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Children's pro-environmental behaviour and its prognostic factors in primary school age

SUMMARY OF DOCTORAL DISSERTATION

Social Sciences,
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Pradinio mokyklinio amžiaus vaikų aplinką tausojantis elgesys ir jo prognostiniai veiksniai

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1. LITERATURE REVIEW

1.1 Children's pro-environmental behaviour and its assessment in psychology research

Pro-environmental behaviour is defined as a behaviour that harms the environment as little as possible or benefits it (Steg & Vlek, 2009). Naturally, children have fewer possibilities to engage in to various pro-environmental actions, compared to adults (Collado, Evans, Corraliza, & Sorrel, 2015; Evans, Brauchle, et al., 2007; Evans, Juen, Corral-Verdugo, Corraliza, & Kaiser, 2007). In their preschool and primary school age, children can execute small-scale actions at the level of classrooms, school yards or local environment (Chawla & Flanders Cushing, 2007). Nevertheless, they are capable of influencing the environment through their behaviour and should therefore be involved in solving environmental issues (Mackey, 2011).

In psychology research, children are asked about a variety of behaviours, including recycling, not littering, conserving water and electricity (e.g. Collado & Evans, 2019), as well as their environmental citizenship actions (e.g. Collado, Staats, & Corraliza, 2013). Otto, Evans, Moon and Kaiser (2019) noted that environmental attitudes and behaviours increase from the age of 7 to 10; thereby, primary school age is a significant period for the formation of environmental habits. In order to understand the development of pro-environmental behaviour in primary school years (or middle childhood), it is necessary to take into account both child-related factors and external influences.

1.2 Child-related factors that are important in the development of pro-environmental behaviour

Cognitive development in middle childhood is characterized by significant changes that allow children to think more flexibly than in

preschool years (Huston & Ripke, 2009), to reason logically about concrete information (Piaget, 1963) and to take the perspective of others (Eccles, 1999; Piaget & Inhelder, 1969). That is why children in their primary school age are able to construct an understanding about environmentally harmful behaviour and to reason about its consequences for others (Honig & Mennnerich, 2012). Since knowledge has a rather small meaning when analysing pupils' ecological behaviour (Otto & Pensini, 2017), special attention should be given to the role of fluid intelligence which refers to analytic ability required in understanding relations or adapting to new situations (Cattell, 1963; Cattell & Horn, 1978). Such ability might hence be important for an understanding of relations in the environment and for engaging in pro-environmental actions.

In addition to cognitive capabilities, affective factors also play a critical role in the development of pro-environmental behaviour, as revealed by research on children's experiences in nature. Studies show the relationship between children's contact with natural environment and their sustainable behaviours (Barrera-Hernández, Sotelo-Castillo, Echeverría-Castro, & Tapia-Fonllem, 2020; Collado, Corraliza, Staats, & Ruiz, 2015; Collado & Evans, 2019; Collado et al., 2013). Nature experiences not only allow a child to develop emotional connection with the natural world (Broom, 2017; Chawla, 2009; Chen-Hsuan Cheng & Monroe, 2012; Fränkel, Sellmann-Risse, & Basten, 2019) but also to acquire knowledge, form values and skills (Chawla, 2009). Such evidence helps to explain indirect relations between children's contact with nature and ecological behaviour, since those can be mediated by emotional affinity toward nature and ecological worldview (Collado et al., 2013). Thus, both cognitive and affective components matter.

Aspects of pupils' moral development should also be taken into consideration when analysing pro-environmental behaviour because such behaviour is equated to pro-social moral actions (Honig & Mennnerich, 2012; Krettenauer, 2017). Caring for nature is associated with a broader development of empathy. For instance,

fear, pain or pleasure expressed by animals reminds human responses; hence, empathy, sympathy and perspective-taking can be applied to human relations with animals (Chawla, 1988, 2009). Furthermore, children of 8–10 years may already feel a moral obligation to act pro-environmentally (Matthies, Selge, & Klöckner, 2012). Middle childhood is actually characterized by a developed ability to apply the criteria of morality to events that were previously unknown (Smetana, 2006). Though research on children's environmental moral judgements reveals a more complex picture (see Collado & Sorrel, 2019; Hussar & Horvath, 2011), primary school years can nonetheless be considered to be a significant period for strengthening moral judgments about actions toward the environment.

In the context of moral judgments, it is important to mention the concept of environmental moral reasoning suggested by Kahn and colleagues (Kahn, 1997, 2002, 2003; Kahn & Friedman, 1995; Kahn & Lourenço, 2002; Severson & Kahn, 2010). Kahn showed that such reasoning can be divided into anthropocentric, i.e. reasoning about how adverse effects to the environment affect humans, and biocentric, i.e. appeals to the larger ecological area and to the moral standing of nature (2002, 2003). When growing and exploring the world, children learn a lot about plants and animals, and linking this information together impacts patterns of their reasoning (Coley, Solomon, & Shafto, 2002). The biocentric reasoning is mostly observed in adolescence and adulthood (Kahn, 1997, 2003; Kahn & Lourenço, 2002), thus, reasoning related to the moral standing of natural world increases with development.

Child-related factors that are important in the development of pro-environmental behaviour should also include socio-demographic characteristics, specifically, age, gender and social desirability. First, due to the cognitive development and limited opportunities to participate in pro-environmental actions, ecological behaviours and environmental attitudes might not be related in younger children (age 6–8) (Evans, Brauchle, et al., 2007; Evans, Juen, et al., 2007).

Second, girls usually demonstrate stronger environmental attitudes and environmental concerns and behave in a more pro-environmental manner than boys (Braun, Cottrell, & Dierkes, 2018; Collado, Evans, & Sorrel, 2017; Müller, Kals, & Pansa, 2009; Rickinson, 2001). This is because women are socialized to be other-oriented which might result in stronger eco-centrism among females (Zelezny, Chua, & Aldrich, 2000). Third, there is evidence regarding the relationship between social desirability and adolescents' ecological values (Wiseman & Bogner, 2003), attitudes and behaviours (Oerke & Bogner, 2013). Younger children are in general more prone to respond in a socially desirable way, compared to the older ones (Crandall, Crandall, & Katkovsky, 1965). Moreover, highest social desirability scores were being found in interview modes (Bowling, 2005; Miller et al., 2015), which is relevant considering the study design adapted in present work. Nevertheless, human functioning cannot be explained by personal characteristics only because it is individual behaviour, personal factors and environmental influences that interact reciprocally (Bandura, 2009).

1.3 The role of external factors in the development of children's pro-environmental behaviour

Learning by observation is one of the most influential ways to learn and it is not limited to simple imitation (Bandura, 1969, 2009; Rogoff, Paradise, Arauz, Correa-Chávez, & Angelillo, 2003). However, research on pro-environmental behaviours of children and their parents does not provide straightforward evidence about the direct linkage between the two. Such relation is stronger when children are younger, e.g. age 9–10, in contrast to age 11–13 (Collado et al., 2017), and in the case of more visible behaviours like recycling, in contrast to paper re-use or electricity saving acts (Matthies et al., 2012; Grønhøj & Thøgersen, 2012). It might also be a case of how middle-class European-American families transmit behaviours, i.e. by using rewards or threats and not by encouraging

children's intent participation (Collado, Evans, et al., 2015), which is considered to be a powerful tool to promote learning (Rogoff et al., 2003). The relationship between parents' and children's actions could therefore depend on the age of a child, the behaviour under study and the culturally embedded learning tradition.

Through modelling, children can also learn attitudes (Bandura, 2009), though evidence regarding transmission of environmental attitudes is scarce. The existing literature indicates that children may be more strongly influenced by the behaviours of other people, rather than by what others think or feel (Collado et al., 2017). There is also a lack of empirical data on verbal modelling (Bandura, 2009) and external incentives (Bandura, 2009; Paradise & Rogoff, 2009; Rogoff et al., 2003) in regard to children's pro-environmental actions. Nevertheless, Matthies and colleagues (2012) showed that the influence of parental praise when a child recycled was mediated by a subjective norm of the children highlighting the significance of parental expectations conveyed by the praise. A more in-depth research in this field could help to better understand the role of parental attitudes, verbal modelling and external incentives.

Despite that parental influence is still considerable in middle childhood (Grusec, Chaparro, Johnston, & Sherman, 2012), primary school years are likewise characterized by the influence stemming from the broader environment, i.e. other adults, peers, school and extracurricular activities (Eccles, 1999; Huston & Ripke, 2009). Models from symbolic environment could also play a pivotal role (Bandura, 1969, 2009). Again, evidence regarding external influences other than parental factors is scarce (for the information about the role of peers, see Collado et al., 2017). Existing literature mostly covers studies on environmental education/environmental learning directed to the changes in individuals' environmental knowledge, attitudes and behaviours (Barratt Hacking, Barrat, & Scott, 2007; Rickinson, 2001). Effective environmental education can be distinguished by the properties of promoting participants' initiatives, active engagement, feelings of competence and success,

involving role models, encouraging cooperation, as well as strengthening connection with nature (Chawla & Flanders Cushing, 2007; McPherson Frantz & Mayer, 2014; Stern, Powell, & Hill, 2014; Tsevreni, 2011; Zelezny, 1999). In Lithuania, there is some evidence of a low motivation of both pupils and teachers, and a lack of appropriate tools in the context of formal science education (Lamanauskas & Augienė, 2019) and non-formal environmental citizenship education (Poškus, Balundė, & Jovarauskaitė, 2019). Hence, special attention should be given to environmental education in school context (Jensen, 2002).

Considering external influences, another group of such factors concerns socio-economic characteristics. Rickinson (2001) noted that children from higher socio-economic background had stronger environmental attitudes and were more likely to act pro-environmentally. Interestingly, parental education, occupation and family income may be irrelevant, while cultural capital of the family might have significant linkages to youth's environmental attitudes, as indicated by Boeve-de Pauw and Van Petegem (2010). Despite contradictory data, socio-economic factors should nonetheless be included in the examination of children's pro-environmental behaviour.

In addition to the described individual and external factors, other potentially important prognostic factors of children's pro-environmental behaviour could also be found in the theories that are extensively applied in research with adults, i.e. theory of planned behaviour and norm activation model. These theories could reveal some additional insights about children's behaviours in their primary school age.

1.4 Theories used for analysing pro-environmental behaviour and their application in children's research

One of the theoretical approaches that are widely used in environmental psychology research is theory of planned behaviour

(TPB) (Ajzen, 1991). According to the theory, main determinant of particular behaviour is intention, i.e. motivational factor. Intention is predicted by attitudes (i.e. degree to which a person has a favourable or unfavourable evaluation of the behaviour), perceived behavioural control (i.e. perception of the ease or difficulty of performing that behaviour) and subjective norm (i.e. perceived social pressure to perform or not to perform the action) (Ajzen, 1991). Following an up-to-date review of the approach, normative factor should comprise of the belief of what others think a person should do (i.e. injunctive norm), and the belief of what others do (i.e. descriptive norm) (Fishbein & Ajzen, 2010). TPB proved to be a valuable framework for exploring various pro-environmental actions (e.g. Bamberg & Möser, 2007). Some of its ideas were also adapted in children's research.

Regarding attitudes, two components of children's environmental attitudes are frequently examined, i.e. affective (eco-affinity) and cognitive (eco-awareness) (e.g. Larson, Green, & Castleberry, 2011). As mentioned earlier, both components are important in predicting children's ecological behaviour (Collado et al., 2013). When studying affective attitude, it is also worthwhile to include empathy as one of the aspects (or dimensions) of children's affective attitude toward nature (Chen-Hsuan Cheng & Monroe, 2012). Empathy is also considered to be important in the process of child moral development (Hoffman, 2000). Furthermore, significant relationships were shown to connect children's subjective norms and pro-environmental behaviours (Ando, Yorifuji, Ohnuma, Matthies, & Kanbara, 2015; Matthies et al., 2012). Based on Ando and colleagues (2015), the relationship between parents' and children's recycling actions could also be mediated by behavioural control as perceived by the pupils. Because perceived behavioural control can serve as a representation of actual control (Ajzen, 2002), it is particularly important bearing in mind the limited control of behaviours in middle childhood. Attitudes, subjective norms and perceived

behavioural control could therefore supplement the prediction of children's pro-environmental behaviour.

Norm-activation model (NAM) (Schwartz, 1977) is another theoretical approach extensively applied in environmental psychology research (e.g. de Groot & Steg, 2009). NAM emphasizes the role of personal (or moral) norm which refers to feelings of moral obligation or self-expectations (not necessarily conscious) for specific action in particular situation (Schwartz, 1977). The process of activating personal norm is considered to represent a cognitive decision-making process and to consist of sequential steps, as follows (Schwartz, 1975, 1977): understanding the consequences of one's behaviour for others (i.e. awareness of consequences); perceiving the actions that may meet the needs of another person or a group of people (i.e. perception of actions); recognition of one's capabilities to take those actions (i.e. recognition of own ability); and apprehension of responsibility to get involved (i.e. ascription of responsibility), which further activates the norm. In NAM, the direct predictor of behaviour under study is personal norm.

Schwartz (1977) believed that social norms prevalent in society are actually a basis for self-evaluation because, when internalized, social norms become personal norms. Thus, people are prone to comply with social norms to receive external reinforcements or to avoid sanctions or, if the norms have been internalized, – to maintain or enhance self-evaluation (Schwartz, 1977). Not surprisingly, the relationship between children's subjective norm and pro-environmental behaviour was found to be mediated by their personal norm (Matthies et al., 2012). In respect to another NAM factor, namely awareness, Matthies et al. (2012) showed that parents' communication about the needs and consequences regarding waste and recycling behaviour predicted children's awareness about the waste problem which in turn predicted their feelings of moral obligation to recycle. However, parental recycling behaviour could also be a direct predictor of children's problem awareness (Ando et

al., 2015). Therefore, a more in-depth knowledge about the role of parental communication behaviour is needed in the field.

1.5 Study relevance, aims and objectives

Though research on children's environmentalism is constantly growing, we still lack evidence about the factors of their pro-environmental behaviour (e.g. Barrera-Hernández et al., 2020). Young generation will face major environmental challenges in the future, and so understanding which factors encourage children to engage in pro-environmental actions is critical (e.g. Zeiske, Venhoeven, Steg, & van der Werff, 2020). Such knowledge could help strengthen environmental education in formal and non-formal sectors and develop evidence-based interventions, i.e. it has a practical value that is relevant considering current ecological issues.

In order to understand the development of pro-environmental behaviour, it is necessary to rely on developmental psychology research (Chawla, 2009; Kahn, 2006). However, there is a scarcity of evidence related to the processes that lead children to think, feel and act in environmentally friendly way (Collado et al., 2017), while empirical examinations that integrate knowledge from both environmental and developmental psychology are rather fragmented. Moreover, the majority of studies focus on adolescents, and much less in known about the development of environmentalism in elementary school students (Ando et al., 2015). Current work is thus aimed to apply an integrated approach for the prediction of pro-environmental behaviour in primary school age and is based on a novel model that integrates the relevant aspects from both environmental and developmental psychology research.

The work is also significant because of its research strategy which allows starting from a qualitative research – a deeper analysis of the topic. Since children's perception of the world and ecological issues is related to the direct experience of such problems and because it reflects the cultural, social and political situation in the society

(Barraza, 2001), we could expect different findings in different cultural contexts. Thus, this study aims to explore yet unknown meanings, experiences or worldviews revealed by the children (Clark, 2011), and to prepare for quantitative research by developing child-friendly questions.

The conceptual model of the study is presented in Figure 1. It is based on the literature review regarding individual and environmental factors as well as relevant knowledge from the theories applied in environmental psychology research, i.e. norm activation model and theory of planned behaviour.

The **aim of the study** is to investigate children's pro-environmental behaviour and its prognostic factors in primary school age.

Based on the aim, **study objectives** are as follows:

1) To analyse children's views of pro-environmental behaviour.

2) To investigate the relationships between children's pro-environmental behaviour and environmental factors.

3) To investigate the relationships between children's pro-environmental behaviour and child-related factors.

4) To develop an empirically-based model on psycho-social factors of children's pro-environmental behaviour.

In accordance with the study objectives, research is planned in two phases: qualitative (study one) and quantitative (study two).

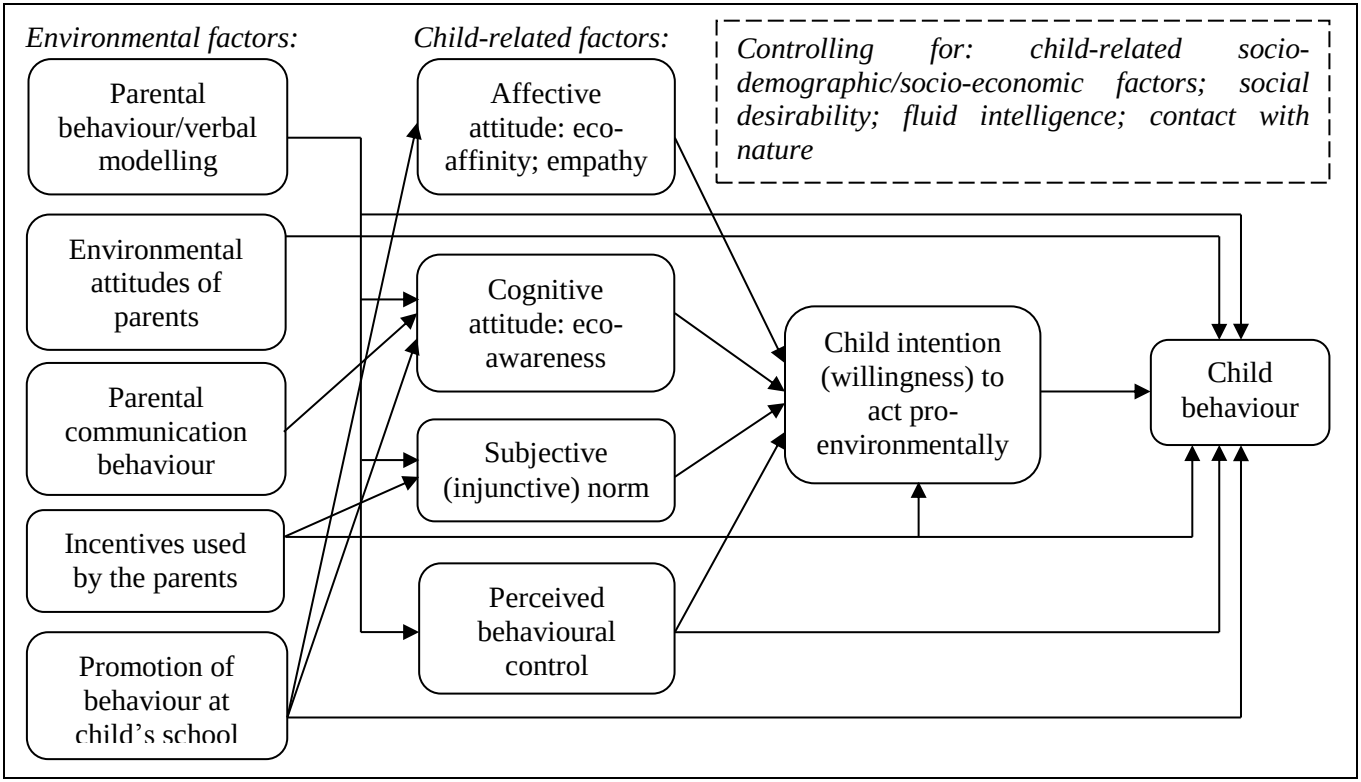

Figure 1. Conceptual model of the study.

2. METHOD OF STUDY ONE

2.1 Study procedure and participants

The first qualitative study sought to analyse children's views of pro-environmental behaviour and to prepare for the development of behavioural items for the next phase of the study. Though there are instruments used with children, it was important to develop the items that would be culturally adapted and based on pupils' vocabulary. Study one was conducted using focus groups' method. A total of six focus groups were organized, including three groups during children's summer camp and another three groups in one primary school in Vilnius. The group interviews took approximately 23 minutes each; they were audio recorded and transcribed verbatim. Before starting, parents (or foster parents) of participating children gave their signed informed consents. The groups took place in quite spaces that were available at the moment.

Thirty-three children aged 6 to 11 years (M = 8.97; SD = 1.21) participated in the study (18 girls and 15 boys). They participated in the groups consisting of 3 to 7 children (there was only one child of 6 years). All except one focus group (comprised of boys only) had participants of mixed gender.

2.2 Measures

The study was conducted under the guidance of Krueger and Casey (2000) with a particular focus on the aspects relevant when undertaking research with children and adolescents. The researcher informed the participants about the aim and procedure of the study and that there were no wrong answers. Audio recording and data protection issues were also explained to the children. The proceeding of each focus group was flexible and adapted to particular interview, though main questions were prepared in advance, i.e. *what do you*

know about the things that people do in order to protect the environment (or nature)?; why do you think environmental (or nature) protection is important?; what do you yourselves do to protect the environment?; where did you learn about nature protection?

2.3 Data analysis

The method of qualitative content analysis (Schreier, 2012) was chosen for analysing the material. This method allows to systematically describe the meaning of qualitative data and to distinguish the most important characteristics of the material. Qualitative content analysis is performed by constructing a so-called coding frame which is used to structure the material. The coding frame consists of main categories or dimensions (higher-level analysis), subcategories (lower-level analysis used for specifying the dimensions) and residual categories. The residual categories include information that is related to the research question but could not be clearly attached to any of the subcategories, or was only mentioned once.

According to the procedure, reliability and trustworthiness analysis was performed twice – during the pilot and the main coding phases (Schreier, 2012). For the main phase, intra-coder reliability (reflecting stability of the analysis over time) was at 80%. Furthermore, to achieve face validity, we followed the procedure of revising coding frequencies of the residual categories, coding frequencies of the subcategories and the level of abstraction of the coding frame.

3. RESULTS OF STUDY ONE

The final coding frame of the study comprised of 5 main categories: environmental problems and environmentally harmful behaviour (content related to this category was mentioned in 3 to 5 groups out of 6 groups in total); reasons for protecting the environment (mentioned in 3–6 groups); pro-environmental behaviour (mentioned in 2–6 groups); pro-environmental behaviour performed by the children (mentioned in 2–5 groups); and sources of knowledge about environmental protection (the content mentioned in 2 to 4 groups).

Environmental problems and environmentally harmful behaviour. Although study participants were asked about how people protect nature, they often mentioned environmental issues or environmentally harmful acts. Four subcategories and few residual categories were attached to this category.

1) Littering was a very common type of behaviour reported by the participants. They shared how they saw peers and adults littering.

2) Environmental/air pollution was described by the children using examples of smoke, car and factory emissions, plastic and oil.

3) Disfigurement of the environment like breaking public facilities was also linked to environmentally harmful actions.

4) Inappropriate behaviour to animals and plants covered views of harming trees or forests, e.g. cutting trees down, and views of inappropriate behaviour toward animals, e.g. poaching.

Residual categories consisted of issues that were mentioned either by one participant or in one group, for instance, food waste. Environmentally harmful actions as well as people who behaved in such manner were judged as ‘bad’ by the children. Residual categories also covered participants’ explanations about the causes of ecological problems. As an example, they thought that forests were being cut down in order to get some timber, regardless of the resulting air pollution. In general, pollution was linked to the consumption. Moreover, children were aware that some people simply do not care about the environment.

Reasons for protecting the environment. At the level of the second category, seven subcategories and one residual category were revealed. The only *residual category* consisted of answers mentioned once during group interviews, e.g. prevention of migration.

1) Maintenance of clean environment or air and reduction of pollution was mentioned very frequently. To prevent this, one has to protect trees and not litter.

2) Protection of human life and health was emphasized because people might get hurt due to scrap glass or other litter. Additionally, environmental issues might be a threat to human life because of the extinction of animals or harm caused to plants.

3) Protection of animals and plants was indicated to be important because of the possible effects caused by littering, cutting trees and pollution. For instance, litter might affect both trees and animals.

4) Maintenance of humans' daily life and entertainment. Environmental issues were linked to a risk of losing important places of entertainment, risk of a more complicated housework for adults, as well as unpleasant experiences like bad smell caused by litter.

5) Prevention of a possible end of the world points to children's thoughts about environmentally harmful actions causing the end of the world. It might happen because of the lack of oxygen or because of the impact on the ozone layer.

6) Aesthetic reasons and importance of experiencing nature. Ecological problems like pollution were thought to have an effect on winters since winters could become 'black' instead of white. Moreover, it might be impossible to touch natural objects like stones because of the environmental issues.

7) For fire prevention. Children shared opinions that forest and meadow fires were caused by cigarettes, scrap glass and by making fires in inappropriate places.

Pro-environmental behaviour. This category consisting of 8 subcategories and few residual categories was connected to the first one, as participants often identified actions contrasting environmentally harmful behaviours.

1) Not littering implies proper disposal of one's rubbish and leaving places clean after spending time there.

2) Collecting rubbish left by others. In this case, children talked about the collection and proper disposal of other people's litter.

3) Recycling, composting and using deposit system. Many children were aware of the recycling containers and deposit system. They suggested applying the principal of this system to other packaging, such as yoghurt package.

4) Protection of forests and other vegetation was mentioned stressing the importance of not cutting down the trees and planting new trees in case of the necessary cuttings.

5) Protection of animals. The children talked about the protection of animals in general and specifically the protection of birds.

6) Ecological transportation implies driving bicycles, skateboards, electric cars, or car sharing.

7) Maintenance of public order means that one should not make noise in the streets, swear, etc. This subcategory also included public services, for instance, road cleaning, as reported by the children.

8) *Planting trees* was referred to when talking about trees grown for particular purpose, e.g. for making paper or furniture.

Residual categories attached to the third main category covered various disagreements and ambiguities expressed by the study participants. For example, children doubted whether buses were an environmentally friendly option considering the pollution they emit. Furthermore, behaviours that were mentioned only once included reusable bags, conservation of energy and participation in nature competitions and rubbish collection campaigns. Some participants talked about the reasons why people protect nature, i.e. because of money or because they really care.

Pro-environmental behaviour performed by the children. The fourth category refers to the actions executed by the participants themselves. Typically, children performed the behaviours together with their parents, grandparents, or when encouraged by them. The category consists of 5 subcategories and 2 residual categories.

1) A large number of participants said that they *do not litter* or try not to do so, e.g. by throwing candy wrappers into trash cans.

2) Study participants reported *collecting rubbish left by other people.* It includes both picking up the trash left in public places or home environment and collecting rubbish during special campaigns.

3) Children reported *sorting (recycling)* plastic, paper, glass, metal and batteries. They also used the deposit system.

4) In the context of *taking care of trees and managing the environment,* children shared that they planted trees and managed their surroundings/backyards.

5) The participants also reported *eating plant-based and healthy food,* such as vegetarian products.

Residual categories. Participants from one focus group talked a lot about how they took care of domestic pets as well as wild or stray animals. They mentioned observing their relatives taking care of the animals, too.

Sources of knowledge about environmental protection. Children mentioned 4 sources of such knowledge. No residual categories were attached to the last category.

1) Family, e.g. parents and grandparents.

2) *School, educational literature and media* included school context, educational computer game, encyclopaedia, nature journals, books and television.

3) Observation of other people behaving pro-environmentally, including the observation of behaviours performed by acquaintances and strangers, e.g. other people collecting rubbish.

4) Few children responded that they were aware of the topic *from 'within',* e.g. they always knew about it or knew by heart.

Results from the first qualitative study may be relevant when discussing findings of the study two. Study one was also important in order to develop questions about pro-environmental behaviour that would be culturally adjusted and appropriate for the age and developmental status of children under study.

4. METHOD OF STUDY TWO

4.1 Study procedure and participants

Study two aimed to investigate the prognostic factors of children's pro-environmental behaviour. The study involved primary school students, their parents (or foster parents) and class teachers. Research with pupils consisted of two parts: 1) test on fluid intelligence (visual reasoning abilities); and 2) structured face-to-face interviews. Parents and teachers filled in the paper-and-pencil instruments. Prior to the main research, three pilot studies were performed in order to test and to improve the questions for children and their parents. The research was approved by the Ethics Committee for Psychological Research in Vilnius University.

Data collection for the main research took place in 3rd and 4th grades in five primary schools situated in Vilnius. Empty classrooms or staff rooms were used for the study. After collecting informed consents signed by the parents, children participated in the testing part, while face-to-face interviews were typically organized afterwards. If desired, parents could receive a brief conclusion about their children's visual reasoning abilities following the testing part. The test was administered in accordance with its instructions (Gintilienė, Butkienė, Girdzijauskienė, & Nasvytienė, 2019) and lasted around 40 minutes. At the beginning of each individual interview, the researcher explained issues regarding research purpose, response protection, importance of participants' personal views, and started with an easy chat to make children feel more relaxed. Together with verbally provided questions, children were also shown special answer sheets. Notably, the study was unexpectedly interrupted due to the quarantine announced in the country. Despite parental consents, a significant proportion of the pupils could not take part in the research. The participants were nonetheless given an opportunity to come to the premises of Vilnius University for the research or to attend individual on-line interviews.

A total of 116 children, 114 parents and 11 teachers participated in the study. The pupils were 8 to 11 years of age (M = 9.40; SD = 0.56); 55% were girls. An average age of the parents was 39.52 (SD = 5.40); 83.9% were females. Most of the parents (80%) had higher university education. In addition, the majority was married (76.8%). Around two thirds of the families consisted of two children (65.5%), while 16.8% had one, and 17.7% had three or more children in the family. Two thirds of the parents (66.1%) also indicated having some pet at home. Considering the socio-economic background, the majority of participating parents responded that they had enough income to satisfy all the necessary needs (46.8%) or to save some money (41.4%); another 11.7% of the families always had extra money. Importantly, 82.3% of the parents noted that there were containers for sorting plastic, paper and glass nearby their family homes. All the participating teachers were females.

4.2 Measures

Measures of child-related factors

Items of *children's pro-environmental behaviour* were based on the focus group research (study one), relevant questions used in other studies with children (Collado, Corraliza, et al., 2015; De Leeuw, Valois, Ajzen, & Schmidt, 2015; Erdogan, Ok, & Marcinkowski, 2012; Leeming, Dwyer, & Bracken, 1995; Matthies et al., 2012) and primary school curriculum (Ministry of Education and Science, 2008). Where possible, items corresponded with participants' statements from the study one. In addition, given the stage of cognitive development (Borgers, de Leeuw, & Hox, 2000; Piaget, 1963), we aimed to develop the questions as concrete and comprehensible as possible. Almost all of the items were provided along with pictures created specifically for the study.

In total, 12 items were provided for the children. The researcher showed an answer sheet with five response options (i.e. 'never', 'rarely', 'often', 'always' and 'I don't know') to the participants. The

fifth choice was analysed as a missing value for the whole children's questionnaire. Based on practice from Larson et al. (2011), the participants also answered an example statement. After an initial exploratory factor analysis (EFA), items with insufficient communalities and/or factor loadings were removed from the analysis resulting in 3 factors that explained 54.34% of the variance (*KMO* = .70, Bartlett's test $p < .001$) and represented three types of child behaviour: recycling (3 items), water/electricity conservation (2 items) and environmental citizenship (4 items). However, questions on environmental citizenship behaviour were later removed from the analysis due to lower validity and reliability indicators; thus, though three types of child behaviour were first distinguished, only two of them were analysed for this dissertation. Internal consistency for the recycling and conservation items was α = .92 and *ICC* = .60, respectively. Sums of items were calculated as the final scores for the instrument.

Instead of asking about intentions, we asked about *children's willingness (or desire) to act pro-environmentally* because of a more child-friendly sounding and because desires are necessary for the development of intentions and imply motivational commitment to act (Bagozzi, 1992). Thus, from a developmental perspective, it is more appropriate to measure children's desires to act, compared to their intentions. Corresponding with behavioural items, questions regarding willingness to recycle (1 item) and willingness to conserve water/electricity (2 items, *ICC* = .60) were used. The answer sheet was also analogous to the behavioural instrument (i.e. 'never', 'rarely', 'often', 'always' and 'I don't know'). Sum of answers to each item was calculated as a final score of children's desire to save water/electricity.

Environmental attitudes of children were measured using Children's Environmental Perceptions Scale (CEPS) (Larson et al., 2011). It comprises of affective (i.e. eco-affinity) and cognitive (i.e. eco-awareness) components. Originally, 8 eco-affinity and 8 eco-awareness items form the scale with five response choices. Response

format for the current study was as follows: ‘totally disagree’, ‘disagree’, ‘agree’, ‘totally agree’ and ‘I don’t know’. During the pilot studies, two items of CEPS were supplemented with examples. EFA confirmed the original structure of CEPS (*KMO* = .70, Bartlett’s test $p < .001$), though two items had to be removed because loading on a factor of different meaning. Internal consistency for the subscales of eco-affinity (7 items) and eco-awareness (7 items) was .76 and .71, respectively. Sums of items were calculated as the final scores of the subscales.

Moreover, ‘Empathy for creatures’ subscale from the Connection to nature index (Chen-Hsuan Cheng & Monroe, 2012) was used to measure an additional dimension of affective attitude toward nature, i.e. empathy. It is comprised of 4 questions; however, one item was divided in two and three items were supplemented with examples during the pilot studies. The answer sheet was analogous to the CEPS (i.e. ‘totally disagree’, ‘disagree’, ‘agree’, ‘totally agree’ and ‘I don’t know’). Internal consistency for the empathy subscale (5 items in total) was .64. Sum of participants’ responses to each item was used as a final score of the instrument.

Children’s subjective norms were measured in accordance with the behavioural instrument and with its response format (i.e. ‘never’, ‘rarely’, ‘often’, ‘always’ and ‘I don’t know’). The phrasing of the questions was adapted from similar studies (Ando et al., 2015; Matthies et al., 2012). Study participants reported on their subjective norms regarding recycling (1 item) and water/electricity conservation (2 items, *ICC* = .90). Sum of items was calculated as a final score of participants’ subjective norm regarding conservation.

When assessing *children’s perceived behavioural control*, its items were also based on the behavioural instrument and adapted from Ando et al. (2015). Response options shown in the answer sheet were as follows: ‘very difficult’, ‘difficult’, ‘easy’, ‘very easy’ and ‘I don’t know’. Questions on the perceived behavioural control of recycling (1 item) and conservation (2 items, *ICC* = .74) were used.

Sum of answers to each item was used as a final score of perceived behavioural control of conservation.

To evaluate pupils' *fluid intelligence*, Lithuanian version of Cattell's Fluid Intelligence Test CFT 20-R (Part 1) was chosen (Gintilienė et al., 2019). It measures visual reasoning abilities and can be administered to groups of individuals from 8 years and 1 month of age. Psychometric properties of the test and its administration instructions can be found in the CFT 20-R manual (Gintilienė et al., 2019). Intelligence coefficient was used as a final score of the test.

Social desirability was measured using Short version of Children's Social Desirability (CSD-S) scale consisting of 14 questions (Miller et al., 2015). For the interview, children were asked to respond 'yes' or 'no' verbally to the questions. Based on confirmatory factor analysis, one item did not load on the factor. Thus, 13 questions were left for the analysis (χ^2 (65) = 85.53, p = .045; *RMSEA* = .07; *CFI* = .91; *TLI* = .90); α = .78. Sum of responses to each question was calculated as a final score of CSD-S.

Measures of environmental factors

Items of *parents' pro-environmental behaviour* were developed based on the items of child behaviour and on relevant questions from Kaiser and Wilson (2004). Response choices ranged from 'never' (1) to 'always' (5). Due to insufficient communalities and factor loadings of water/electricity conservation items in EFA, only the questions regarding parental recycling behaviour (4 items) were included; α = .88. Sum of answers to each item was used as a final score of parental recycling behaviour.

Environmental attitudes of parents were assessed with the New Ecological Paradigm, a revised scale (Dunlap, Van Liere, Mertig, & Emmet Jones, 2000). 15 items were provided along with the response options from 'totally disagree' (1) to 'totally agree' (5). Since most of the questions were assigned to the first factor in EFA, the scale was treated as a one-factor measure (*KMO* = .81, Bartlett's test p <

.001), following the recommendations by Dunlap and colleagues (2000). However, four items did not load satisfactorily on the factor and were removed from the further analysis. The remaining items had internal consistency of .85. Sum of responses to these questions was used as a final score of NEP.

Verbal modelling, communication behaviour and incentives used by the parents. Adapted from some similar studies (Ando et al., 2015; Matthies et al., 2012), parents were given a question regarding their communication with children about environmental issues (1 item). Furthermore, questions for parents included their communication about the importance of various pro-environmental behaviours, verbal modelling of such behaviours, and praising or otherwise encouraging children when they acted pro-environmentally. These parental measures corresponded with the items of child behaviour, i.e. single items related to the communication about the importance of recycling and conservation behaviours, verbal modelling of recycling and conservation behaviours, and incentives for recycling and conservation acts were used. Response options ranged from 'totally disagree' (1) to 'totally agree' (5).

Participating parents also answered questions regarding *socio-demographic and socio-economic variables,* including their gender, age, education, current job, marital status, place of residence, type of housing and the availability of recycling containers. We inquired about the financial situation of families (Bagdonas, Kairys, Liniauskaitė, & Pakalniškienė, 2013), as well as car(s) owned, if any. In order to evaluate whether children had an opportunity to observe the behaviours of others, we asked about other adults living at home, the number of children and the number of older children in the family. To explore aspects of child's contact with the natural world, parents were inquired about family pets, how often the child spends time in nature (e.g., forests or parks), as well as child's hobbies. The latter was coded as 'activities in nature'; 'possible activities in

nature' (when it was not clear from the response whether the activity occured in a natural surrounding or in a city); and 'other activities'.

Teachers' questionnaire comprised of questions on the *promotion of pro-environmental behaviour at child's school*. Teachers' variables corresponded to the items of child behaviour, therefore, separate single items related to the promotion of recycling and conservation behaviours were included. The responses were provided on a five-point scale ranging from 'totally disagree' to 'totally agree'. Additionally, the teachers received an open-ended question regarding activities carried out in classrooms or schools. However, given a small number of informants, no comparisons could be made; hence, the analysis included only their responses to the closed-ended questions.

4.3 Data analysis

Descriptive statistics, correlations, group comparisons and exploratory factor analysis (EFA) were calculated using SPSS 26 software. Because not all of the data satisfied normal distribution, nonparametric tests were also applied. For EFA, indexes of Kaiser–Meyer–Olkin (*KMO*), *p*-value of Bartlett's test, communalities and factor loadings (Čekanavičius & Murauskas, 2004; Tolmie, McAteer, & Muijs, 2011) were used among other indicators. Reliability analysis was based on internal consistency using Cronbach's α in case of three or more items or interclass correlation coefficient (*ICC*) in case of two items. Confirmatory factor analysis and path analysis were performed with Mplus 8.2 program (Muthén & Muthén, 2017). For these analyses, chi-square test statistic (χ^2), root mean square error of approximation (*RMSEA*), comparative fit index (*CFI*) and Tucker-Lewis index (*TLI*) were applied (Čekanavičius & Murauskas, 2011). Children's pro-environmental behaviour was introduced as a dependent variable, other child-related factors as mediators and environmental factors as independent variables (or as additional

mediators in case of an introduction of control variables) in path analysis.

Child gender, social desirability, fluid intelligence, family's financial situation, older siblings in the family, pets at home, child's hobbies and contact with nature were added as control variables. Other socio-demographic variables were excluded from the analysis due to a very uneven distribution among different groups.

5. RESULTS OF STUDY TWO

Before performing correlational and path analysis, it was important to evaluate which of the control variables are significant and should be included in the further analysis. Mann–Whitney–Wilcoxon test was applied to compare the estimates of child-related factors in groups by gender, older siblings in the family and pets at home (see Table 1). Girls were more likely to answer that they performed conservation actions (mean ranks 61.56 and 49.22; $Z = –2.14$, $p = .002$), were willing to recycle (mean ranks 44.94 and 29.15; $Z = –3.35$, $p = .002$) and had higher eco-affinity (mean ranks 34.40 and 25.40; $Z = –2.00$, $p = .046$) than boys. Furthermore, study participants with pets reported lower subjective norm regarding recycling (mean ranks 32.09 and 42.00; $Z = –2.21$, $p = .027$) and had lower eco-awareness (mean ranks 32.29 and 46.63; $Z = –2.74$, $p = .006$), compared to the children without pets. No differences were found in regard to older siblings, thus, the variables of child gender and pets at home should be included in the analysis.

Other group of controlled variables involved children's contact with nature, social desirability and visual reasoning abilities (fluid intelligence). Spearman's correlations between the three variables and child-related factors are presented in Table 2. The frequency of contact with nature was related with children's recycling behaviour ($r = .26$, $p = .013$) and perceived behavioural control of recycling ($r = .36$, $p = .001$). Despite the fact that socially desirable responses correlated with subjective norm regarding recycling only ($r = .36$, $p = .005$), and fluid intelligence had only one relation with participants' eco-awareness ($r = .27$, $p = .030$), all the three control variables should be included in the further analysis.

Finally, Kruskal–Wallis test was used to compare child-related factors by families' financial situation and children's hobbies, but no statistically significant differences were found in these groups, as shown in Table 3.

Table 1. *Mean ranks' differences of child-related factors by children's gender, older siblings in the family and pets at home*

	Child gender				Older siblings in the family				Pets at home			
	Girls	Boys	*Z*	*p*	No	Yes	*Z*	*p*	No	Yes	*Z*	*p*
Recycling behaviour	46.07	50.34	–0.77	.439	45.59	51.04	–0.99	.325	40.90	49.04	–1.47	.142
Conservation behaviour	61.56	49.22	–2.14	**.032**	55.29	57.00	–0.29	.769	48.45	54.65	–1.55	.121
Willingness to recycle	44.94	29.15	–3.35	**.001**	41.52	34.34	–1.53	.126	37.92	35.75	–0.46	.646
Willingness to conserve	46.19	39.76	–1.30	.195	42.33	44.97	–0.54	.592	35.59	44.74	–1.85	.064
PBC of recycling	39.39	47.46	–1.64	.102	41.52	44.74	–0.65	.513	43.95	39.93	–0.81	.416
PBC of conservation	43.56	43.42	–0.03	.978	43.26	43.79	–0.10	.917	42.47	41.69	–0.15	.881
SN regarding	38.49	34.87	–0.81	.420	37.97	36.05	–0.43	.664	42.00	32.09	–2.21	**.027**

	Child gender				Older siblings in the family				Pets at home			
	Girls	Boys	*Z*	*p*	No	Yes	*Z*	*p*	No	Yes	*Z*	*p*
recycling												
SN regarding conservation	35.79	36.28	–0.60	.890	39.33	33.60	–1.19	.175	32.98	36.22	–0.12	.367
Eco-awareness	38.71	38.23	–2.00	.924	38.53	38.45	–0.20	.987	46.63	32.29	–0.37	**.006**
Eco-affinity	34.40	25.40	–0.10	**.046**	30.13	31.02	–0.02	.844	28.43	30.11	–2.74	.713
Empathy for creatures	45.70	36.14	–1.84	.066	45.44	35.65	–1.86	.063	40.39	39.80	–0.11	.912

Note. Statistically significant estimates presented in bold. PBC – perceived behavioural control; SN – subjective norm.

Table 2. *Correlations between child-related factors and children's social desirability, visual reasoning abilities and frequency of contact with nature*

	Social desirability	Visual reasoning abilities	Frequency of contact with nature
Recycling behaviour	.19	–.20	.26*
Conservation behaviour	.09	–.14	.02
Willingness to recycle	.20	–.01	.03
Willingness to conserve	.09	–.03	.19
PBC of recycling	.04	–.18	.36**
PBC of conservation	.12	.00	.24*
SN regarding recycling	.36**	.07	.17
SN regarding conservation	.13	–.15	.08
Eco-awareness	–.20	.27*	.00
Eco-affinity	.00	.05	–.16
Empathy for creatures	–.05	–.04	–.06

Note. *$p < .05$; **$p < .01$. PBC – perceived behavioural control; SN – subjective norm.

Table 3. *Mean ranks' differences of child-related factors by families' financial situation and children's hobbies*

	Families' financial situation					Children's hobbies				
	Satisfying all the necessary needs	Able to save some money	Always have extra money	*H* (2)	*p*	Activities in nature	Possible activities in nature	Other activities	*H* (2)	*p*
Recycling	42.14	48.73	50.11	1.69	.430	46.86	46.22	42.26	0.61	.737
Conservation	53.42	52.67	56.79	0.19	.908	47.09	57.78	49.91	2.38	.305
Willingness to recycle	37.03	35.19	35.00	0.17	.917	36.44	31.57	38.37	2.03	.363
Willingness to conserve	41.59	41.53	37.00	0.41	.816	41.27	41.84	39.18	0.29	.864
PBC of recycling	41.21	40.95	34.21	0.66	.718	42.15	42.30	36.59	1.44	.487
PBC of	42.15	42.45	27.64	2.66	.264	45.23	44.63	35.96	3.13	.209

	Families' financial situation					Children's hobbies				
	Satisfying all the necessary needs	Able to save some money	Always have extra money	*H* (2)	*p*	Activities in nature	Possible activities in nature	Other activities	*H* (2)	*p*
conservation										
SN regarding recycling	35.61	35.77	33.93	0.06	.971	38.65	36.37	32.09	1.46	.483
SN regarding conservation	22.25	25.97	29.83	1.38	.502	19.50	26.94	22.00	2.01	.366
Eco-awareness	34.53	38.66	36.83	0.66	.721	40.36	34.23	33.78	0.96	.619
Eco-affinity	30.76	26.17	25.50	1.18	.553	28.08	29.41	26.73	0.35	.840
Empathy	38.01	41.30	33.86	0.81	.666	42.05	38.42	37.58	0.33	.847

Note. PBC – perceived behavioural control; SN – subjective norm.

The analysis was further aimed to examine the relationships between children's pro-environmental behaviours (recycling and conservation) and various environmental as well as child-related factors which then lead to the testing of prognostic factors.

Starting with recycling behaviour, correlations between child-related and environmental variables can be seen in Table 4. As expected, child recycling behaviour was linked to the corresponding parental behaviour ($r = .49$, $p < .001$), verbal modelling of recycling acts ($r = .33$, $p = .001$) and incentives ($r = .24$, $p = .019$). Contrary to the theoretical assumptions, children's actions were also related with parental communication about environmental issues ($r = .30$, $p = .004$). However, no relationship between environmental attitudes of parents and child behaviour existed ($r = .15$, $p = .150$). Furthermore, no significant correlation was found between pupils' recycling acts and recycling in schools ($r = –.04$, $p = .739$) (see Table 4). Considering environmental factors, children's recycling behaviour was therefore related with parental variables, i.e. recycling behaviour performed by the parents, verbal modelling of such actions, incentives and communication behaviour.

In terms of child-related variables, children's recycling behaviour correlated with their willingness to recycle ($r = .30$, $p = .015$) and the perceived behavioural control ($r = .51$, $p < .001$) (see Table 5). Surprisingly, child behaviour was also linked to subjective norm regarding recycling ($r = .38$, $p = .002$). Hence, pupils' recycling acts were related with their desire to perform such behaviour, perceived behavioural control and subjective norm.

Table 4. *Correlations between child-related and environmental factors in regard to children's recycling behaviour*

		8	9	10	11	12	13	14
1	Child's recycling behaviour	.49***	.15	.30**	.20	.33**	.24*	–.04
2	Willingness to recycle	.11	–.04	.05	–.12	–.01	.13	.13
3	Eco-awareness	.18	–.06	.28*	.07	.24*	.01	.40**
4	Eco-affinity	.08	–.04	–.04	–.16	.14	–.03	.03
5	Empathy for creatures	.04	.00	.11	.01	.11	.06	.12
6	SN regarding recycling	.37**	.11	.19	.09	.20	.01	.16
7	PBC of recycling	.37**	.08	.33**	.25*	.28*	.25*	.03
8	Parental behaviour	-	.08	.22*	.47***	.64***	.14	.31**
9	Environmental attitudes of parents		-	.40***	.31**	.10	.08	–.09
10	Parental communication about environmental issues			-	.64***	.38***	.28**	.08

		8	9	10	11	12	13	14
11	Parental communication about the importance of recycling				-	.57**	.36***	.16
12	Verbal modelling of recycling behaviour by the parents					-	.36***	.18
13	Incentives used by the parents						-	.11
14	Recycling in schools							-

Note. $*p < .05$; $**p < .01$; $***p < .001$. SN – subjective norm; PBC – perceived behavioural control. 1 – child's recycling behaviour; 2 – willingness to recycle; 3 – eco-awareness; 4 – eco-affinity; 5 – empathy for creatures; 6 – SN regarding recycling; 7 – PBC of recycling; 8 – parental behaviour; 9 – environmental attitudes of parents; 10 – parental communication about environmental issues; 11 – parental communication about the importance of recycling; 12 – verbal modelling of recycling behaviour by the parents; 13 – incentives used by the parents; 14 – recycling in schools.

Table 5. *Correlations between children's recycling behaviour and child-related factors*

		1	2	3	4	5	6
1	Recycling behaviour	-					
2	Willingness to recycle	.30*	-				
3	Eco-awareness	.01	.17	-			
4	Eco-affinity	.11	.48**	.02	-		
5	Empathy for creatures	.13	.35**	.27*	.55***	-	
6	SN regarding recycling	.38**	.42**	.09	.33*	.14	-
7	PBC of recycling	.51***	.32*	.29*	–.02	.24*	.18

Note. *p < .05; **p < .01; ***p < .001. SN – subjective norm; PBC – perceived behavioural control.

To test the prognostic factors of children's recycling behaviour, path analysis was performed based on the conceptual model of the study (see Figure 1) and the results from correlational analysis presented above. We first included the relationships that corresponded to the theoretical assumptions and that were confirmed to be significant by correlational analysis (model 1). After testing the model, insignificant paths were removed from the model. Afterwards, we added new paths that were unexpected according to the conceptual model but proved significant when calculating correlations (model 2). When necessary and reasonable, modification indices were also added to the models.

Standardized path coefficients from the model 1 of children's recycling behaviour can be seen in Table 6. Participants' behaviour was predicted by their subjective norm only (β = .46, p = .001), while desire to recycle was predicted by pupils' eco-affinity (β = .70, p < .001). The model had a good model fit (χ^2 (13) = 12.52, p = .486;

RMSEA = .00; *CFI* = 1.00; *TLI* = 1.07). Model 2 revealed the same significant relationships (see Table 6), though it did not show a good model fit (χ^2 (9) = 13.11, *p* = .158; *RMSEA* = .10; *CFI* = .81; *TLI* = .62). Nevertheless, model 1 and model 2 did not differ significantly ($\Delta\ \chi^2 = .59$; $\Delta\ df = 4$). Hence, subjective norm proved to be the only direct predictor of children's recycling behaviour.

Table 6. *Standardized path coefficients from the model 1 and model 2 of children's recycling behaviour*

	Model 1		Model 2	
Paths of the models	*β*	*p*	*β*	*p*
Child-related predictors				
Willingness to recycle → recycling behaviour	.01	.957	-	-
PBC → recycling behaviour	.33	.063	-	-
SN → recycling behaviour	.46	**.001**	.78	**< .001**
Eco-affinity → willingness to recycle	.70	**< .001**	.66	**.002**
Empathy → willingness to recycle	.10	.687	-	-
SN → willingness to recycle	.25	.095	-	-
PBC → willingness to recycle	.17	.232	-	-
Environmental predictors				
Parental behaviour → child's recycling behaviour	.13	.630	-	-
Verbal modelling → child's recycling behaviour	.25	.101	-	-

Paths of the models	Model 1		Model 2	
	β	*p*	*β*	*p*
Incentives → child's recycling behaviour	.14	.448	-	-
Parental behaviour → child's SN	.10	.745	-	-
Parental behaviour → child's PBC	.50	.122	-	-
Verbal modelling → child's PBC	–.02	.940	-	-
Parental communication about environmental issues → child's recycling behaviour	-	-	–.09	.696
Parental communication about environmental issues → child's PBC	-	-	.15	.654
Parental communication about the importance of recycling → child's PBC	-	-	.29	.435
Incentives → child's PBC	-	-	–.02	.943

Note. Statistically significant estimates presented in bold. PBC – perceived behavioural control; SN – subjective norm. Path based on the modification indices shown in italic. Model 1 represents the relationships that were based on the conceptual model of the study and confirmed by correlational analysis; in model 2, insignificant paths were removed and new paths were added based on the correlational analysis.

Analysis regarding conservation behaviour followed the same steps as the analysis of recycling behaviour. First, we evaluated the relationships between child-related and environmental variables concerning children's conservation behaviour. This time, no statistically significant correlations were found between child behaviour and environmental factors (see Table 7). As presented in

Table 8, children's behaviour was though related with their desire to save water/electricity (r = .45, p < .001) and the perceived behavioural control (r = .29, p = .008). Contrary to the theoretical assumptions, conservation behaviour also correlated with participants' eco-affinity (r = .37, p = .004), empathy for creatures (r = .24, p = .029) and eco-awareness (r = –.32, p = .006). In terms of conservation behaviour, only the correlations with child-related factors proved significant.

Table 7. *Correlations between child-related and environmental factors in regard to children's conservation behaviour*

		8	9	10	11	12	13
1	Child's conservation behaviour	–.04	.03	.11	.08	.00	–.14
2	Willingness to conserve	–.06	.10	.08	.02	.22*	–.01
3	Eco-awareness	–.06	.28*	.04	.07	–.01	.07
4	Eco-affinity	–.04	–.04	–.02	–.26	–.08	–.14
5	Empathy for creatures	.00	.11	–.05	–.09	–.03	–.22
6	SN regarding conservation	.06	.11	.18	.13	.30*	.11
7	PBC of conservation	–.08	.20	.20	.20	.00	.02
8	Environmental attitudes of parents	-	.40***	.26**	.17	.25**	–.10
9	Parental communication about environmental issues		-	.47***	.39***	.34***	.14
10	Parental communication about the importance of conservation			-	.72***	.48***	.04

		8	9	10	11	12	13
11	Verbal modelling of conservation behaviour by the parents				-	.36***	–.04
12	Incentives used by the parents					-	.23**
13	Promotion of conservation behaviour in schools						-

Note. *p < .05; **p < .01; ***p < .001. SN – subjective norm; PBC – perceived behavioural control. 1 – child's conservation behaviour; 2 – willingness to conserve; 3 – eco-awareness; 4 – eco-affinity; 5 – empathy for creatures; 6 – SN regarding conservation; 7 – PBC of conservation; 8 – environmental attitudes of parents; 9 – parental communication about environmental issues; 10 – parental communication about the importance of conservation; 12 – verbal modelling of conservation behaviour by the parents; 13 – incentives used by the parents; 14 – promotion of conservation behaviour in schools.

Table 8. *Correlations between children's conservation behaviour and child-related factors*

		1	2	3	4	5	6
1	Conservation behaviour	-					
2	Willingness to conserve	.45***	-				
3	Eco-awareness	–.32**	–.02	-			
4	Eco-affinity	.37**	.48***	.02	-		
5	Empathy for creatures	.24*	.33**	.27*	.55***	-	
6	SN regarding conservation	.11	.41**	.01	.15	.25	-
7	PBC of conservation	.29**	.31**	.30*	.56***	.47***	.17

Note. *p < .05; **p < .01; ***p < .001. SN – subjective norm; PBC – perceived behavioural control.

To investigate the prognostic factors of children's conservation behaviour, path analysis followed the aforementioned steps, i.e. we first included the relationships that corresponded to the conceptual model of the study (see Figure 1) and were confirmed to be significant by correlational analysis (model 1); insignificant paths were then removed from the model. We further added new paths that were not based on the conceptual model but proved significant by the correlations between variables (model 2). When necessary and when corresponded with the theoretical assumptions, modification indices were also added to the models.

As shown in Table 9, children's willingness to conserve was the only predictor of their behaviour (β = .39, p = .017), while willingness was predicted by their eco-affinity (i.e. affective attitude)

(β = .62, p = .001) and the subjective norm (β = .25, p = .004) in the model 1. It showed a good model fit (χ^2 (7) = 6.11, p = .527; *RMSEA* = .00; *CFI* = 1.00; *TLI* = 1.05). Model 2 revealed that pupils' conservation behaviour could be predicted not only by their willingness (β = .60, p = .001) but also by children's eco-awareness (i.e. cognitive attitude) (β = –.29, p = .014) and their subjective norm regarding conservation (β = –.27, p = .012). Willingness to conserve was predicted by children's eco-affinity (β = .58, p < .001), their subjective norm (β = 0,31, p = 0,004) and parental communication behaviour (β = .27, p = .028) in model 2, which also had a good model fit (χ^2 (6) = 2.53, p = .865; *RMSEA* = .00; *CFI* = 1.00; *TLI* = 1.17). Again, model 1 and model 2 did not differ significantly ($\Delta \chi^2$ = 3.58, Δ *df* = 1). Thus, children's conservation behaviour could be predicted by their desire to conserve water and electricity, their cognitive attitude and the subjective norm.

Table 9. *Standardized path coefficients from the model 1 and model 2 of children's conservation behaviour*

	Model 1		Model 2	
Paths of the models	β	p	β	p
Child-related predictors				
Willingness to conserve → conservation behaviour	.39	**.017**	.60	**.001**
PBC → conservation behaviour	.08	.621	-	-
Eco-affinity → conservation behaviour	-	-	–.09	.648
Empathy → conservation behaviour	-	-	.04	.801
Eco-awareness → conservation behaviour	-	-	–.29	**.014**

Paths of the models	Model 1		Model 2	
	β	*p*	*β*	*p*
SN → conservation behaviour	-	-	–.27	**.012**
Eco-affinity → willingness to conserve	.62	**.001**	.58	< **.001**
Empathy → willingness to conserve	.03	.857	-	-
SN → willingness to conserve	.25	**.004**	.31	**.004**
PBC → willingness to conserve	.10	.536	-	-
Environmental predictors				
Incentives → child's willingness to conserve	–.03	.810	-	-
Incentives → child's SN	.11	.437	-	-
Parental communication about environmental issues → child's willingness to conserve	-	-	.27	**.028**
Parental communication about environmental issues → child's eco-awareness	-	-	.40	**.004**

Note. Statistically significant estimates presented in bold. PBC – perceived behavioural control; SN – subjective norm. Paths based on the modification indices shown in italic. Model 1 represents the relationships that were based on the conceptual model of the study and confirmed by correlational analysis; in model 2, insignificant paths were removed and new paths were added based on the correlational analysis.

To test the general model of the study (model 3), both recycling and conservation behaviours were included together with their prognostic factors that were revealed by the models 2. Model 3 had a good fit (χ^2 (18) = 13.89, p = .736; *RMSEA* = .00; *CFI* = 1.00; *TLI* =

1.20) and showed that results related to children's recycling behaviour remained the same, i.e. their behaviour was predicted by the subjective norm only (β = .74, p < .001), while eco-affinity predicted children's willingness to recycle (β = .59, p = .007). Conservation behaviour was predicted by pupils' willingness to conserve (β = .42, p = .006) and their eco-awareness (β = –.34, p = .001) but not by the subjective norm (β = –.20, p = .582). Moreover, willingness to conserve was predicted by participants' eco-affinity (β = .51, p = .001) and parental communication behaviour (β = .34, p = .003) but not by children's subjective norm regarding conservation (β = .38, p = .081). In addition, parental communication behaviour was not any more a significant predictor of children's eco-awareness (β = .33, p = .248). Thus, recycling behaviour was explained by pupils' subjective norm, while conservation behaviour – by their desire to conserve and by their cognitive attitude.

To test the final model of the study (model 4), control variables (i.e. child gender, social desirability, visual reasoning abilities or fluid intelligence, frequency of contact with nature and pets at home) were added to the general model. The effect of control variables was directed to all other variables in the model. Similar to the previous steps, we also took necessary and reasonable modification indices (specifically, correlations) into account. Notably, due to the primary finding that children's contact with nature predicted parental communication behaviour, we decided to test the correlation between the two variables instead of one-direction relationship because both directions could be theoretically possible. Model 4 showed a good fit (χ^2 (23) = 21.04, p = .579; *RMSEA* = .00; *CFI* = 1.00; *TLI* = 1.07) and did not differ from the model 3 ($\Delta\chi^2$ = 7.15, Δdf = 5).

Standardized path coefficients from the final model are presented in Table 10. Subjective norm regarding recycling remained the prognostic variable of children's recycling behaviour (β = .50, p < .001) and eco-affinity continued to predict their desire to recycle (β = .40, p = .003). Furthermore, participants' conservation behaviour was

predicted by their willingness to conserve (β = .51, p = .044) and their eco-awareness (β = –.38, p = .015), while eco-affinity (β = .39, p = .008) and subjective norm (β = .54, p < .001) remained as two prognostic factors of participants' desire to conserve. In addition, based on model modifications, statistically significant relations were found between parental communication behaviour and children's contact with nature (r = .66, p < .001) and their eco-affinity (r = .35, p = .002), as well as between pupils' subjective norm regarding recycling and their willingness to recycle (r = .60, p = .001). In terms of control variables, child gender and fluid intelligence had no significant effect on other variables of the model (see Table 10). To sum up, fewer paths have remained in model 4, compared to the model 2 of conservation behaviour, while results regarding recycling behaviour remained very similar.

Final model of the study (model 4) is presented in Figure 2.

Table 10. *Standardized path coefficients from the final model of children's recycling and conservation behaviours*

Paths of the model	β	p
SN regarding recycling → recycling behaviour	.50	**< .001**
Eco-affinity → willingness to recycle	.40	**.003**
Willingness to conserve → conservation behaviour	.51	**.044**
Eco-awareness → conservation behaviour	–.38	**.015**
SN regarding conservation → conservation behaviour	–.34	.056
Eco-affinity → willingness to conserve	.39	**.008**
SN regarding conservation → willingness to conserve	.54	**< .001**
Parental communication about environmental issues → child's willingness to conserve	.26	.097

Paths of the model	β	p
Parental communication about environmental issues → child's eco-awareness	.32	.133
Control variables		
Child gender → recycling behaviour	.13	.442
Social desirability → recycling behaviour	–.07	.743
Frequency of contact with nature → recycling behaviour	.27	**.004**
Pet at home → recycling behaviour	.41	**.004**
Visual reasoning abilities → recycling behaviour	–.16	.418
Child gender → willingness to recycle	–.26	.139
Social desirability → willingness to recycle	.32	**.038**
Frequency of contact with nature → willingness to recycle	.17	.101
Pet at home → willingness to recycle	–.22	.236
Visual reasoning abilities → willingness to recycle	.32	.203
Child gender → SN regarding recycling	–.10	.519
Social desirability → SN regarding recycling	.46	**.001**
Frequency of contact with nature → SN regarding recycling	.27	**.004**
Pet at home → SN regarding recycling	–.31	**.024**
Visual reasoning abilities → SN regarding recycling	.15	.322
Child gender → conservation behaviour	–.24	.153

Paths of the model	β	p
Social desirability → conservation behaviour	–.10	.479
Frequency of contact with nature → conservation behaviour	.25	.065
Pet at home → conservation behaviour	–.05	.798
Visual reasoning abilities → conservation behaviour	–.06	.734
Child gender → willingness to conserve	–.04	.713
Social desirability → willingness to conserve	.03	.878
Frequency of contact with nature → willingness to conserve	.05	.749
Pet at home → willingness to conserve	.29	**.033**
Visual reasoning abilities → willingness to conserve	.11	.453
Child gender → SN regarding conservation	–.07	.680
Social desirability → SN regarding conservation	.19	.334
Frequency of contact with nature → SN regarding conservation	.04	.763
Pet at home → SN regarding conservation	–.01	.956
Visual reasoning abilities → SN regarding conservation	–.14	.427
Child gender → eco-affinity	–.20	.340
Social desirability → eco-affinity	.01	.949
Frequency of contact with nature → eco-affinity	.22	**.014**
Pet at home → eco-affinity	.02	.925

Paths of the model	β	p
Visual reasoning abilities → eco-affinity	.15	.351
Child gender → eco-awareness	–.21	.239
Social desirability → eco-awareness	–.16	.347
Frequency of contact with nature → eco-awareness	–.14	.505
Pet at home → eco-awareness	–.36	**.014**
Visual reasoning abilities → eco-awareness	.30	.114
Child gender → parental communication about environmental issues	–.06	.668
Social desirability → parental communication about environmental issues	–.07	.690
Pet at home → parental communication about environmental issues	.09	.554
Visual reasoning abilities → parental communication about environmental issues	–.06	.772

Note. The effect of control variables was directed to all other variables in the general model. Statistically significant estimates presented in bold. SN – subjective norm.

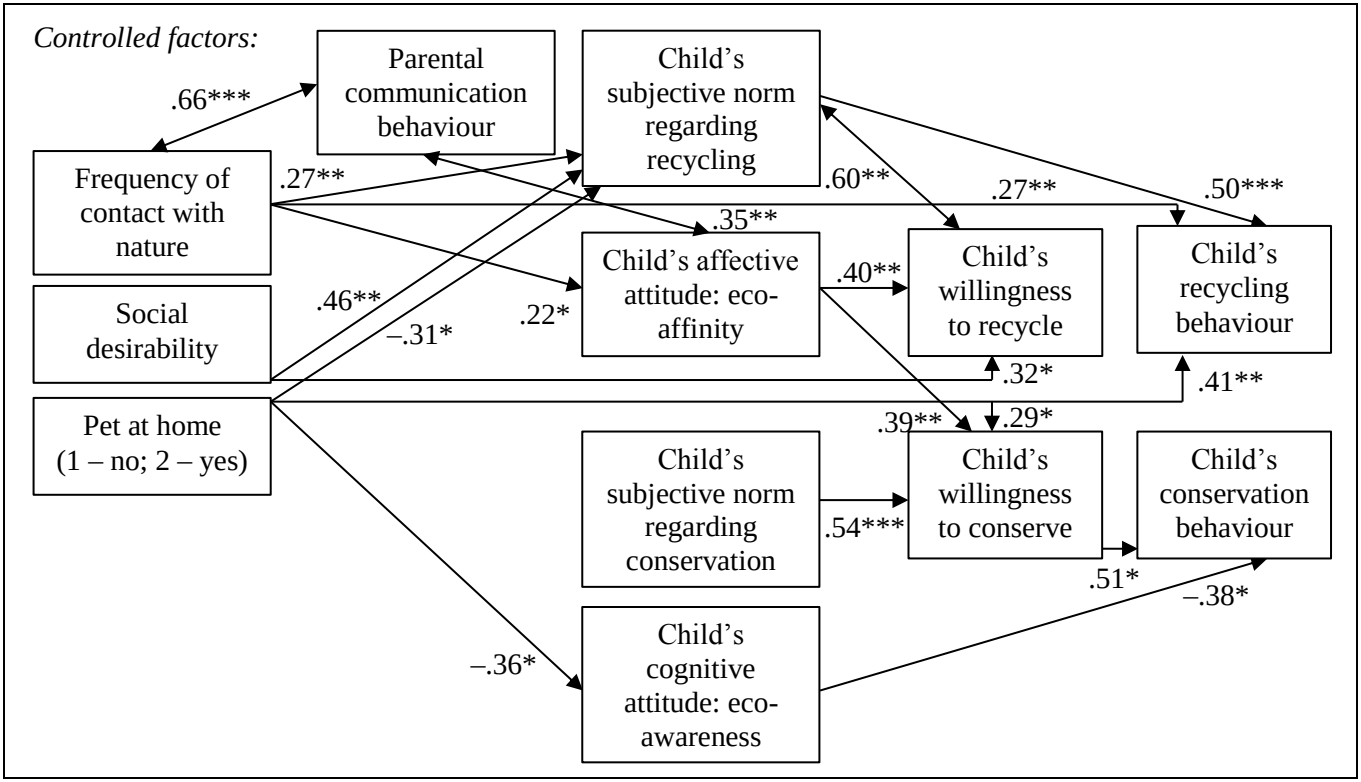

Figure 2. Final model of the study. *Note.* *$p < .05$; **$p < .01$; ***$p < .001$.

6. DISCUSSION

Middle childhood is a significant period that gives children an opportunity to develop competencies and interests in a variety of domains (Eccles, 1999). It might likewise be an important age to engage children in practices of caring for nature; however, we lack knowledge about pro-environmental behaviour in primary school years. This study contributed to a better understanding of children's views of pro-environmental behaviour (study one) and allowed to examine the factors that predict their own behaviour in primary school age (study two).

Study findings showed that children knew of various pro-environmental actions like protection of plants and animals (Honig & Mennnerich, 2012). They were best aware of the behaviours related to waste management, e.g. not littering and recycling (e.g. Littledyke, 2004). Furthermore, children who participated in the study one reported that they were executing several types of actions themselves. Based on the results from the study two, pupils also reported that they often or always engaged in pro-environmental behaviour. It revealed that children were aware of the topic of environmental protection and did care about it. Thus, primary school age is indeed an appropriate time to promote pro-environmental behaviour in children.

Recycling and water/electricity conservation acts were distinguished as two types of pupils' pro-environmental behaviour, implying that it would be worthwhile analysing separate behaviours performed by the children in their primary school years. In middle childhood, children develop self-awareness and are capable to reflect on their own successes and failures (Eccles, 1999; Wigfield & Eccles, 2002). In addition, with age, self-awareness and competence beliefs become more differentiated (Marsh, Craven, & Debus, 2000; Wigfield & Eccles, 2002). We may assume that primary school children could also differentiate beliefs regarding their ability to

perform pro-environmental acts and that promotion of pro-environmental behaviour during this period should therefore be focused to particular actions.

The children viewed environmental behaviours in moral terms (Hahn & Garrett, 2017; Kahn, 1997; Kahn & Friedman, 1995; Kahn & Lourenço, 2002; Pearce, Hudders, & Van de Sompel, 2020; Severson & Kahn, 2010) and expressed both anthropocentric and biocentric reasoning regarding nature protection. The anthropocentric appeals covered categories of personal interests, aesthetics and human wellbeing (Kahn, 2002, 2003). Not surprisingly, places in nature were significant to the children in respect of what they could do in them, and were associated with positive experiences (Bonnett & Williams, 1998; Burgess & Mayer-Smith, 2011; Hallås & Heggen, 2018; Kalvaitis & Monhardt, 2012). The anthropocentric appeals reported by the children also represented their pro-social moral reasoning because of the empathic concerns, i.e. concerns for other people's needs (Eisenberg-Berg, 1979). Actually, there is evidence about the strong relationship linking pro-ecological and altruistic behaviours in children (Barrera-Hernández et al., 2020). Thus, interventions could simultaneously promote both types of children's behaviour.

In terms of biocentric reasoning, children emphasised the protection of animals, plants and environment in general. Such reasons were mentioned to no lesser degree than anthropocentric appeals, contradicting the evidence that biocentric reasoning mostly characterizes adolescence and adulthood (Kahn, 2003). Severson and Kahn (2010) acknowledged that biocentric considerations can actually emerge earlier depending on the nature of questions posed to children. Findings of the present study are similar to the results from Hallås and Heggen (2018) who showed that anthropocentric and eco-centric views of nature were distributed equally among pre-school and primary school children. It may be assumed that questions of positive or neutral nature stimulate more biocentric statements in children, compared to the questions about adverse effects to the

environment. To summarize, it is worth integrating both human-related and nature-oriented reasons for protecting nature to strengthen children's motivation to act pro-environmentally.

Although children were asked about nature protection, they also mentioned environmentally harmful behaviour and ecological problems, such as air and water pollution (e.g. Barraza & Robottom, 2008). Litter was among the most frequently mentioned issues (e.g. Littledyke, 2004). Interestingly, children indicated disfigurement of the environment as another environmentally harmful act. On the one hand, it suggests that their experiences in urban locality contribute to a range of cognitive and affective dimensions in their learning (Pike, 2011). On the other hand, because primary school children reason logically about concrete information (Piaget, 1963), in future studies, it would be worthwhile to formulate the questions referring to nature (rather than environmental) protection. When discussing environmentally harmful actions, some participants also realized that such behaviours could be related with people's views or attitudes, e.g. not caring about nature. Hence, in middle childhood, pupils are able to perceive intentions behind individuals' moral judgements (Buon, 2017), including intentions behind environmental actions.

Considering pro-environmental behaviour performed by the children, environmental and child-related factors were distinguished as the main predicting factors in the age under study. Regarding child's environment, parental factors and school context were investigated but they appeared to play a less significant role, compared to the child-related factors. Thereby, study results could not support the role of behavioural modelling (Bandura, 2009; Rogoff et al., 2003). On the one hand, communication within family (Kalvaitis & Monhardt, 2012; Pike, 2011) and observation of other people's behaviours (Bonnett & Williams, 1998) were among the most frequently mentioned sources of children's knowledge about environmental protection in the study one, highlighting the importance of such learning. On the other hand, as mentioned earlier, primary school students may already feel a moral obligation to act

pro-environmentally (Matthies et al., 2012) and this process relies on the internalization of social norms (Schwartz, 1977). We may therefore assume that the influence of parental factors was stronger for the children in their younger age.

Other parental factors like incentives or verbal modelling of particular behaviours were also irrelevant. Katz-Gerro, Greenspan, Handy and Vered (2020) noted that environmental behaviour of adult children was not related to being taught or controlled in the socialization process but rather by participating as equal partners in environmental activities. It points to the role of socialization as a bidirectional process because those who are socialized construct their own beliefs based on the information they receive from the outside (Grusec et al., 2012). Nonetheless, one of the parental factors, namely communication about environmental issues, proved to have significant links with children's eco-affinity (i.e. affective attitude) and the frequency of contact with nature. In this context, it is important to mention that caring for the natural world develops in connection with the socialization process when parents or other close adults show examples of such caring and draw child's appreciative attention to nature (Chawla, 2007, 2009). Moreover, talking about the environment in families is considered to be shaping children's environmental attitudes (Eagles & Demare, 1999) and strengthening their environment concern (Meeusen, 2014). Altogether, parental communication could promote more families' time in nature and increase environmental concern in their children, adding to the development of their emotional connection with the natural world.

In regard to the promotion of pro-environmental behaviour at schools, current research could not evaluate the environmental education that is considered to be effective in changing learners' knowledge, attitudes or behaviours, e.g. promoting active engagement and participation or strengthening connection with nature (Chawla & Flanders Cushing, 2007; Stern et al., 2014; Zelezny, 1999). Future research could help gain more in-depth answers in the field, especially bearing in mind that according to the

children from the study one, they learned about environmental protection from schools or from educational literature (e.g. Bonnett & Williams, 1998). In this respect, issues mentioned by the participants could represent the knowledge areas introduced to Lithuanian pupils through primary school curriculum, for instance, about prevention of pollution (Ministry of Education and Science, 2008). In summary, environmental factors were less relevant when predicting children's pro-environmental behaviour, while child-related factors appeared to play a major role in the context of current research.

Children's recycling behaviour was predicted by their perception about parental expectation (i.e. subjective norm) (Ando et al., 2015; Matthies et al., 2012). This factor also proved important as an indirect predictor of pupils' conservation acts mediated by their willingness to conserve, i.e. by motivational aspect (Ajzen, 1991; Fishbein & Ajzen, 2010). In the developmental process, children learn what roles and practices are expected of them, and it contributes to the developing sense of who they are, what they can do and what they want to do (Chawla, 2009; Eccles & Wigfield, 2002). Thus, study findings stress the importance of children's subjective perception about how parents expect them to behave. In middle childhood, children's perception and interpretation about parental practices might require even more attention than the real practices because of the influence of child's development, temperament, gender and cultural context (Grusec et al., 2012). It is important to note, however, that subjective norm regarding recycling was measured using one item that was the first question of the instrument. Therefore, results related to the subjective norm should be interpreted with caution because of a possibility of a socially desirable responding.

In terms of the conservation behaviour, it was predicted not only by children's willingness to conserve but also by their cognitive attitude, i.e. eco-awareness. This relationship turned out to be negative, contradicting evidence about the positive linkage between

environmental attitudes and behaviours (Kollmuss & Agyeman, 2002). The conflicting finding might indicate that water and electricity saving acts were understood as a different type of behaviour, compared to the recycling actions, by the pupils. In the study one, conservation behaviour in general was mentioned very rarely. Based on the results from other studies, water and electricity savings could be linked to financial costs in the families (Aguirre-Bielschowsky, Lawson, Stephenson, & Todd, 2017, 2018; Carmi, Arnon, & Orion, 2015). On the contrary, recycling acts were well known among the children as a type of pro-environmental behaviour. Quite a broad knowledge of waste problem and waste management behaviours could be a result of a visible recycling infrastructure in the city where the study took place as well as an extensive escalation of such issues in Lithuanian media. Children from the study one indicated media as one of the sources of their knowledge, too. Thus, similar to the behaviours of adults (Bamberg & Möser, 2007; Stern, 2000), pro-environmental actions performed by the children could be predicted by different factors, so interventions should be targeted accordingly.

One of the aspects that is worth strengthening by child- and family-directed interventions is eco-affinity, i.e. affective attitude, because it predicted children's willingness to act pro-environmentally (Collado et al., 2013; Dopko et al., 2019), and such findings coincided in the case of both recycling and conservation behaviours. Connectedness to nature can promote individuals' psychological restoration (Wyles et al., 2019), and restorative experiences may be related to children's environmental attitudes and behaviours (Collado & Corraliza, 2015). Additionally, emotional affinity toward nature can be critical for the formation of children's environmental identity (Kals & Ittner, 2003). The latter also acts as a motivational force (Clayton, 2003). Notably, some of the children reported that they knew about environmental protection from 'within' which potentially reveals their connection with the natural world. Another aspect that could theoretically help explain the

relationship between connection to nature and motivation to act pro-environmentally is empathy with nature (Tam, 2013). However, we did not find any significant relations to children's empathy in this study and further examinations would be worthwhile considering the importance of empathy for the development of pro-social motives (Hoffman, 2000).

Regarding the controlled variables, child gender and verbal reasoning abilities (fluid intelligence) had no significant effects on the research model. Because children's moral reasoning was found to be linked to their verbal intelligence (Malti, Eisenberg, Kim, & Buchmann, 2013) but not to the fluid intelligence (Beißert & Hasselhorn, 2016), we may need to test the role of the crystalized intelligence in the development of pro-environmental behaviour in future research. The findings regarding child gender were also unexpected due to the inconsistency with the existing evidence (e.g. Collado et al., 2017). At least during the narrow age span that was covered in the study, differences between girls and boys might be only minor in regard to their pro-environmentalism. As we have seen from the analysis of various prognostic factors in this study, the role of separate factors may appear insignificant when looking at a comprehensive and multifaceted model rather than when evaluating isolated differences or relationships. Other factors like social desirability, frequency of contact with nature and pets at home might be worthwhile controlling in the future studies.

Summarizing, the study allowed examining children's pro-environmental behaviour based on a comprehensive conceptual model that comprised constructs from the developmental and environmental psychology research. Multi-informal approach was applied, so responses by children, their parents and class teachers could be involved. To the best of our knowledge, this is the first study that integrated key theories applied in the field and the information provided by several groups of respondents. Questions for children were created based on the focus group research, statements used in other studies with children, primary school

curriculum and the corrections made in several pilot studies. Nevertheless, it is important to further improve tools for assessing environmental behaviour in primary school children. Abstract question formulations that can be seen in children's studies are not appropriate considering their developmental status (Borgers et al., 2000). Though we aimed to develop comprehensible items supplemented with visual material, we did not succeed in covering more diverse aspects of behaviour. Thus, present work does not provide definitive answers since we still lack knowledge about the topic, and research tools require further improvement.

6.1 Study limitations and guidelines for future research

Limitations of the study require interpreting its findings with caution. Though we sought to involve participants of a very similar age into focus groups (Clark, 2011; Krueger & Casey, 2000), it was only partially achieved. Likewise, the groups were of mixed gender. In less homogeneous groups, children are less likely to share their experiences and thoughts (Clark, 2011). Moreover, particular statements were not attached to individual study participants, thus, it was impossible to further analyse the data according to individual characteristics of the children. When interviewed, children might also strive providing what seems a 'good' response or experience peer pressure to conform to friends' views (Littledyke, 2004). Hence, limitations of the study one could have resulted in reduced data diversity.

Findings from the study two showed that behavioural assessment tool did not include items on more challenging actions that primary school children could perform (Evans, Brauchle, et al., 2007). Similarly, items of research instruments for parents and teachers did not allow revealing greater differences between the responses. A small study sample that was very similar in respect of socio-economic and socio-demographic characteristics could have reinforced this limitation. Furthermore, principles of constructing a

reasoned action questionnaire (Fishbein & Ajzen, 2010) were not exactly followed and could have resulted in weaker and less accurate relationships between the constructs. It is also important to take into account that children's pro-environmentalism could be influenced by their peers (Collado et al., 2017; Eccles, 1999) which remained unexplored in present study. In addition, though we followed the theoretical background on the direction of the links between studied constructs, opposite effects could also occur (e.g. Damerell, Howe, & Milner-Gulland, 2013). Finally, neither qualitative (study one) nor quantitative (study two) research allows the generalization of its findings. Future research could therefore help searching for more comprehensive answers in the field.

In future research, it would be valuable to examine how pupils' environmental moral judgements transform into environmental behaviours (Collado & Sorrel, 2019). In addition to collecting larger samples, it would be worthwhile to rely on more objective research methods for assessing children's behaviours, e.g. observation (Chawla, 2009). Measuring more diverse actions performed by children and their parents could likewise provide more accurate information on their behaviours (Evans, Otto, & Kaiser, 2018) and on the role of behavioural modelling. Furthermore, more detailed examination of environmental education in both formal and non-formal sectors could broaden our understanding about the role of education in the development of children's pro-environmentalism. A more in-depth analysis is also necessary regarding the symbolic modelling (Bandura, 2009, 2016) of environmental behaviours, as well as the role played by empathy. Finally, longitudinal and experimental study designs would provide evidence on the causality regarding prognostic factors of pro-environmental behaviour in primary school age.

CONCLUSIONS

1. Children viewed environmental behaviour in moral terms. When reasoning about the importance of environmental protection, they indicated reasons related to human health and well-being and nature in a broader sense; therefore, their environmental moral reasoning comprised of pro-social, anthropocentric and biocentric appeals. Anthropocentric and biocentric reasoning can appear equally often in middle childhood, just like in adolescence or adulthood.

2. Pro-environmental actions were mostly linked to the waste management behaviour by the pupils. The analysis of their own behaviour allowed distinguishing waste recycling and water/electricity conservation acts that were predicted by different factors and different interconnections between the factors. Thus, various prognostic factors might be significant when explaining children's pro-environmental behaviours.

3. Among the most important sources of their knowledge on nature protection, children mentioned communication within families and observation of other people's behaviours. Considering the environmental factors related to pupils' pro-environmental behaviours, parental communication about environmental issues emerged as the most significant one. It was related with children's frequency of contact with nature and with their eco-affinity.

4. For the prediction of pro-environmental behaviours in primary school age, several child-related factors proved to be significant.

4.1. Subjective norms predicted children's behaviours both directly (in case of the recycling actions) and indirectly (in case of the conservation behaviour). It revealed the importance of pupils' subjective perception about parental expectations.

4.2. Willingness to act pro-environmentally was predicted by children's eco-affinity, implying the significance of

emotional connection with the natural world in the development of motivation to care for nature.

4.3. Conservation behaviour was predicted by children's willingness to conserve water and electricity and by their eco-awareness. Because the latter relationship proved negative, it could indicate that conservation behaviour was linked less to the environmental protection, contrary to the waste recycling acts.

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