance at the two tables reveals that there are qualitative (as expressed in the factors' components) and quantitative (as expressed in percent of variance) differences between factors that influence attitudes and factors that influence behavior.

Table 1

Factors Influencing Attitudes, by Title, Variables and their Influence (% of Variance)

Factor number	**Factor title**	**Variables**	**Influence (% of variance)**
A1	My past and present close relationships and myself as a citizen	My child; my child's school; political/ institutional sources; my community; being a parent; parents and family	15.28
A2	Personal and interpersonal interactions with informal educational agents and with nature	Youth movement; nature; personality; a leader / a guide	13.83
A3	My early formal education	My teacher/s; schools in which I've studied	10.31
A4	The media – "fast intake" information sources	Internet; television; newspapers	9.42
A5	Formal, cognitive informative sources	Work/occupation; academic/continuation studies	9.39
A6	Informal, "medium to slow intake" informative sources	Movies; books; discussions/interactions with people	8.32
		TOTAL % of variance	**66.55**

The factor analysis reveals that six factors form categories of influences on attitudes, together explaining 66.5% of the variance. Factors A1, A2, and A6 (which together account for 37.43% of the total explained variance) represent a person's informal, personal and intimate relationships and experiences. Factors A3–A5 (together accounting for 29.12% of the total explained variance) represent the more remote and formal circles that influence our lives - past and present formal education (factors A3 and A5) and the media (factor A4).

Table 2

Factors Influencing Behavior, by Title, Variables and their Influence (% of Variance)

Factor number	**Factor title**	**Variables**	**Influence (% of variance)**
B1	My early formal education, books and present citizenship and institutional formative sources	Schools in which I've studied; my teacher/s; books; political/institutional sources	14.48
B2	The media – "fast intake" formative sources	Newspapers; television; internet; movies	14.28
B3	My present intimate relationships and their related circles	My child; my child's school; my community; being a parent	11.96
B4	My past close relationships, myself and interpersonal relationships	Discussions/interactions with people; personality; parents and family	11.00
B5	Formal, Cognitive informative sources	Work/occupation; academic/continuation studies	10.52
B6	Interpersonal interactions with informal educational agents and with nature	A leader/a guide; youth movement; nature	9.9
		TOTAL % of variance	**72.14**

The factor analysis reveals that six factors form categories of influences on behavior, together explaining 72.14% of the variance. Factors B3, B4, and B6 (which together account for 32.86% of the total explained variance) represent a person's close circles and intimate relationships in the present and in the past. Factors B1, B2, and B5 (together accounting for 39.28% of the total explained variance) represent formal formative influences and the media.

When comparing influences on attitudes to influences on behavior, the factor analyses reveal that with regard to influences on attitudes, a higher percent of the variance (37.43%) is explained by informal formative experiences that are related to a

person's closest circles and intimate experiences and relationships, whereas with regard to influences on behavior, a higher percent of the variance (39.28%) is explained by formal formative influences and the media.

The above results support the claim that different factors influence attitudes and behavior. Most of the influences on environmental attitudes incubate by slow processes that involve personal and interpersonal experiences, whereas most of the influences on behavior involve more formal experiences and rather fast intake processes (as expressed by the media).

Exploring Types of Participants by Cluster Analyses

To identify clusters of people who exhibit similarities in their reactions to experiences that can potentially influence their attitudes or their behavior, we applied a method of cluster analysis. The analysis was applied to the rankings of the ENV group ($N = 67$), with separate analyses for formative influences on attitudes and for formative influences on behaviors.

Cluster analysis is a method that represents multivariate variation in data as a series of sets. The objective is to sort items into groups such that the degree of association is strong between members of the same cluster and weak between members of different clusters (http://www.nature.com/).

In the present study, k-means clustering was used for creating two clusters. With this method, the number of clusters is predetermined. The k-means algorithm assigns each point to the cluster whose center is nearest. The center is the average of all the points in the cluster - that is, its coordinates are the arithmetic mean for each dimension

separately over all the points in the cluster. K-means clustering generates an ANOVA table showing mean-square error. Following are the results of the analyses.

Results of cluster analyses.

Two clusters were obtained. Cluster 1 was termed the "social" type, and cluster 2 was termed the "private" type. The "social" type is more influenced by variables related to interpersonal relationships, whereas the "private" type is more influenced by variables that are not directly related to social interactions, such as the media. The results are presented in Figures 2 and 3. Figure 2 presents the two clusters that were obtained for attitudes, and Figure 3 presents the two clusters that were obtained for behavior.

Within each pair of clusters, each cluster differs from the other quantitatively and qualitatively. The quantitative aspect is revealed by the fact that in cluster 1, the mean scores are almost consistently higher than the mean scores of cluster 2. That is to say, people who belong to cluster 1 are generally more open to accepting influences on their attitudes and on their behaviors, compared with people who belong to cluster 2. The qualitative differences between the clusters are expressed by the differences in the types of variables that have high levels of influence.

Cluster analysis of influences on attitudes.

Following are the analysis results.

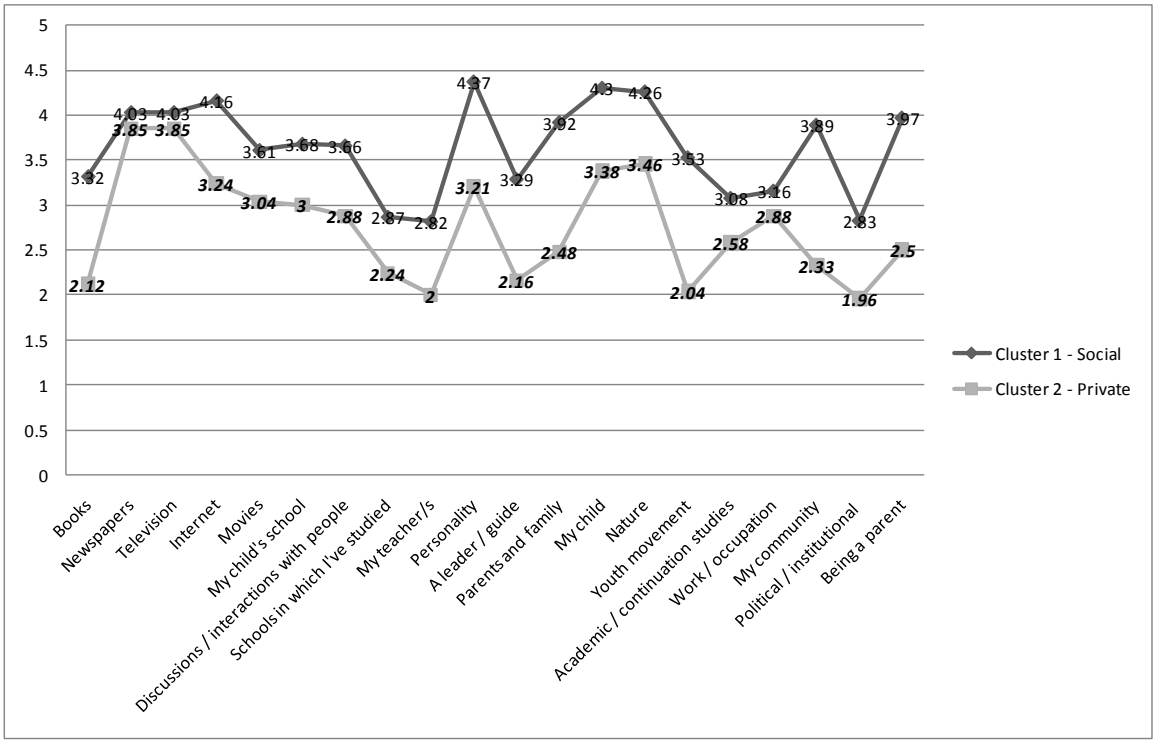

Figure 2. Attitude clusters - distribution of the means of the variables, by cluster

Figure 2 reveals that with regard to influences on attitudes, among the "social" types (cluster 1), the variable "personality" (mean ranking of 4.37) is most influential. Next in degree of influence are the variables "my child" (4.34) and "nature" (4.26). Contrary to the "social" type, the "private" type (cluster 2) is mostly influenced by "television" (3.85) and "newspapers" (3.85). The most extreme differences between the two clusters are in the effects of family and social influences—"being a parent", "parents and family", "my community", and "youth movement". The smallest differences are in the influences of "newspapers", "television", "academic/continuation studies", and "work/occupation".

Cluster analysis of influences on behavior.

Following are the analysis results.

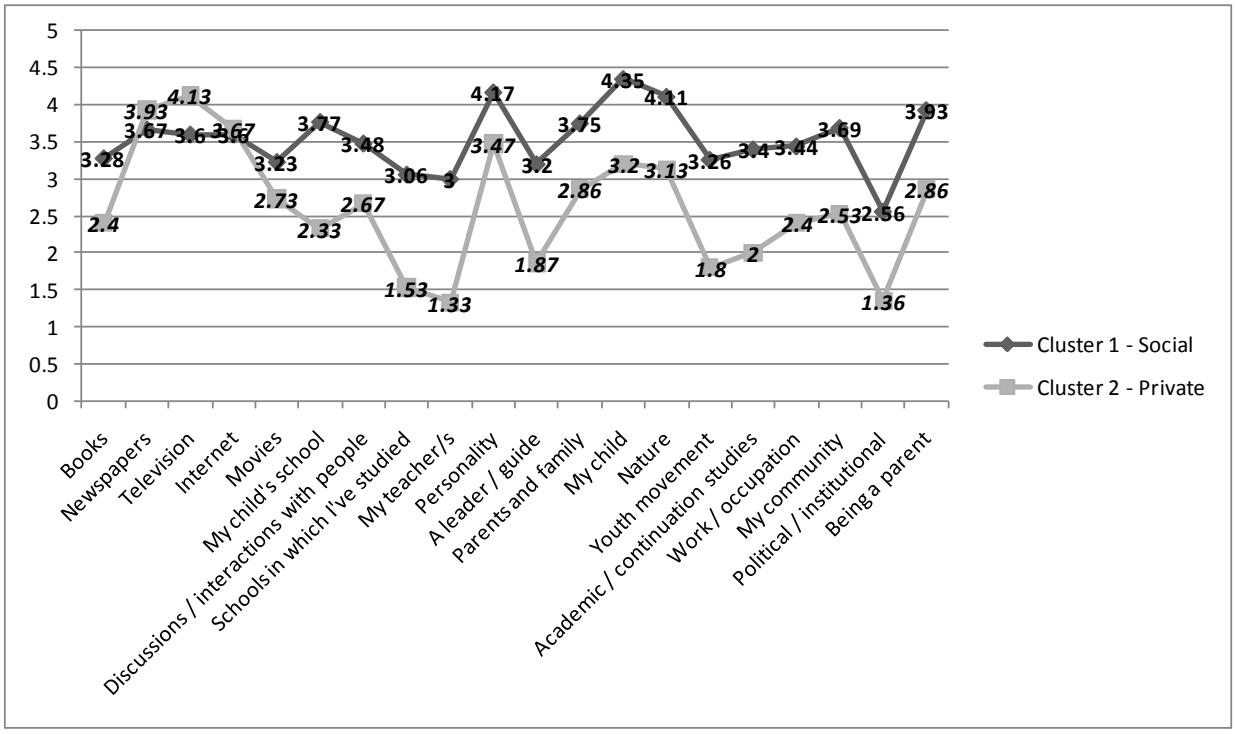

Figure 3. Behavior clusters - distribution of the means of the variables, by cluster

Figure 3 reveals that with regard to influences on behavior, among the "social" types (cluster 1), the variables “my child” (mean ranking of 4.35), “personality” (4.17), and “nature” (4.11) are most influential. Among the "private" types (cluster 2), variables related to media—“newspapers” (3.93), “television” (4.13), and “internet” (3.67) - are most influential. The largest gaps between the two clusters are in influences of “my child’s school”, “being a parent”, and “academic/continuation studies”.

Analysis of distribution of participants between clusters.

The following tables represent the distribution of participants between the clusters. Participants’ distributions are presented separately for attitudes (Table 3) and for behavior (Table 4).

Table 3

Distribution of Cases between Clusters Regarding Influences on Attitudes

Cluster	No. of cases	Percent of cases
1 - Social type	38	59%
2 - Private type	26	41%
Invalid cases	3	-
Total valid cases	**64**	**100%**

There is an 18% difference between the number of participants in cluster 1 and the number of participants in cluster 2.

Table 4

Distribution of Cases between Clusters Regarding Influences on Behavior

Cluster	No. of cases	Percent of cases
1 - Social type	48	72%
2 - Private type	15	28%
Invalid cases	3	-
Total valid cases	**64**	**100%**

There is a 44% difference between the number of participants in cluster 1 and the number of participants in cluster 2.

Tables 3 and 4 reveal that in both attitudes and behaviors, substantially more participants belong to cluster 1—the "social type". The result implies that the majority of the sample is open and receptive to influences. The result is consistent with the results shown in Figure 1 regarding the participants' self-ranking of environmental attitudes and behavior.

With regard to influence on behavior, the difference (44%) between the two clusters is substantially larger (2.4 times greater) than the difference between the two clusters of attitudes (18%). This result implies that the adults in the sample are more open to accepting influences on their behavior than they are to accepting influences on their attitudes. The Discussion section will elaborate on this finding, since it has been

supported by recent findings of a different study using different samples and methodology (Eilam & Trop, in preparation).

Analysis of the Variable "Personality" With Regard to its Interactions and Relative Impact

This section presents analyses that were carried out in order to answer the following questions: (a) With which other variables does the variable "personality" mostly interact? (b) What is the relative impact of the variable "personality"?

Analysis of interactions between "personality" and other variables.

Interactions between "personality" and other variables were analyzed in the following two ways:

A. Analysis of results obtained by the above factor analyses of influences on attitudes and on behavior;
B. Analysis of correlations between the variable "personality" and the other variables.

Following are the results of the analyses.

Inspection of factor analysis results.

Variables that belong to the same factor exhibit strong interactions with one another. With regard to influences on attitudes, the variable "personality" is included in factor 2, "personal and interpersonal interactions with informal educational agents and with nature". It is in strong interaction with the variables "youth movement", "nature", and "a leader / a guide".

The variable “nature” has been found in previous research to be one of the strongest predictors of environmentalism. The strong interaction between “personality” and “nature” suggests that on its own, exposure to nature cannot predict development of environmental attitudes. For environmental attitudes to develop, there is a need for personality to mediate such formative experiences. Further research is required in order to elucidate the specific characteristics of “personality” with regard to the present context.

With regard to influences on behavior, the variable “personality” is included in factor 4, “highly personal and interpersonal relationships”. It is in strong interaction with the variables “discussions/interactions with people” and “parents and family”.

Analyses of correlations.

An alternative approach to factor analysis is measuring closeness between variables by measuring correlations. While factor analysis presents groups of interrelated variables, correlation measurements can expose discrete variables that are in significant correlation with the variable “personality” regardless of the interactions among the other variables.

The association between each pair of variables was measured by calculating Pearson correlation coefficients. The significance of the correlation was determined by applying single-tailed *t*-tests. The outcome of the comparisons was a matrix of results of correlation tests, in which each variable was compared to another. The variables that were in significant correlation with the variable “personality” were singled out (Table 5). Table 5 presents correlations of “personality” with variables influencing attitudes and with variables influencing behavior. Following are the results of the analysis.

Table 5

Correlations between the Variable "Personality" and Other Variables, for Influences on Attitudes and for Influences on Behavior

Variable	Influences on attitudes			Influences on behavior		
	Significant correlations with "personality" (Pearson correlation)	**Significance** (1-tailed)	**N**	**Significant correlations with "personality"** (Pearson correlation)	**Significance** (1-tailed)	**N**
Community	0.557	0.000	61	0.321	0.06	62
Nature	0.509	0.000	61	0.369	0.002	61
Youth movement	0.502	0.000	61	0.333	0.005	60
Books	0.409	0.000	62	0.250	0.026	61
My child	0.340	0.004	60	0.306	0.008	62
My parents and family	0.316	0.007	60	0.348	0.003	61
Political/institutional sources	0.281	0.015	60	-	-	-
Being a parent	0.262	0.022	59	0.252	0.026	60
A leader/guide	0.257	0.022	62	0.222	0.044	60
School/s in which I've studied	-	-	-	0.332	0.004	62
Discussions/interactions with people	-	-	-	0459	0.000	62

Table 5 reveals that the variable "personality" interacts closely with most of the variables that were examined in the questionnaire. Eight variables were significantly correlated with personality in influencing both attitudes and behavior.

The following variables were not in significant interaction with "personality": (a) "Internet", "newspapers" and "television"—variables that belong to the factor "the media"; (b) "work/occupation" and "academic/continuation studies"—variables that belong to the factor "cognitive informative sources"; and (c) the variable "my teacher/s", which belongs to the factor "my early formal education".

Negative and significant correlation was found between the variables "personality" and "television" ($r = –0.239$*) with regard to influences on attitudes.

The differences between interactions regarding influences on attitudes and influences on behaviors are as follows: The variable "political/institutional sources" interacts with "personality" in influencing attitudes and does not significantly interact with "personality" in influencing behavior; the variables "school/s in which I've studied" and "discussions/interactions with people" interact with "personality" in influencing behavior and do not interact in influencing attitudes.

Analysis of the relative impact of the variable "personality".

The relative impact of "personality" was determined separately for each cluster. The clusters represent types of respondents, the "social" type and the "private" type. An analysis was carried out to determine to what degree "personality" influences each type of respondent, and within each type, to what degree it influences respondents' attitudes and to what degree it influences their behavior.

Figures 2 and 3 present the mean rankings of each variable for each cluster. Of the 20 variables that were ranked, the six variables that received the highest mean rankings by cluster and by influence aspect were singled out and depicted in a comparison table (see Table 6). Table 6 shows, for each cluster, the variables with the highest impact on attitudes and those with the highest impact on behavior. The relative importance (or impact) of personality is determined by the ranking of the variable among the six most influential variables.

Table 6

The Six Most Influential Variables, by Cluster ("social", "private") and by Aspect of Influence (Attitudes, Behavior)

Cluster type							
Cluster 1 – social				**Cluster 2 - private**			
Attitudes (N=38)		**Behavior (N=48)**		**Attitudes (N=26)**		**Behavior (N=15)**	
Variable	**Mean ranking**	**Variable**	**Mean ranking**	**Variable**	**Mean ranking**	**Variable**	**Mean ranking**
Personality	4.40	My child	4.40	Newspapers	3.40	Television	4.10
My child	4.30	Personality	4.20	Television	3.90	Newspapers	3.90
Nature	4.30	Nature	4.10	Nature	3.50	Internet	3.70
Internet	4.20	Being a parent	3.90	My child	3.40	Personality	3.50
Newspapers	4.03	My child's school	3.77	Internet	3.20	My child	3.20
Television	4.03	My parents and family	3.75	Personality	3.20	Nature	3.10

Table 6 reveals that for both clusters, the variable "personality" has a substantial effect on both attitudes and behavior; it is among the six most influential variables. However, the impact of personality on "social" types is different from its impact on "private" types. Among the social types, personality is the most important variable influencing attitudes and the second most important variable influencing behavior. Among the "private" types, personality is still an important determinant, but it is sixth in importance for attitudes and fourth for behavior. These results support the claim presented above regarding the important role of the inner self (personality) in organizing and giving meaning to all other formative experiences that can influence attitudes and behaviors towards the environment.

These results are consistent with the results of the previous analysis, which reveal that personality interacts with most other variables to produce an influencing effect.

Analysis of the Relative Influence of Environmental Schools in Comparison to Non-Environmental Schools

Environmental schools can influence parents' attitudes and behavior by two primary means, as follows: (a) by directly influencing parents through activities that involve parents and through correspondence with them; and/or (b) by indirectly influencing parents through intergenerational influences of students who internalize their learning and pass it on to their parents. Therefore, when examining the impact of environmental schools in Israel, it is important to look both at direct and at indirect influences.

We applied the following two analyses to examine the influence of environmental schools in Israel:

A. Analysis of the variables with the highest rankings, for each cluster and for each aspect of environmental literacy. The analysis relies on the data presented in Table 6. The data were obtained from the ENV group (parents of children who study in environmental schools).

B. Comparison of rankings of the ENV group to the rankings of the N-ENV group in order to determine whether environmental schools in Israel make a significant difference compared to non-environmental schools.

Analysis of ENV schools' direct and indirect influence.

When one examines Table 6, the following observations emerge regarding the direct influences of ENV schools and the indirect influences through intergenerational influences by children:

A. ***Influences on attitudes.***

- The variable "my child's school" does not appear as one of the six most influential variables on parents' attitudes either in cluster 1 ("social") or in cluster 2 ("private"). There is no indication of ENV schools' direct influence on the children's parents.
- The variable "my child" appears among the six most influential variables in both clusters 1 ("social") and 2 ("private"). Therefore, there is a strong indication of ENV schools' indirect influence on parents through intergenerational influence on attitudes.

B. ***Influences on behavior.***

- The variable "my child's school" appears among the six most influential variables on the behavior of parents who belong to cluster 1 ('social"), but not among those of parents who belong to cluster 2 ("private"). ENV schools appear to be highly effective in exerting direct influence on the behavior of parents who belong to the "social" type**.**
- The variable "my child" appears among the six most influential variables in both clusters 1 ("social") and 2 ("private"). Therefore, there is a strong indication of ENV schools' indirect influence on parents' behavior through intergenerational influence.

C. ***ENV schools' direct influence on children's parents*.** The results imply that environmental schools in Israel are more successful at influencing parents' behaviors than at influencing parents' attitudes towards the environment.

D. ***Intergenerational influence*.** The results imply that intergenerational influence successfully affects attitudes and behavior to an equally high degree.

The above findings raise the following question: In comparison to non-environmental schools, do environmental schools in Israel influence children's parents differently? The following analysis refers to these differences.

Analysis of differences between ENV and N-ENV schools in direct and indirect influences.

For the purposes of the present analysis, two samples were used and compared. The study sample was the ENV group ($N = 67$), which consisted of parents of children who study in environmental schools in Israel. The control sample was the N-ENV group ($N = 28$), which consisted of parents of children who do not study in environmental schools but rather study in regular schools located in the same types of neighborhoods with the same population characteristics as the ENV schools.

In order to compare the influences of the two types of schools, we compared the mean rankings of the ENV group with the mean rankings of the N-ENV group and plotted them against each other. This was done for comparison of influences on attitudes (Figure 4) and for comparison of influences on behaviors (Figure 5). We tested for significant differences between groups for the variables "my child's school" and "my child".

A dark arrow in Figure 4 or 5 signifies a significant difference between the means of the corresponding variable. A dashed arrow signifies a borderline statistical significance between the means.

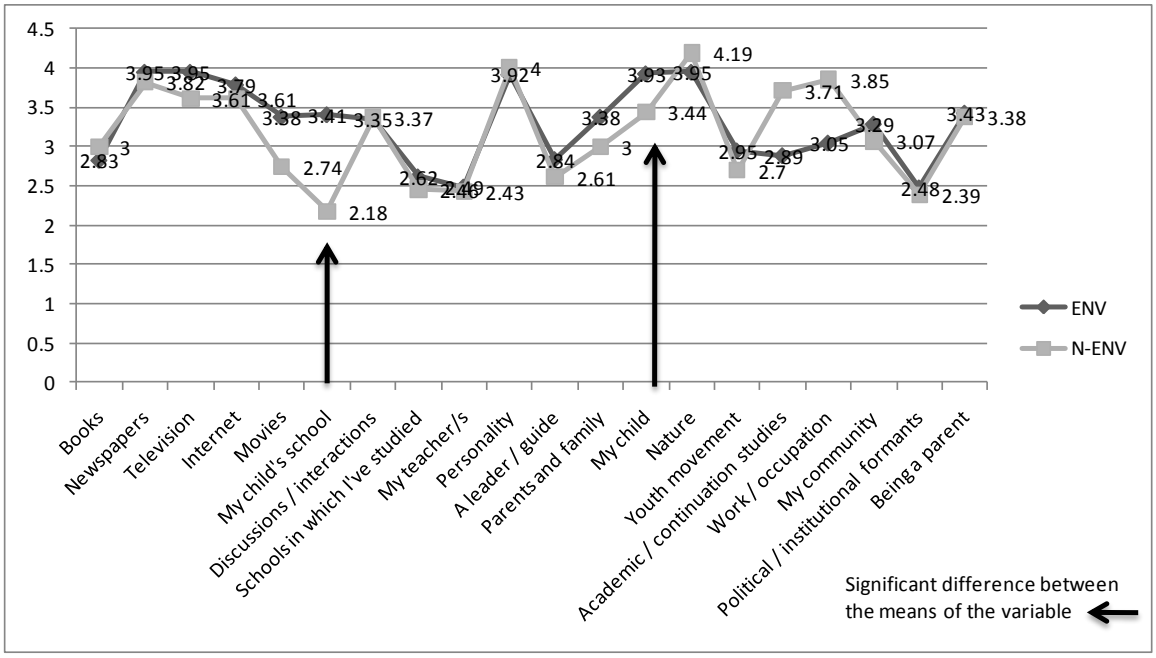

Figure 4. Comparison of mean rankings for influences on attitudes of ENV and N-ENV groups, by influencing variables.

The results regarding influences on attitudes indicate that the differences between the ENV and N-ENV groups in the mean rankings of the variables "my child's school" (direct influence) and "my child" (indirect, intergenerational influence) are statistically significant. Environmental schools in urban communities in Israel have a significantly greater influence on parents' attitudes than do non-environmental schools.

Figure 5 presents the mean rankings for influences on behavior of the ENV and N-ENV groups, by variable.

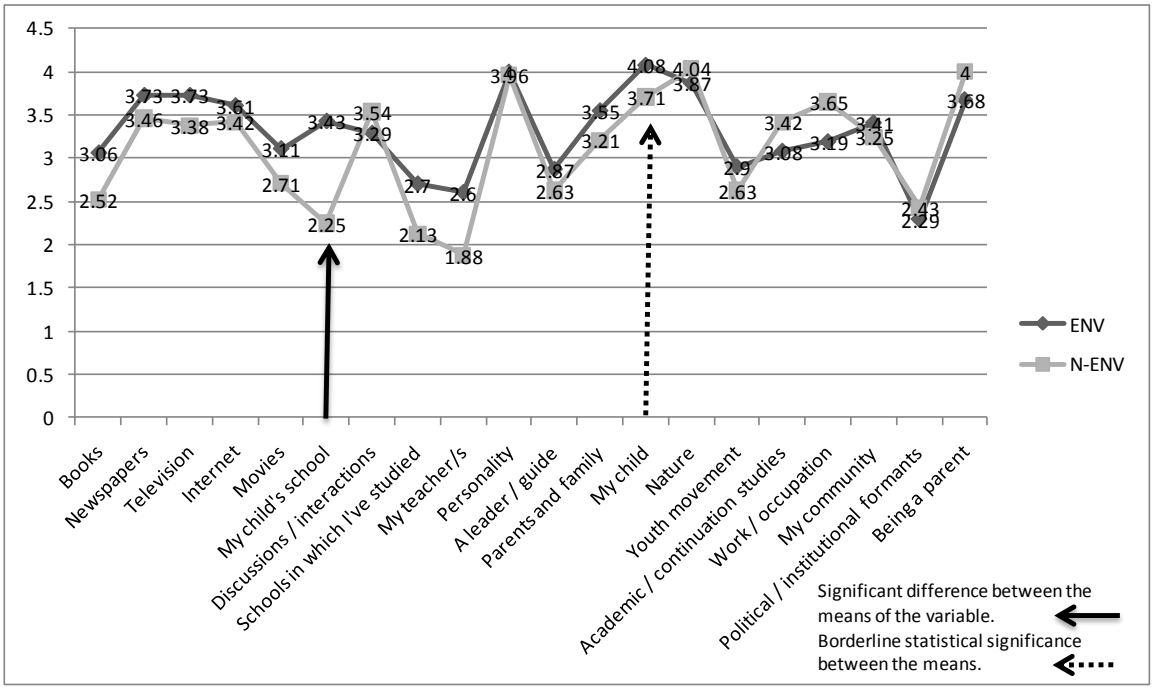

Figure 5. Comparison of mean rankings of influences on behavior for the ENV group and the N-ENV group, by influencing variables.

The results regarding influences on behavior indicate that the difference between the ENV and N-ENV groups in the mean rankings of the variable "my child's school" (direct influence) is significant, and the difference between the mean rankings of the variable "my child" (indirect, intergenerational influence) approaches statistical significance. This lack of significance can be attributed to the small sample size.

The compilation of results of the two analyses in the present section reveals that environmental schools in the two examined urban communities in Israel do affect parents' attitudes and parents' behavior, both through direct and through indirect formative influences (see results of the second analysis above). Yet, with regard to the direct influence of environmental schools, ENV schools are more effective in influencing behavior than they are in influencing attitudes (see results of the first analysis above).

Analysis of the Extent of Interaction between the Variables "My Child's School" and "My Community"

To analyze the extent of interaction between the variables "my child's school" and "my community" among environmental schools, we compared the ENV sample (N = 67) to the N-ENV sample (N = 28). Using Pearson correlation coefficients, we calculated which variables were significantly correlated and interacted most strongly with each of the above two variables. This procedure was done separately for the ENV group and for the N-ENV group, and separately for influences on attitudes and influences on behavior. Table 7 presents the results of the comparisons.

Table 7

Significant Correlations of the Variables "My Child's School" and "My Community" with Other Variables, by School Type and Influence Aspect

School type	The variable "my child's school"				The variable "my community"			
	Attitudes		***Behavior***		***Attitudes***		***Behavior***	
	Variable	*Pearson corr. Coefficient*	*Variable*	*Pearson corr. Coefficient*	*Variable*	*Pearson corr. Coefficient*	*Variable*	*Pearson corr. Coefficient*
ENV	**My child**	0.568	**My child**	0.595	**Personality**	0.557	**Being a parent**	0.557
			My community	0.402	**Political/ institutional sources**	0.505	**Political/ institutional sources**	0.417
					Nature	0.449		
					Parents & family	0.445		
					My child	0.416		
N-ENV	**Schools in which I've studied**	0.580	**My teacher/s**	0.744	**Youth movement**	0.565	**Personality**	0.464
	My teacher/s	0.431	**Schools in which I've studied**	0.666	**Political / institutional sources**	0.517		
	Political/ institutional sources	0.451	**Discussions/ interactions with people**	0.604	**Discussions/ interactions with people**	0.488		

Table 7 reveals that environmental schools in Israel do interact with their communities to form a linked influential experience on parents' behavior. With regard to influences on attitudes, the interactions between environmental schools and their communities are weaker.

These results provide additional support to this study's findings regarding environmental schools' relatively high effectiveness in influencing parents' behavior, in comparison to their moderate effectiveness in influencing parents' attitudes.

The variable "my child" is in high interaction with the variable "my child's school" and with the variable "my community", implying that some of the school's influences on parents' attitudes might not pass directly from schools to parents but rather result from intergenerational influences. In contrast to the environmental schools, there are no signs of any such interactions between non-environmental schools and their communities. This implies that non-environmental schools in urban communities in Israel do not interact with their communities to form an interconnected influential experience on environmental attitudes or behavior.

Additional information that can be obtained by examining Table 7 is as follows: In ENV schools, close ties are created between the school, the child and the community. In N-ENV schools the influence of the child's school is more strongly associated with that of the parents' past formal educational history and of external formal political/institutional sources. The intimacy and connectedness to the "here and now" that are observed among parents in the ENV schools are not observed among those in the N-ENV schools.

When one examines the interactions between "my community" and its related variables, the variable "political/institutional sources" shows a high correlation with "my community" in three out of four analyses and seems to be closely related to the concept of "my community" as perceived by the respondents. The differences between the ENV and N-ENV groups are less striking with regard to the variable "my community" than with regard to the variable "my child", but the phenomenon of intimate-close relations versus not intimate-past relations can be observed here, too, in a weaker form and with regard to influences on attitudes only.

Discussion

The discussion section addresses the following issues that emerge from the analyses: (a) the present study's implications for previous SLE research; (b) the role of environmental schools as sources of environmental influence on their communities; and (c) differences between influences on attitudes and influences on behaviors.

Implications for Previous SLE Research

The present article refers to previous SLE research by putting forward the following claims:

The validity of previous SLE research that aims to expose influences on environmental stewardship is compromised by a lack of differentiation between types of influence processes. Processes of influence on attitudes are not the same as processes of influence on behavior. When the two types of processes are considered as one, the derived picture becomes blurred by a mixture of two types of influencing vectors.

When formative experiences with regard to environmental stewardship are analyzed as isolated entities, their explanation capacity and predictive value are reduced. Some useful information can be gained by analyzing factors of influence and focusing attention on interactions between variables.

The focus of attention on interaction between variables rather than on discrete variables implies that among different types of people different associations between variables are expected to be found.

The variable "personality" is a fundamental determinant in organizing and mediating most other variables. Before it becomes possible to gain predictive value from SLE research, much research is required in order to understand how these processes occur.

The above claims are supported by the following findings:

The present study reveals that different variables interact to produce different degrees of influence on participants' attitudes and on their behaviors. The differences between influences on attitudes and influences on behavior are revealed in multiple analyses as follows: (a) Factor analyses (see Tables 1 and 2) revealed that most of the influences on attitudes are derived from slow processing of interpersonal experiences, whereas most of the influences on behaviors are derived from more remote sources such as the workplace and the media. (b) Analysis of distribution of participants between clusters revealed that it is easier to influence adults' behaviors than to influence adults' attitudes (see Tables 3 and 4). This conclusion is based on the finding that the difference between the two clusters (in terms of the percentage of the sample) was 2.4 times greater for influences on behaviors compared with influences on attitudes. (c) Analysis of the six most influential variables, which was aimed at identifying the influence of the variable "my child's

school" on the parents (see Table 6), revealed that there are differences between schools' influences on attitudes and on behaviors. (d) Finally, analysis of significant correlations between variables related to schools' influence and variables related to communities' influences (see Table 7) revealed that there are differences in interactions between variables, with regard to attitudes and with regard to behaviors.

The profound differences that were found suggest that in previous SLE research, which ignored the above differences, important information might have been masked by a lack of differentiation between influences on attitudes and influences on behaviors.

The present study focuses attention on the useful information that can be gained by analyzing interactions between variables rather than focusing on discrete variables. Analyses of interactions between variables revealed the following: (a) For each aspect of influence, six factors form categories of influences. The relative contribution of each category to the explained variance was calculated and presented (see Tables 1 and 2). (b) Analyses of correlations between variables provided insights into the important role of "personality" in organizing, constructing and giving meaning to most other influencing variables (see Table 5). (c) The analysis of interactions between the variables representing the schools their communities revealed that environmental schools in Israel interact with their urban communities to form an interconnected influential effect on children's parents. Non-environmental schools showed no such interactions with their urban communities. The analysis of interactions also revealed that environmental schools, their communities, and the parents' children form an association of influences that are intimate, relevant, and presently in progress, whereas in non-environmental schools, the

sources of influences are in the parents' past or derived from remote sources (see Table 7).

In the present study, two types of respondents were identified through a method of cluster analysis. The differences between the respondents were not merely quantitative but also qualitative. In a study conducted in Eastern Taiwan, Hsu (2009) found quantitative differences between environmental activists and those apathetic to environmental protection. The differences between the two groups were in the mean scores of the variables. The present study suggests that the differences between differing groups are also qualitative, as expressed by the different associations that can be found among variables. In the present study, the sample sizes were too small to enable factor analysis for each of the obtained clusters. Table 6 provides indication of these differences by presenting a comparison of the six most influential variables in each cluster. A. Gough (1999) drew attention to the importance of not treating the responses as coming from a homogeneous population. By using a combination of cluster analysis followed by factor analysis within each cluster, future studies will be able to yield insights into the unique ways in which the influential variables are associated with one another within each group of respondents.

Within the SLE debate, S. Gough (1999), N. Gough (1999), and Payne (1999) directed attention to the role of the inner self in constructing and giving meaning to significant life experiences. The same experiences can be constructed in many ways and lead to an array of attitudes and behaviors towards the environment. The present research confirms the fundamental role of "personality" by applying a statistical method that confirms that

"personality" is in significant interaction with most other variables and thus acts as a covariant that affects the ways in which other variables influence attitudes and behaviors.

The relative importance of the variable "personality" is even greater in cluster 1 than in cluster 2. Cluster 1 is composed of people who are more open to accepting influences regarding the environment. It is expected that the environmental activists and educators who constituted the samples of previous SLE research would be compatible with cluster 1 of the present study, because they were chosen for those studies on the basis of their interest in environmental issues. Since "personality" is revealed in the present study as such a crucial determinant of influences among the cluster 1 types, it becomes even more important to understand the characteristics of "personality" if we wish to gain any real insight into the makeup of environmental activists and educators, or even to gain more in-depth understanding of how influence processes work and shape an environmental worldview.

The Role of Environmental Schools as Sources of Environmental Influence on their Urban Communities

Chawla (2001) noted that results of SLE research suggest that formal education, and particularly primary school, is a weak source of formative environmental influence (Hsu, 2009). The present study indicates that in Israel, environmental schools nowadays are taking a role as catalysts of change within their communities.

Our study reveals that environmental schools in Israel are particularly successful in influencing the behaviors of parents who belong to cluster 1 (72% of the sample). The difference that was found between environmental schools and non-environmental schools was significant. The data for the present study were collected from parents of children

who study in a limited number of environmental and non-environmental schools in urban communities. The sample size for the present study is too small to enable us to draw conclusions regarding environmental schools country-wide. When the results of the present study are compiled with the results of another recent study, however, it becomes possible to draw such a conclusion. In a recent study by Eilam and Trop (in preparation), six environmental schools were chosen in Israel as representative of urban environmental schools in terms of relevant aspects of their curricula. The study analyzed the influences of the environmental schools on their communities by using 12 indicators for evaluation. The obtained results support the present study's findings.

Our current results also draw attention to the important role of schools in urban communities in creating a local sense of place among community members. Environmental schools that developed close interactions with their communities became part of the immediate intimate significant experiences of students' parents, thus focusing attention on the potential role of schools in loosely integrated urban communities and on the high impact of environmental interactions in integrating such communities.

Differences between Influences on Attitudes and Influences on Behavior

As discussed above and revealed by the study, influence is not a unified process. Our results support our proposition that attitudes and behaviors are influenced by different processes. The distinction made here between influences on attitudes and influences on behavior has implications for a wide range of issues in environmental education research and practice. If attitudes and behaviors are influenced by different processes, it follows that when designing and evaluating environmental programs, different strategies need to be employed for obtaining acquisition of environmental attitudes and for obtaining

acquisition of environmental behaviors. More research is required in order to identify effective strategies for influencing each of these aspects. It also follows that when evaluating influences, a clear distinction needs to be made between evaluation of influences on attitudes and evaluation of influences on behaviors. Another implication of the above results is that the media and formal education would be expected to be more effective in influencing changes in behaviors, rather than in influencing changes in attitudes. While influences on attitudes mature slowly through "slow-intake" experiences, influences on behavior are relatively easier to achieve through "medium-fast" experiences that can be operationalized in a pre-planned manner by the media and institutions. Our results imply that the adults in the sample are more open to accepting influences on their behavior and less open to accepting influences on their attitudes.

The results of the study also challenge the traditional environmental education model from the 1980s, which held that acquisition of environmental behavior is based on acquisition of environmental attitudes as a prerequisite. According to the present study among adults, it is easier to influence adults' behaviors than to influence their attitudes. These results are not surprising when viewed in light of some well-known behavioral campaigns worldwide, such as campaigns to buy greener products. Intensive behavioral campaigns can gain demonstrable success in a relatively short time. Their success can be reinforced by law, regulations, or social pressure. On the other hand, attitudinal changes, as they emerge from the study, are more complex cognitive and affective processes that are slower to develop. More research is required in order to understand the relationships between the two aspects of environmental literacy and to determine whether influence on behavior is a contributing factor to influence on attitudes or vice versa.

Implications of the Study for Future Research

The influence factors we obtained are an a posteriori statistical reflection of variables that interact with each other to create influences. We assume that these factors reflect the sample from which the data were gathered. The sample is composed mostly of females, in their mid-career (30–50 years old), with middle to high socio-economic status, well educated, and mostly with high awareness towards the environment. A reflection of the above characteristics can be found in the composition of the factors. For example, factor A1 for attitudes—"my past and present close relationships and myself as a citizen"—reflects people who are firmly woven into their societies. They represent high interconnectedness with the immediate (their children and children's schools) and remote social environment (political institutions). These characteristics are further reflected in the composition of the other factors. It is expected that when applying the same methods to samples of people from different backgrounds, different types of interactions between variables will arise. For example, in low-income and low-education urban areas, we might find that the media has a higher impact and that "political/institutional sources" will not be in interaction with "my child". These considerations need to be taken into account in future research.

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