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Participatory school experiences as facilitators for adolescents' ecological behavior

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ABSTRACT

This study investigates how sustainability-related in-school experiences, through psycho-social variables, influence adolescents' out-of-school general ecological intentions and behaviors. Data from a nationally representative sample of 2361 Finnish adolescents was used to test a hypothetical model. Effects of school experiences were studied using structural equation modeling. Excellent model fit showed that in-school agency and prosocial experience enhance adolescents' pro-environmental values, personal norms and self-efficacy for general ecological behavior. Ecological and pro-environmental intentions and behaviors outside of school were strengthened by the psycho-social constructs, especially by pro-environmental value and self-efficacy. In-school agency and prosocial experiences had stronger effects on psycho-social constructs, while the effect of ecological experiences was low. The model suggests that school's sustainability education should not provide only ecological experiences, but more importantly connect pro-social and agency experiences through an approach that emphasizes pro-environmental values and self-efficacy for general ecological behavior.

1. Introduction

1.1. Modeling self-reported general ecological behavior

Drivers of ecological problems and sustainability issues are rarely the result of malicious intent, but rather the consequences of the behavior and lifestyles of billions of humans (Schulz, 2011). Much effort has gone into studying the variations in and causation of ecological behavior. A widely applied theoretical framework in the field of environmental psychology is the Theory of Planned Behavior (TPB; Ajzen, 1991). Central to the theory is that the intention to perform a behavior is regarded as the immediate precedent of that behavior. The intention is then predicted by three psychosocial variables: people's perceived control, their value to performing the particular act, and their subjective norms. Specific behavioral types are then preceded by the specific intentions to act, which in turn are preceded by the three aforementioned psychosocial variables. Psychological literature emphasizes that values, attitudes and norms are important for pro-environmental behaviors (Bamberg & Möser, 2007; Hungerford & Volk, 1990; Milfont & Duckitt, 2004; Wiseman & Bogner, 2003).

Although the TPB is widely applied when modeling pro-environmental behavior of adults (e.g. Bamberg & Möser, 2007), less in known on the factors that influence the behavior of young people (Busse & Menzel, 2014; Kaiser, Oerke, & Bogner, 2007) in general and the role of school context in particular in enhancing general ecological behavior. Adolescents differ from adults in various ways: their values and life style are developing, and in general, they are not fully able to make independent decisions for instance on their consumption. When studying young people, their possibilities to make sustainability-related choices have to be taken into account. Kaiser et al. (2007) have defined different types of general ecological behaviors (GEB), such as energy conservation, mobility, waste avoidance, consumerism, recycling, and vicarious pro-environmental behaviors. Adolescents are especially relevant to study since they are at the onset of their lives as active citizens and leaders of tomorrow (Ginwright & James, 2002), they are also at the point of consolidating habits and behavioral patterns (Moreno, Henauw, Gonzalez-Gross et al., 2008), and the formation of identity and

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interpersonal relationships (Blakemore, 2008).

The school context may have a strong influence on adolescents' personal development. Adolescents spend a large part of their time in school, and formal education is seen as one of the key pathways to changing the way we interact with our environment (McKeown & Hopkins, 2007; Morgesen & Mayer, 2005). In this study the TPB was used as a leitmotif to study whether adolescents' in-school sustainability experiences have effects on their sustainability-related psychosocial variables and finally also on their out-of-school general ecological intentions and behaviors. TPB was the starting point of the study, but we made modifications to study adolescents' responses to general ecological issues especially in the school context, for instance personal norms concerning sustainability issues related to school context. Self-efficacy instead of controlled behavioral control was studied, because in educational psychology, perceived self-efficacy has been found to be important in influencing motivation, learning, and competences development (Anderson & Betz, 2001; Bandura, 1997; Usher & Parjares, 2008). Self-efficacy is defined as a belief on one's own ability to complete a task, reach a goal or exert a behavior (Bandura, 1997). According to Ajzen (2002), self-efficacy is much related to perceived behavioral control. The difference is in that perceived behavioral control is formed of two dimensions, self-efficacy and controllability (Ajzen, 2002). Because several variables are found to influence behavior, the theory of planned behavior (Ajzen, 1991) with structural equation modelling (SEM) is often applied in quantitative research (e.g. Bamberg & Möser, 2007; Kaiser, Wölfing & Fuhrer, 1999) to build general models to explain GEB.

1.2. School as learning environment for ecological behavior

In school education, learning on GEB is connected with sustainability education, which is recommended to be implemented as a whole-school approach (Henderson & Tilbury, 2004; Tilbury & Wortman, 2005). Nowadays Education of Sustainable Development (ESD) is widely included the school curriculum around the world (UNESCO, 2014). ESD include multiple viewpoints of sustainability, and emphasize participation and the interactions between learners and their surroundings. ESD also strives to involve more student-centered and collaborative, inquiry-based approaches to teaching and learning. The aim is that learners critically and positively consider sustainability issues, participate in informed decisions for a sustainable future, and engage in action (McKeown & Hopkins, 2007; Tilbury & Wortman, 2005). In addition to awareness and skills, students should embrace sustainability values and the willingness to choose a responsible way to live in terms of sustainability (Henderson & Tilbury, 2004).

In ESD, learning should be holistic, considering the ecological, social and economic aspects of sustainability. However, environmental knowledge has often been emphasized in school education (McKeown & Hopkins, 2007; Morgesen & Mayer, 2005). Although the goals of, for instance, eco-schools emphasize students' values and an active role in learning responsible behavior, the education often increases only knowledge but fails to achieve the most important goal, which is to enhance the students' responsible way of life (Boeve-de Pauw & Van Petegem, 2011; Krnel & Naglič, 2009). The reason for this mismatch between goals and outcomes may be that formal education has focused on activities such as teacher-managed actions by the students, which do not remarkably change pupils' attitudes and behaviors since they ignore pupils' critical thinking, decision-making and action competences (Krnel & Naglič, 2009).

Although there is an agreement on the quality and goals of ESD, there is not much evaluative research on the success of sustainability education (Boeve-de Pauw, 2014; UNESCO, 2014). For instance, it is not known how students experience ESD at school and if these experiences have any influence on their values, skills and intentions to act in a sustainable way in their own life. Thus, an important question is the ultimate outcome of ESD efforts: Do adolescents believe that they have the skills and opportunities to live in a sustainable way in their own life and work actively for SD at school or in society?

Although there is an agreement on the quality and goals of ESD, there are not much research how well the final goals of ESD have been reached (UNESCO, 2014). To acquire nuanced information on the effects of implemented sustainability activities at school, structural equation modeling (SEM) would provide a useful tool for evaluation purposes, because it allows the study of complex interactions between different experiences and psychosocial variables which precede specific behaviors. However, modeling of the effects of ESD efforts has not been carried out because of several difficulties. First, the goals of ESD are based on the UNESCO agenda, meaning that the theoretical background and methodology of ESD research cannot be defined at the empirical level, but the framework of behavioral sciences has to be applied. Second, the processes of ESD vary in different contexts, learning organizations and countries. Finally, in organizations many groups of acting individuals have to be considered, which makes the planning and conducting of ESD research demanding and non-straightforward.

Finland has an egalitarian educational system, which steady improvement in student learning has been attained through the Finnish education policies based on equity, flexibility, creativity, professionalism and trust to schools' and teachers' pedagogical expertise (Sahlberg, 2007). In the Finnish basic education ESD is a cross-curricular theme. To provide information on the effects of Finnish schools' ESD efforts, we stated a hypothesis on the relationship between adolescents' school experiences, psycho-social factors and self-reported general ecological intentions and behaviors, the final goal of ESD. TPB was applied and SEM used in testing the hypothetical model (Fig. 1).

1.3. Participation and agency experiences at school

Studies from different areas such as environmental education, youth development and experiential learning (e.g. Kolb, 1984) illustrate the importance of experiences in learning and in the adoption of behaviors. Schools' action culture is largely directed by the curriculum, which makes the school a learning environment that provides adolescents with specific experiences of sustainability. A basic question that arises is the ultimate outcome of ESD efforts: Do adolescents believe that they have skills and possibilities to live in a sustainable way in their own life and work actively for SD at school or within society? Only a few studies have focused on this question. In an earlier study, we conducted a multilevel analysis based on a large survey of Finnish grade nine students (Uitto, Boeve-de Pauw & Saloranta, 2014). We found that, despite the large variance of adolescents' personal socio-psychological characteristics within the schools, ESD management and implementation in subject teachers' teaching methods and headmasters' decisions had an effect on adolescents' self-efficacy for GEB at the school level (Uitto et al., 2014). This suggests that the efforts of ESD are not lost, because schools that invest in ESD influence adolescents' self-efficacy beliefs.

According to recent studies, participation in sustainability (Reid, Bruun Jensen, Nikel & Simovska, 2009) plays a crucial role in reaching the goals of ESD. In general, the level of student's participation can be described in terms of five different levels, 1) students listen to the teacher, 2) they are supported in expressing

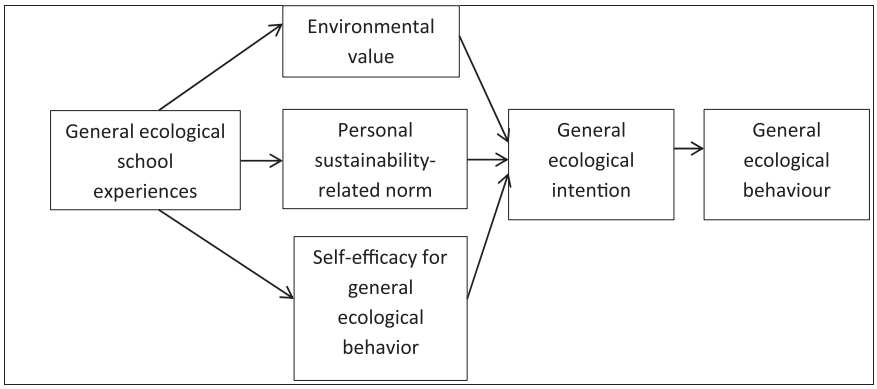

Fig. 1. Hypothetical model of general ecological school experiences and psycho-social variables in explaining self-reported general ecological intentions and behaviors.

their views, 3) their views are taken into account, 4) they are involved in decision-making processes, 5) they share power and responsibility in decision making (Shier, 2001). It is obvious that the goals of ESD are directed towards the higher levels of participation, so that learning environments are organized in a way that pupils have the possibility to participate in the planning and implementation of diverse sustainability activities (UNESCO, 2014). The research on transformative learning in organizations (Engeström & Sannino, 2010) states that the goals are not only to learn how to participate and act, but to learn activity, the competence to comprehend the structure and function of the organization and how change can be made through agency, which means the awareness of one's role and the possibility of influencing and changing the organization. Although the functioning of a school is prescribed by the curriculum, and the activities are often quite normative in nature (Engeström & Sannino, 2010), the core idea of ESD emphasizes agency and transformative learning (c.f. Mogensen & Schnack, 2010), which is also a challenge for school education.

Recently Zint, Kraemer, and Kolenic (2014) have shown that adolescents' environmental stewardship increases if they experience active or participatory environmental actions. Van der Linden (2015) describes how direct experiences with climate change can facilitate the adoption of climate change mitigation behaviors in adults. An important step in research on the environmental behavior of adolescents is to study more deeply how participatory experiences within the context of formal education, together with their psycho-social factors influence their adoption of sustainability behaviors. The current study will go deeper into what kind of effects different kinds of experiences have on the psycho-social variables preceding the GEB.

2. Focus of the study

The aforementioned insights into SD and ESD, the psychology of environmental behavior, the specific context of formal education, and activity theory come together in the research question we put forward in the current study:

> What are the effects of psychosocial variables and in-school ecological experiences on adolescents' out-of-school self-reported general ecological behaviors?

Because socio-psychological variables have been considered to be important for environmental attitudes and behaviors (Bamberg & Möser, 2007; Hungerford & Volk, 1990), the TPB (Ajzen, 1991) was chosen as a leitmotif for this study. Since formal education presents a specific learning environment in which the activities are largely defined by curriculum, the TPB was not used as such but modified according to the implementation of the goals of ESD. We present the hypothesis that adolescents' sustainability experiences of participation together with the psychosocial factors values, norms, self-efficacy and intentions (Fig. 1) are important precedents of GEB.

To answer the research question, two major analytical steps were central to the study. First, the effects of psychosocial variables as pro-environmental values, personal sustainability-related norms in the school context and self-efficacy for GEB through a confirmatory analysis of the stated hypothesis were estimated (Fig. 1). The original model of TPB include attitudes, however, because ESD emphasize sustainability values, items that measure pro-environmental values were used in this study. Second, the effects of different kinds of in-school sustainability experiences, ranging across different contexts and levels of participation, on the psychosocial variables were estimated.

The analyses created new knowledge about the relative importance of each of the psychosocial variables and how they can be targeted through sustainability experiences at school. Such insights are relevant since they can guide schools and ESD practitioners toward more effective practices in teaching for sustainability, but they also help us understand the formation and adoption of environmental behavior in adolescents in general. Fig. 1 represents the hypothetical model, connecting school experiences to self-reported GEB outside the school. It is also an integrated illustration of the two analytical steps.

3. Methods

3.1. The questionnaire and variables

To study factors behind secondary school 9th grade students' sustainability actions at schools, a large scale research project was initiated in 2009 (see Uitto & Saloranta, 2010). A specific student questionnaire was developed for the research. The original questionnaire composes of ten pages with 210 items connected to with questions that consider students' sustainability-related psychosocial variables and activities within and outside the school. The questionnaire includes items that measure students' responses on either ecological or social sustainability issues, but for this paper only the ecological dimension was concerned. To measure the self-reported GEB, the items of Kaiser and Wilson (2004) and Kaiser et al. (2007) were applied or specific items were written to suit the need of the study. We used two types of behaviors and the associated intention in the current study. On the one hand we focus

Table 1
Variable names, original number of items in the questionnaire, section questions, and scale types of each section.

Variables	Number of items	Question	Scale type
Self-reported general ecological behavior	20	Estimate how often you behave the way described below in your own life outside of school	1 = very seldom, 2 = rather seldom, 3 = sometimes, 4 = rather often, 5 = very often
Self-reported general ecological intention	11	What kind of intentions you have in the future? Choose the alternative you think best suits your opinion. My intention is …	1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree
Pro-environmental value/attitude	20	What is your opinion about the statements listed below? Choose the alternative you think best suits your opinion.	1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree
Personal sustainability-related norm	13	What is your opinion about the school rules? Choose the alternative you think best suits your opinion.	1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree
Self-efficacy for ecological behavior	11	What do you think about your skills to act in sustainable way? Choose the alternative you think best suits your opinion.	1 = very poorly, 2 = rather poorly, 3 = middling, 4 = rather well, 5 = excellently
Sustainability school experiences at grades 7 to 9	23	Estimate how often you have acted the way described below in the school. I have participated …	1 = very seldom, 2 = rather seldom, 3 = sometimes, 4 = rather often, 5 = very often

on energy saving behavior (c.f. Kaiser et al., 2007) in the private sphere, on the other we focused on vicarious pro-environmental behavior.

The items measuring pro-environmental values were developed by applying the studies of Kaiser et al. (1999) and Dunlap, Van Liere, Mertige, and Jones (2000) and Milfont and Duckitt (2004). The value items measured students' responses to the statements emphasizing biophilic or utilistic values, or human values. For personal sustainability-related norms, self-efficacy beliefs, school sustainability experiences, intentions and self-reported behaviors, the activities relating to the objectives and contents of the cross-curricular theme "Responsibility for the environment, well-being, and a sustainable future" in the Finnish National Curriculum of Basic Finnish National Board of Education (2004), and the OKKA Foundation[2] were applied (see also Breiting, Mayer, & Mogensen, 2005). These documents emphasize learning on sustainability values, attitudes and competencies to act ecological sustainable way in one's own life and for the basis of schools ESD goals. Personal sustainability-related norm items were designed to measure adolescents' responses in the school context, because the aim of the study was to investigate the effects of ESD in the school context. Self-efficacy for GEB was measured as adolescents' evaluation on their own skills to act ecologically in their own life, outside the context of formal education. Variable names, numbers of items measuring students' responses to questions concerning ecological sustainability, as well as Likert scale types of the questionnaire are shown in Table 1. Items used in the present study can be found in Table 2.

The contextualization translates into the item battery that was used to tap into the different psycho-social factors included in the survey. Sample items for ecological intentions and behaviors are provided in Table 2. Table 3 lists sample items for psychosocial constructs. Samples of items tapping into the different kinds of sustainability experiences adolescents encounter in the context of their formal education are included in Table 4.

[2] The OKKA Foundation is a foundation for teaching, education and personal development supporting the educational sector. Its founding organizations are the Trade Union of Education in Finland (OAJ) and several teachers' associations in the vocational sector. The OKKA Foundation has the right to grant sustainable development certification of educational establishments in Finland (http://www.koulujaymparisto.fi/).

3.2. Respondents

A stratified sampling procedure was used to collect a nationally representative data by taking the number of schools in each sub-region (counties) and the relation of the urban, suburban and rural schools into account. In the research project grade nine students' personal and school-related variables were studied so that 3232 questionnaires were sent to 54 lower secondary schools in 2010. In Finland grade nine is the last year in the comprehensive school and as a part of lower secondary school (grades 7–9) separated from the primary school (grades 1–6) and upper secondary school (grades 10–12). The respondents had an average age of 15 years. The number of participating students per school varied between 21 and 64. In each school the questionnaire was completed either by the students of two or three class groups. The total number of analyzed questionnaires was 2361 after removing inadequately filled-out questionnaires. The response rate for the selected schools was 91%, and for the students 73%. Altogether, 1244 girls and 1106 boys answered the questionnaire; 11 students did not indicate their gender. The sample has a boy:girl sex ratio of 0.89. The students were allowed 1 h to complete the survey, which was sufficient.

3.3. Analyses

Missing values per item was usually 0–2%, at highest less than 6%. In the first step, missing values were imputed with an expectation-maximization (EM) algorithm (PASW 18). The substitution of missing values had virtually no effect on the items' means (0.0001–0.01%).

Explorative factor analyses (EFA) were used to discern the different latent variables meant to tap into the constructs central to the hypothetical model: values, norms, self-efficacy, and general ecological intentions and behaviors, and to assess their unidimensionality. Next, confirmatory factor analyses (CFA) and structural equation models (SEM) were used to further study the interrelations between the constructs.

3.3.1. Exploratory factor analyses

The aim of the EFA was to study the underlying latent constructs of variables. Principal axis factoring method (Ford, MacCullum, & Tait, 1986) was used (IBM software, PASW 18). Only factors with eigenvalues more than 1 were retained as suggested by the Kaiser-Guttman rule (Bandalos & Boehman-Kaufman, 2009). The number

Table 2
Descriptives and CFA for ecological and vicarious pro-environmental behavior, as well as intentions for behaviors (N = 2361).

Factor	Scale	Factor loading	*M*	*SD*	Items
Intentions					
Intention for ecological behavior	*M = 3.27*	1.00	3.01	1.13	By my ways of life preventing the formation of waste and litter already in advance.
	SD = 0.98				
	α = 0.86	1.00	3.35	1.20	Sorting my waste and litter in the right way.
		1.01	3.35	1.16	By my ways of life diminishing the waste of energy (e.g. by saving electricity).
		0.81	3.36	1.17	When traveling using public transport (e.g. bus, train).
Intention for vicarious pro-environmental behavior	*M = 2.5,*	1.00	2.43	1.05	Participating in the activities of organizations conserving nature or the environment.
	SD = 0.90				
	α = 0.85	1.02	2.61	1.08	Participating in the activities of human right organizations and charities.
		1.17	2.80	1.09	Learning what the environmental problems are and how they might be solved.
		1.11	2.43	1.08	Persuading my friends to join in the activities of environmental protection or charity work.
Behaviors					
Ecological behavior	*M = 3.39*	1.00	4.03	1.09	As the last person to leave a room, I switch off the lights.
	SD = 0.74	0.69	3.44	1.44	When I leave the computer I leave it on for later use. R
	α = 0.60	0.78	3.23	1.33	I shower as long as I want to. R
		0.81	2.84	1.31	I leave the TV on, even if I am not watching it. R
Vicarious pro-environmental behavior	M = 1.85	1.00	1.52	0.97	I try to persuade my friends to eat vegetarian food.
	SD = 0.77	1.14	2.03	1.20	I try to persuade my friends to buy items in flea markets.
	α = 0.74	0.87	1.57	0.99	I participate in activities that work with nature (e.g. 4H club).
		1.14	1.89	1.10	I participate in the actions of charity organizations or in voluntary work (e.g. UNICEF, The Red Cross).
		1.21	2.23	1.21	I persuade my friends to use public transportation.

of factors was based on a visual inspection of the scree plot, interpretability of the items sets, and their fit with the theoretical framework within which the current study is set up. Since we explicitly expect the emerging factors to be interrelated, we rotated the factor solution obliquely (Direct oblimin). Only factors with more than two items and with a factor loading above 0.30 were retained, as suggested by Tabachnick and Fidel (2007). We performed two separate EFAs. the first to using the items expected to load on psychosocial, intention and behavior items, and the second using all the items tapping into the experiential factors.

Table 3
Descriptives and CFA for socio-psychological factors (N = 2361).

Factor	Scale	Factor loading	*S.E.M*	*SD*	Items
Pro-environmental value	M = 3.48	1.00	3.44	1.19	Animals and plants have equal rights to life as humans.
	SD = 0.75	0.87	3.53	1.04	People are part of nature, like other living organisms.
	α = 0.78	1.02	3.50	1.03	I affect the state of the environment through my own consumer habits.
		0.99	3.30	1.05	People dismiss environmental problems.
		1.03	3.70	0.99	Through my own behavior I affect the well-being of my circle of acquaintances.
		1.14	3.43	1.14	People exploit the nature too much only to fill their own needs.
Personal sustainability-related norm	M = 3.30	1.00	3.05	1.15	I follow the school's environmental instructions because I find them important.
	SD = 0.96				
	α = 0.86	1.17	3.27	1.16	If everybody follows the school behavior rules, it helps make school more pleasant.
		1.11	3.44	1.27	I turn off dripping taps at school because I do not want to waste water.
		1.18	3.41	1.15	I can contribute to a good atmosphere at school through my friendly behavior.
		1.10	3.33	1.25	School rules are for the benefit of all pupils.
Self-efficacy for GEB	M = 3.09	1.00	3.48	1.04	By my own actions diminishing my consumption of electrical energy.
	SD = 0.81	0.80	2.80	1.04	Comparing the energy consumption of different electric equipment.
	α = 0.90	1.07	3.28	1.11	Choosing the most environmentally friendly way to travel.
		1.10	3.34	1.14	Sorting usable waste into the right receptacles.
		1.11	2.95	1.05	Diminishing the amount of mixed waste in advance with my consumption choices.
		1.06	2.97	1.07	Clarifying the meaning of different eco-labels on products.
		1.01	3.14	1.18	When shopping clarifying the country of origin of the product.
		1.03	3.03	1.11	Thinking about the causes and effects of problems for humankind (e.g. poverty, wars).
		1.01	2.80	1.02	Clarifying what kind of environmental problems there are in my neighboring area.

Table 4
Descriptives of CFA for ecological experiences (N = 2361).

Factor	Scale descriptives	Factor loading	*M*	*SD*	
Ecological school experiences	M = 1.89	1.00	1.77	1.07	Calculating the size of my ecological footprint or rucksack.
	SD = 0.79	1.14	2.01	1.04	Studying a product's life-cycle.
	α = 0.84	1.13	1.78	1.03	The school's recycling event and sold or exchanged my old goods.
		0.96	1.93	1.06	Making a visit related to environmental matters (e.g. to a recycling center or communal dump).
		1.12	1.96	1.04	Making a study of the condition of the nearby environment (e.g. the condition of water or air, or the noise level).
		1.18	1.99	1.09	Theme weeks or campaigns related to energy saving.
Prosocial school experiences	M = 2.57	1.00	2.31	1.18	Cleanup events of the schoolyard or neighborhood.
	SD = 0.87	1.14	2.29	1.20	Campaigns (e.g. exercise, sleep, nutrition) to support health.
	α = 0.81	1.13	2.70	1.21	Discussions during lessons at school related to safety, comfort, welfare or bullying.
		0.96	2.95	1.26	Evacuation (e.g. fire drill) of your school building.
		1.12	2.57	1.22	Making a visit to a cultural institution (e.g. museum, theater, library).
		1.18	2.28	1.23	Aid campaigns (e.g. a UNICEF walk, a Red Cross Hunger Day).
Agency experiences	M = 2.15	1.00	2.70	1.28	An enquiry to enhance school functions (e.g. teaching, the functioning of the school canteen).
	SD = 0.86				
	α = 0.80	1.17	2.21	1.17	Improving comfort (e.g. by repairing equipment in communal areas or your schoolyard).
		0.10	2.04	1.26	The actions of a student fraternity or canteen group.
		0.98	2.19	1.42	Activities such as twinning students, peer students or peer mediator students.
		1.13	1.83	1.06	International activities (e.g. having international visitors).
		1.27	1.95	1.13	Your school's own environmental actions (e.g. planning events).

Seven factors emerged from the first EFA. Three factors (pro-environmental value, personal sustainability-related norm, and self-efficacy for GEB) appeared as clearly separate and unidimensional factors. Self-reported general ecological intentions and behaviors were each built up out of two underlying factors, relating to the specific content of the items they span, which are marked as intention for ecological behavior and ecological behavior on the one side, and intention for vicarious pro-environmental behavior and pro-environmental behavior on the other. Ecological intention and behavior contain items concerning waste avoidance, recycling, energy conservation and mobility. Vicarious pro-environmental intention and behavior contain items concerning persuade friends or partaking in activities organized through organizations. Tables 2 and 3 show the items in each of the factors.

The second EFA explored the item battery relating to sustainability school experiences. Three factors emerged from this EFA, discerning between ecological experiences, prosocial experiences and agency experiences. The number of items accepted per analysis varied from four to nine (see Table 2 through Table 4). The next step in the analyses was to check the internal consistency of each of the factors that emerged from the EFAs. As can be seems in Table 2 through Table 4, all scales tapped into the constructs with sufficient reliability (all alphas between 0.74 and 0.90), except for self-reported ecological behavior for which a marginally acceptable alpha of 0.60 is reported, and which could not be increased through item deletion.

3.3.2. Confirmatory factor analyses

The next step in the analyses is central to answering the research question. Through confirmatory factory analyses (CFA) we built a model estimating the effects of the experiential factors on the different psychosocial variables and further on specific ecological and vicarious pro-environmental behaviors through the intentions of the respondents. To evaluate the model fit, multiple fit indices were used with minimum values around 0.95 for the CFI and TLI index, and a value of 0.06 or less for the RMSEA (Tabachnick & Fidel, 2007). Where necessary, modification indices (MI) were used to identify how to improve the model fit based on error covariance between items within the same factor (Byrne, 1993). Since all data was ordered categorical by nature, the WLSMV estimator was used with delta parameterization (Muthén and Muthén, 2010).

The CFA was not estimated in a multilevel approach, but the errors for the nestedness of adolescents in schools were corrected for their hierarchical dependency through the *Mplus* type = complex command. Once fit-indices were acceptable for the CFA with all latent factors included in same model, the estimations for interrelationship between those constructs were estimated. First the relations between the psycho-social constructs and the experiential variables were fitted (model 1, see Fig. 2). After allowing for covariance between some items, fit indices were found acceptable. Then, effects on behavioral intentions and behaviors were also included into the model (model 2, see Fig. 3), again some covariance between items were allowed, based on modification indices, and only within latent variables, not between them.

4. Results

4.1. Self-reported general ecological intentions and behaviors

For self-reported general ecological intentions outside of school, two types of dimensions were found to be used in the SEM analysis: intention for ecological behavior (items of recycling, energy conservation and mobility) and intention for vicarious pro-environmental behavior (participating in the activities of organizations, learning about environmental issues, persuading other people to participate). The corresponding two self-reported behaviors included ecological behavior (energy conservation) and vicarious pro-environmental behavior (participating in the activities of organizations, persuading other people to participate) (see Table 2). The descriptive results indicate that adolescents slightly agreed to have intentions to such ecological behavior ($M = 3.3$) and slightly disagreed to have intentions for vicarious pro-environmental behavior ($M = 2.6$). However, in both cases the standard deviation was high (i.e. near 1). For self-reported behaviors, adolescents' responses indicated that on average they

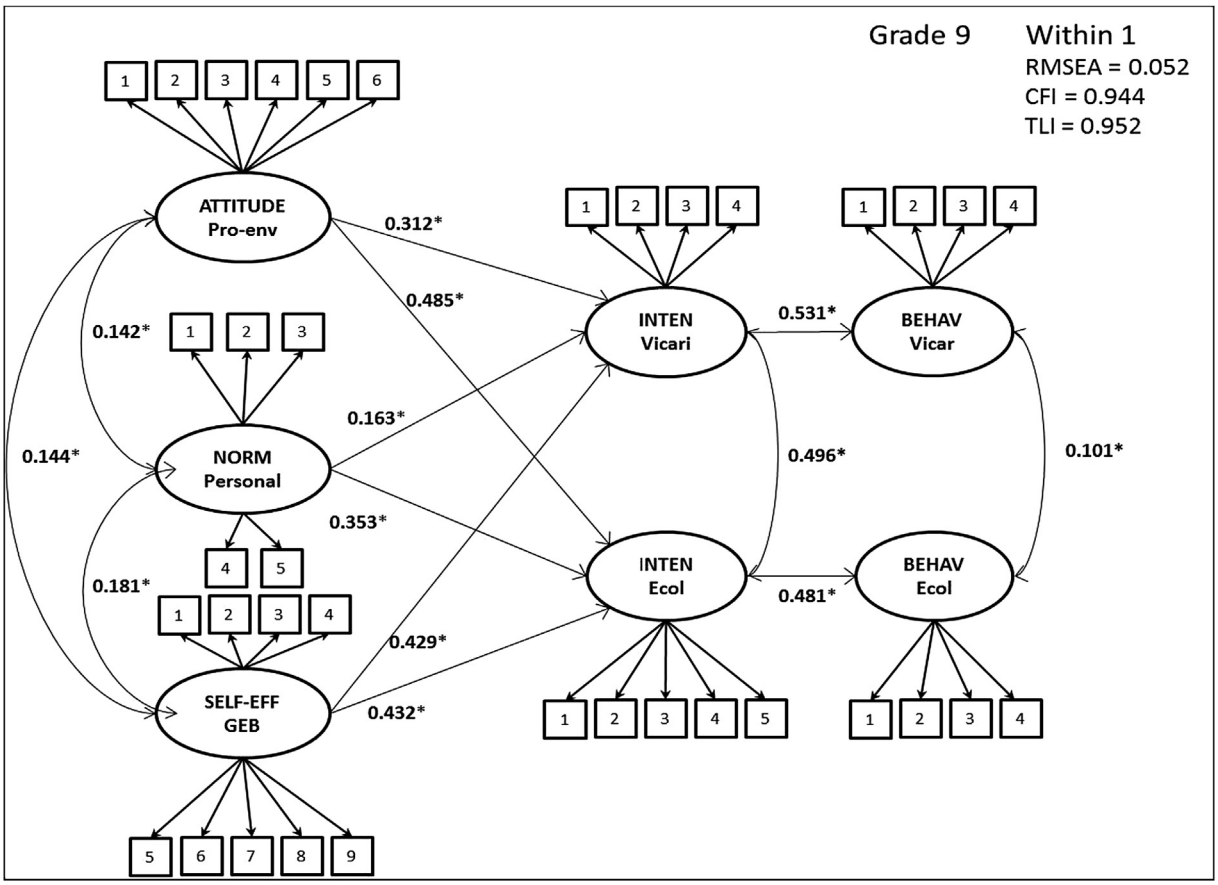

Fig. 2. SEM model (Model 1) testing the hypothetical model on the influence of psychosocial variables on general ecological behaviors outside of the school. Values indicate standardized regression weights, * marks significance at $p < 0.001$. VALUE Pro-env = pro-environmental value, NORM Personal = personal sustainability-related norm, SELF-EFF GEB = Self-efficacy for GEB, INTEN Vicar = Intention for vicarious pro-environmental behavior, INTEN Ecol = Intention for ecological behavior, BEHAV Vicar = Vicarious pro-environmental behavior, BEHAV Ecol = Ecological behavior.

sometimes or quite often acted ecologically by saving energy ($M = 3.4$), but vicarious pro-environmental behavior took place more seldom ($M = 1.9$).

4.2. Psychosocial factors

On average, the item means of each factor indicated that adolescents' environmental values ($M = 3.5$) and personal sustainability-related norms in the school context ($M = 3.3$) were slightly positive (see Table 2). For instance, the adolescents agreed with the statements on the value of living nature and that it is important to follow school's sustainability-related norms. Adolescents' self-efficacy for GEB was middling ($M = 3.1$). Adolescents were unsure about their skills to act in favor of the environment, for instance in energy conservation, waste avoidance or consumption.

4.3. Experiences

Three different dimensions of sustainability experiences were included in the study: (1) ecological experiences, (2) prosocial experiences and (3) agency experiences (see Table 4). Most frequently they participated in prosocial activities ($M = 2.6$) and least in ecological activities ($M = 1.9$). Ecological experiences included activities like learning about ecological footprints or a product's life-cycle, participation in the school's recycling events, school visits, studies of the conditions of the local environment or the school's energy-saving activities. In these items the focus was on eco-sustainability without a clear human context. Prosocial experiences included activities like voluntary tidying bees, health campaigns, conversations considering safety, well-being or bullying, practicing emergency exits, visits to a cultural institution or aid campaigns. In agency experiences adolescents had an active and autonomous role in influencing a school function, such as answering enquiries to enhance the school's function, improving well-being in the school, participating in an adolescent fraternity or canteen group, acting as a peer mediator, or taking part in international activities or the school's environmental actions. In prosocial and agency experiences the focus was more clearly on the human context.

4.4. Structural equation models

The results of the SEM models are shown in Fig. 2. The first model (model 1) showed the estimated all structural relations included between the constructs of the hypothetical model, both for ecological behavior and for vicarious pro-environmental behavior. With all fit indices at an acceptable level, this model fits nicely to the data and thus confirms the TBP. The model not only includes the estimates for the effects of the constructs on behavioral intentions and behaviors, but also the intercorrelation between intentions, between behaviors, and between the precedents in the model. The model confirmed the importance of self-efficacy beliefs as the major predicting construct of self-reported ecological intentions. The second model (Fig. 3) adds the three experiential factors and thus provides an answer to the central research question of this study. All experiences are shown to have effects on the

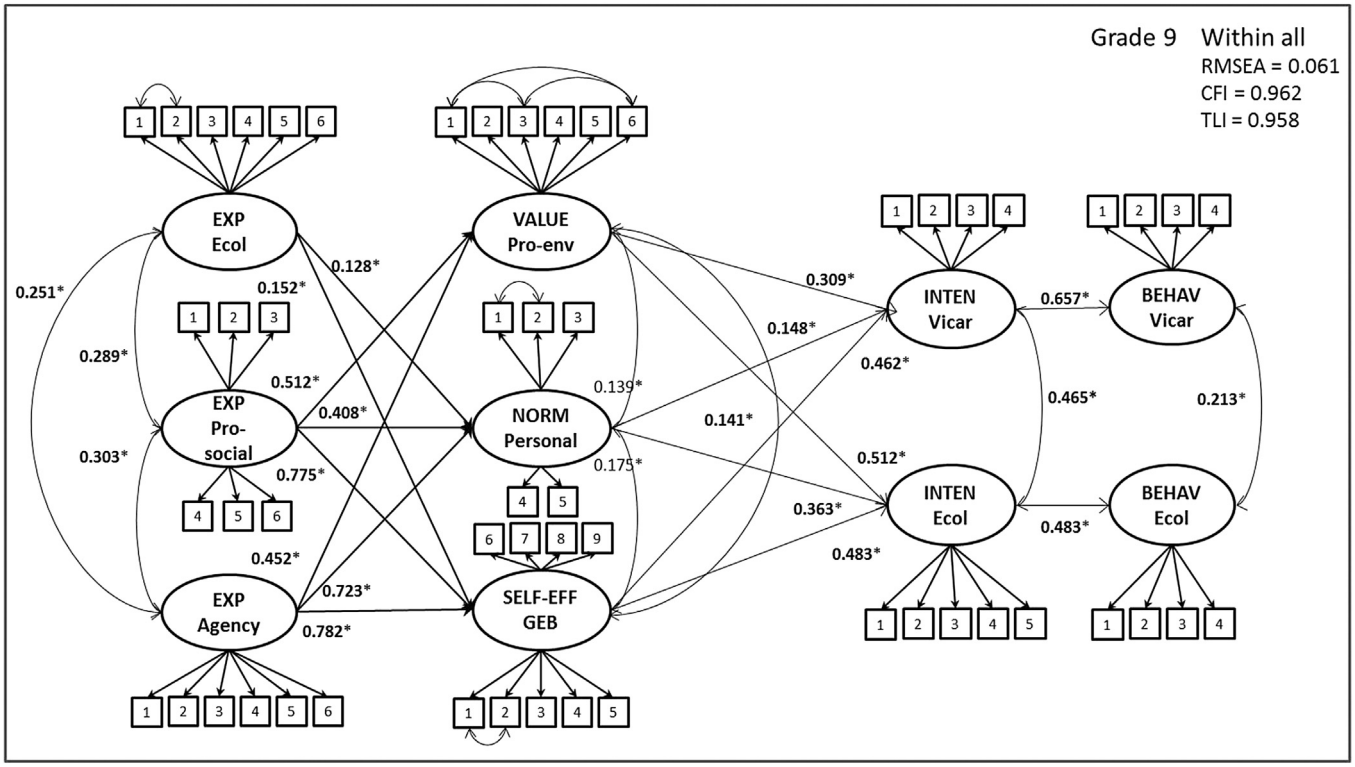

Fig. 3. Final SEM model (Model 2) testing the hypothetical model of school experiences and psychosocial factors in explaining general ecological intentions and behaviors outside of the school. Values indicate standardized regression weights. *marks significance at $p < 0.001$. EXP Ecol = Ecological school experiences, EXP Prosocial = Prosocial school experiences, EXP Agency = Agency experiences. VALUE Pro-env = Pro-environmental value, NORM Personal = Personal sustainability-related norm, SELF-EFF GEB = Self-efficacy for GEB, INTEN Vicar = Intention for vicarious pro-environmental behavior, INTEN Ecol = Intention for ecological behavior, BEHAV Vicar = Vicarious pro-environmental behavior, BEHAV Ecol = Ecological behavior.

psychosocial precedents of behavior in the model. The results show, however, that those effects are not equal, with the lowest effect sizes being observed for ecological experiences, larger effects for pro-social experiences, and the largest effects for experiences that contain elements of agency. Non-significant effects are not reported in the figures. The final model (Fig. 3) explained 35.9% of the variation in ecological behavior ($R^2 = 0.36$) and 55.6% of the variation in the vicarious behavior ($R^2 = 0.56$).

5. Discussion

Many studies relating to ESD (Duggan, Smith & Thompsen, 2013; Tilbury, 2007; UNESCO, 2014) have focused on the monitoring and evaluation of the management and implementation of ESD programs. A detailed study on the learning experiences of learners is lacking, and more importantly, the question of whether ESD efforts make a difference is not commonly dealt with in the literature. We asked questions whether sustainability experiences at school have an impact on adolescents' self-reported general ecological behaviors. The aim of this study was to clarify this question by investigating how grade nine students' school experiences and psycho-social factors influence their out-of-school GEB and with the model help in assessing the effects of current ESD efforts in schools.

5.1. General ecological intentions and behaviors

Adolescents spent a large part of their life at school, thus experiences in the context of formal education are undeniably important in their leaning and adoption of environmental behaviors. In our study we focused on three kinds of experiences adolescents can be exposed to in their school context and studied how they impact on the precedents of their general ecological and vicarious pro-environmental behaviors. The strengths of the study are the large nationally representative sample for adolescents, and the analytical approach that allows for complex interactions between the different constructs.

The respondents' mean scores for the GEB scales are quite similar to those found by Kaiser et al. (2007) for mobility ($M = 3.8$, $SD = 0.8$) and recycling ($M = 3.5$, $SD = 1.2$). In their study, the respondents scored lowest for vicarious pro-environmental behavior ($M = 2.1$, $SD = 0.8$), which is in line with the results of our study. Also for adults, the mean factor score for ecological behavior in Milfont's (2004) study ($M = 3.3$, $SD = 0.7$). These results indicate that there is reason and room for encouraging adolescents' environmental behaviors.

However, other studies have shown that young people tend to answer overly positively to items relating to environmental behaviors (e.g. Milfont, 2009; Oerke & Bogner, 2013), and the current results might thus suggest that the respondents were not, or at least were less, elicited to answer in a socially desirable way. The moderate effects of the two kinds of behavioral intentions and their respective behaviors included in this study confirm the results from other scholar, such as Bamberg (2002), and Bamberg and Möser (2007), who have illustrated that there is no perfect match between intention and behavior, especially when it comes for vicarious pro-environmental behaviors. However, for ecological behavior, such as in recycling or energy conservation there was no gap at all. In our study the correlation between the intentions between these two behavioral types was much larger that the self-reported GEB. The results reflect the reality of the fact that the step from intention to actual behavior is dependent on contextual

conditions, which can be very diverse (e.g. Olli, Grenstad, & Wollebaek, 2001). The current results thus underpin the importance of including intentions into these kind of analyses so as not to underestimate the effect of the constructs that impact on behavior and thus neglect the context within which the behavior takes place. Kaiser et al. (2007) found that adolescents' self-reported vicarious pro-environmental behavior correlated, for instance, with energy conservation behavior, which is in accordance with this study, as shown in model 3.

5.2. Linking experiences, psychosocial factors, intentions and behaviors

The respondents' mean scores for their self-efficacy for GEB were only mildly positive, as can be seen in Table 2. Finnish ninth-grade students thus seem modest in their beliefs about their own ability to have an impact on the environment, or to cause an outcome that is favorable for the environment. Previous studies by Uitto et al. (2014) and Meinhold and Malkus (2005) have shown the importance of self-efficacy for GEB in influencing the GEB among adolescents, and the models in the current study confirm this finding. Thus, the modest score for ecological behavior, and the low score for vicarious pro-environmental behavior might be due to the only moderate beliefs the respondents have in their own abilities concerning the GEB and the abilities to inspire other people to participate in environmental activities. Apart from self-efficacy for GEB, our results also show that pro-environmental value and the personal sustainability-related norm have a role to play, especially when it comes to explaining the intention for vicarious pro-environmental behavior, albeit smaller than self-efficacy.

Our studies suggest that to stimulate adolescents' GEB, an approach that focuses on a combination of pro-environmental value, personal norm and especially self-efficacy for GEB is important. The current study's central focus went one step further by investigating the impacts that different kinds of in-school sustainability experiences have on the three psycho-social precedents in the model. A combination of exploratory and confirmatory factor analyses showed that the item battery that was used to tap into school experiences could be divided into three distinctly different factors. The first one groups the items of ecological experiences. These mainly deal with quite straightforward educational methods, such as calculating an ecological footprint, studying products' life cycles, participating in school campaigns and ecologically oriented visits outside of school. These kinds of inquiry or problem-based learning activities are considered typical for ESD (McKeown & Hopkins, 2007; Tilbury & Wortman, 2005; UNESCO, 2014). However, as stated by Krnel and Naglič (2009), the approaches do not considerably change adolescents' GEB if adolescents' competencies on critical thinking, decision-making and action are ignored. Their finding is in accordance with the current study on the importance of self-efficacy for GEB and agency experiences to evoke GEB individual ecological and vicarious pro-environmental behaviors.

The second experience factor has a more social character and included items linked more closely to human contexts than is the case for the ecological experiences. Examples of pro-social experiences are participation in campaigns promoting health and aid or visiting cultural institutions. This result also agrees with previous studies indicating that when compared to many other educational contexts, Finnish adolescents are mostly interested in human-related contexts, at least within science education (Lavonen, Byman, Juuti, Meisalo & Uitto, 2005; Uitto, Juuti, Lavonen & Meisalo, 2006). However, the result does not mean that ecological issues should be ignored in ESD at the expense of the human context, but that human and societal contexts should be more closely linked to all ESD activities, which is in fact one of the basic ideas of ESD (UNESCO, 2014).

The third factor groups the items that contain elements of agency and a high level of adolescents' participation. These items reflect experiences in which adolescents share power and responsibility in decision-making with teachers and other students (cf. Shier, 2001). Having an active and responsible role at school, such as acting as a twinning or peer student and having an active role in planning or organizing the schools' ecological actions, enhanced adolescents' ecological behavior outside of school. Agency is related to the concepts of empowerment and action competence (e.g. Mogensen & Schnack, 2010). However, these construct are defined to be the expected ideal goal for ESD, being educational approaches rather than a specific competence among other measurable school competences. In action competence research, the focus is on formative assessment (Mogensen & Schnack, 2010), lacking the aim to measure overt behaviors. Thus, to get versatile information on the effects of implemented sustainability activities at school, structural equation modeling (SEM) provides a useful tool, because it allows one to study the interactions between different experiences, and psychological and social variables preceding specific behaviors of the adolescents.

Fig. 3 show the estimates for the effects of each of the three experiential factors in the hypothetical model. Straightforward ecological experiences are least import in the model. They have only small or no effects on the adolescents' personal norms and self-efficacy for GEB, and no effect on pro-environmental value. Instead, pro-environmental value was influenced by pro-social experiences. This result can be interpreted in many ways. According to Groot and Steg (2008), values guide the selection and evaluation of behaviors, so that when different competing values are activated in a specific situation, choices are based on values that are considered to be most relevant for action. Altruistic and biospheric values, although correlating, provide a distinct basis for pro-environmental intentions. However, people who give priority to pro-social values also have stronger pro-environmental beliefs and are more willing to engage in ecological behavior (Groot & Steg, 2008). In model 2 this would imply that pro-environmental value, which in this study is biospheric in nature, is not evoked by ecological experiences at school. Of course, values are also influenced by many social environments, such as the home. Thus, although adolescents might have innate biospheric values, mostly pro-social school experiences were able to enhance pro-environmental value. The results indicate that ecological experiences, which are traditionally felt to be the core of ESD (UNESCO, 2014), need to be critically evaluated for their abilities to motivate adolescents on sustainability issues and be developed to better reach the goals of ESD in school education.

The model shows larger effects for the more socially loaded dimension, and the largest effects are observed for the agency experiences. The three kinds of experiences used in this study show significant intercorrelations. This suggests that schools are not focusing on a single kind of experience but rather that adolescents are most probably exposed to different kinds of experiences within the their school. Furthermore, our results do not imply that ecological experiences are devoid of a human dimension or of agency. They do suggest, however, that these latter concepts can increase the effectivity of experiences when the goal is to stimulate ecological behavior.

5.3. Relevance of the results for practice

As stated in the UNESCO report (2014), ESD is emerging as the unifying theme for many types of education that focus on different aspects of sustainability. However, according to the report, more research is needed to document that ESD is quality education.

Evaluation of the impacts of ESD is demanding because adolescents' behavior is influenced by many different personal and external factors related to themselves, their backgrounds and different formal and informal learning environments in and outside of school. However, goal evaluation can also be carried out by studying the effect of ESD efforts from the learner's point of view, in which various learning environments, environmental settings and learners' personal characteristics can be considered when clarifying the main points in evaluating the process. In our study, adolescents' personal psycho-social factors as well as their sustainability-related school experiences were the starting point for the study.

According to our study schools differ in their abilities to influence adolescents' sustainability-related values, norms and self-efficacy for GEB, ecological and pro-environmental vicarious intentions and behaviors. It also indicated that the most common approach in ESD, participation in ecological activities, only had a slight influence on those personal factors, that are the goals of ESD, namely pro-environmental values, norms and behaviors.

To develop ESD at school it seems to be important to make school experiences of eco-sustainability more affective and participatory. Many studies have shown that emotional aspects inspire adolescents to learn about ecological issues (Uitto, Juuti, Lavonen, Byman, & Meisalo, 2011; Fröhlich, Sellmann, & Bogner, 2013). It is important to connect pro-social experiences with ecological experiments at school. This is in accordance with the findings of de Groot and Steg (2008), namely that although environmental values can be categorized into three value orientations, biospheric and altruistic value orientations correlate with each other. In this study, the modeling shed light on the crucial question of the effectiveness of ESD, and whether ESD has any potential to enhance adolescents' own sustainability intentions and behaviors.

According to the results, ESD in its current form in Finnish schools would need some reforming. It is important to learn ecological behaviors at school, but it would seem to be advantageous to connect the activities even more closely to social context. It is crucial to provide adolescents with experiences in which they can feel they are responsible actors in the school organization. The more or less passive participation in sustainability in teacher-planned and organized activities may not engage adolescents in responsible life.

5.4. Conclusions and further research

This study has shed light on an important topic, namely whether sustainability-related school experiences influence adolescents' values, norms and self-efficacy for GEB, and on their self-reported GEB. It would be useful to focus future research on the development of the further validation of the experiential scales used in the current study. In such a scenario, more attention could be paid to ask adolescents on their participation and agency experiences at school (Shier, 2001), environmental and pro-social values as well as self-efficacy for GEB on the one hand, and different types of ecological behaviors (Kaiser et al., 2007) outside of school on the other. It would seem that out-of-school behaviors could also be categorized as basic individual ecological behavior, such as recycling, as well as different levels of participation and agency within society. Another large part of sustainability is pro-social behavior, which was not modeled in the present study.

It is important to acknowledge that our results shed on overall light on the issues raised and that rather than going into depth on specific relations, they have a broad focus. Each of the effects and correlations in our final model could be a topic for further studies. Also, a confirmation of our final model in other cultural contexts and at other ages (younger children and adults) is a promising topic for further research. Furthermore, in order to study the relations suggested by the current results, a large-scale longitudinal and quasi-experimental study would be a valuable next step.

In essence, our results show that even though Finnish adolescents currently score low or moderately on two ecological behaviors, there is a large variation in their responses. That variation seems to be explained by their self-efficacy for GEB, where adolescents with a higher perception of their own abilities relating to these issues engage more in self-reported GEB. Their sense of self-efficacy seems to mainly originate from in-school experiences that focus on pro-social issues, participation in the school's sustainability activities and especially in higher level agency experiences.

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