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Articles

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Pradinio mokyklinio amžiaus vaikų aplinkosauginės nuostatos ir atliekų rūšiavimo elgesys: mokyklos ir tėvų vaidmuo

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Abstract: This study aimed to investigate the relationship between environmental attitudes and recycling behaviour in primary school age, and to evaluate the role that school and parents play in the prediction of children's attitudes and behaviour. Primary school pupils aged 8–11 years (. = 116), their parents and their class teachers participated in the study. During the structured face-to-face interviews, children answered questions about their recycling behaviour and environmental attitudes (i.e. eco-affinity and eco-awareness). Parents provided answers on their recycling behaviour, verbal modelling of the behaviour, incentives used when a child recycles waste, and environmental attitudes, while class teachers provided information about the recycling in children's school. Structural equation models were tested with a purpose to evaluate the role of different independent variables, i.e. only school, only parental factors, or both, when predicting child recycling behaviour. Results of the study showed that children's environmental attitudes had no significant links to their recycling behaviour. The only factor that appeared to be significant in the prediction of child behaviour was parental recycling behaviour. Furthermore, recycling in schools predicted pupils' eco-awareness. Based on the study findings, it would be worthwhile to promote more practical training of pro-environmental behaviour, and to strengthen children's eco-affinity.

Keywords: social learning, environmental attitudes, recycling, primary school age.

Summary: Vaikystė išskiriama kaip reikšmingas amžiaus tarpsnis aplinkosauginėms nuostatoms ir aplinką tauso- jančiam elgesiui formuotis. Pradinis mokyklinis amžius pasižymi svarbiais kognityviniais pokyčiais ir besiplečiančiu socialiniu vaiko pasauliu, taip pat didele tėvų įtaka. Šiuo tyrimu siekta ištirti aplinkosauginių vaiko nuostatų ir atliekų rūšiavimo elgesio sąsajas pradiniame mokykliniame amžiuje bei įvertinti mokyklos ir tėvų vaidmenį prognozuojant šias vaikų nuostatas ir elgesį. Tyrime dalyvavo 116 mokinių, kurių amžius 8–11 metų, taip pat vienas iš jų tėvų ir vaikų klasių auklėtojos. Individualių struktūruotų interviu metu vaikai atsakė į klausimus apie tai, kaip jie rūšiuoja, ir klausimus apie aplinkosaugines savo nuostatas – afektinę ir kognityviąją. Tėvai pateikė atsakymus apie savo rūšiavimo elgesį, žodinį šio elgesio modeliavimą šeimoje, taikomus paskatinimus, kai vaikas rūšiuoja, ir aplinkosaugines nuostatas, o klasių auklėtojos – informaciją apie atliekų rūšiavimą mokykloje, kurioje vaikas mokosi. Vaiko elgesiui prognozuoti buvo sudaryti struktūrinių lygčių modeliai su skirtingais nepriklausomaisiais kintamaisiais: rūšiavimu mokyklose, tėvų veiksniais ir kartu mokyklos bei tėvų veiksniais. Rezultatai atskleidė, kad aplinkosauginės vaikų nuostatos ir rūšiavimo elgesys nebuvo susiję reikšmingais tarpusavio ryšiais. Moksleivių elgesį nuspėjo tik atitinkamas tėvų elgesys, o rūšiavimas mokyklose prognozavo

kognityviąją vaikų nuostatą. Remiantis gautais rezultatais, būtų galima kreipti dėmesį į praktinį aplinkosauginį švietimą ir ugdymo procese labiau orientuotis į moksleivių afektinę nuostatą.

Keywords: socialinis mokymasis, aplinkosauginės nuostatos, rūšiavimas, pradinis mokyklinis amžius.

Childhood is frequently presented as a significant age for the development and promotion of pro-environmental attitudes and behaviours (e.g. Chawla, 2009). Otto et al. (2019) showed that environmental attitudes and behaviours increase from the age of 7 to 10; thereby, middle childhood or primary school age is particularly important for the formation of pro-environmentalism in children. Based on Eccles (1999), children's engagement in various activities during middle childhood is influenced by their cognitive changes, broadening social worlds and exposure to social comparison in peer groups. Investigation of children's engagement in pro-environmental behaviour should therefore include both child-related factors and external influences.

Middle childhood is characterized by significant cognitive changes that allow children to think more flexibly than in preschool years (Huston & Ripke, 2009). They can reason logically about concrete information (Piaget, 1963) and take the perspectives of others (Eccles, 1999; Piaget & Inhelder, 1969). These changes are also reflected in children's ability to construct understanding about environmentally harmful behaviour and to reason about its consequences for others (Honig & Mennnerich, 2012). Furthermore, research on children's environmental attitudes points to the importance of affective factors. Youngsters' attitudes toward the environment can be considered to consist of two components representing eco-awareness, i.e. understanding about environmental issues and the importance of nature, and eco-affinity, i.e. interest in nature and intentions to engage in pro-environmental behaviour (Larson et al., 2011). Emotional affinity toward nature and ecological beliefs were shown to be connected with children's willingness to perform ecological acts (Collado et al., 2013). Moreover, there is a strong evidence on the relationship between nature connection and pronvironmental behaviour of individuals (Mackay & Schmitt, 2019). Thus, it is worth investigating the links between pupils' environmental attitudes and behaviours, including both cognitive and affective aspects of the attitudes.

Based on the social learning theories, observation of behaviours performed by others is one of the most influential ways to learn (Bandura, 2009; Rogoff et al., 2003), and the family is a primary source of behavioural modelling (Bandura, 1969). Through modelling, children can also learn attitudes (Bandura, 2009). Nevertheless, research on the links between environmental attitudes and behaviours of children and their parents does not provide a clear picture. Given the limitations regarding children's maturation, attitudes and behaviours of parents and their offspring might not converge in case of younger children, i.e. 6 to 8 years of age (Evans, Brauchle, et al., 2007). Furthermore, the linkage

between parental and child behaviours may be stronger for more visible actions like recycling, in contrast to paper re-use or electricity saving acts (Grønhøj & Thøgersen, 2012; Matthies et al., 2012). We could hence expect stronger relationships between environmental attitudes and behaviours of children and their parents when pupils are at least 9 years old and in case of a more visible pro-environmental behaviour.

As children's language skills develop, another source of learning by verbal modelling becomes increasingly influential (Bandura, 2009). However, empirical data on verbal modelling in regard to pro-environmental behaviour is lacking. Similarly, we know very little about the role of external incentives like rewards (Bandura, 2009; Paradise & Rogoff, 2009; Rogoff et al., 2003) for the development of environmentalism in children. Nonethe-less, Matthies et al. (2012) showed that parental sanctions (i.e. praising a child when she or he separates used paper) conveyed parental expectations (i.e. that parents want a child to separate the used paper) as perceived by the primary school students. More research could help to better understand the role that verbal modelling and external incentives play in the formation of children's environmental attitudes and behaviours. Similar to behavioural modelling and attitudes of parents, verbal modelling of particular behaviour is expected to have both direct and indirect (i.e. through children's attitudes) relations with child's behaviour, while external incentives might predict children's actions directly.

Despite that parental influence is considerable in middle childhood (Grusec et al., 2012) primary school years are likewise characterized by substantial influences stemming from broader environment of children (Eccles, 1999; Huston & Ripke, 2009). Again, empirical work regarding external factors other than parental role is scarce. Existing literature mostly covers studies on environmental education directed to the changes in individuals' environmental knowledge, attitudes and behaviours (Barratt Hacking et al., 2007; Rickinson, 2001). In Lithuania, there is some evidence of a lack of appropriate tools and practical activities in the context of formal science education (Lamanauskas ir Augienė, 2019) and non-formal environmental citizenship education (Poškus et al., 2019). It implies that special attention should be given to environmental education at schools which can equip pupils with the necessary knowledge and commitment to address various challenges (Jensen, 2002). Importantly, child-oriented environmental education can also affect parents' knowledge and household behaviour, because pupils transfer what they learn to their parents (Damerell et al., 2013); thus, it can have an impact on the whole family. Based on the social learning theories described above (Bandura, 2009; Rogoff et al., 2003), it would be worthwhile to explore the role of behavioural modelling that takes place in primary schools. Though families are a primary source of learning by observation, schools provide another source of such influence in pupils' everyday life.

Factors that are important for the development of environmental attitudes and behaviours should also include background factors. Child

gender requires special attention, because girls usually demonstrate stronger environmental attitudes and concerns and behave in a more pro-environmental manner than compared to boys (Braun et al., 2018; Collado et al., 2017; Müller et al., 2009; Rickinson, 2001). As indicated by Zelezny et al. (2000), females are socialized to be other-oriented, which might result in stronger eco-centrism among them. In terms of other background factors, Rickinson (2001) noted that children from higher socioeconomic background have stronger environmental attitudes and are more likely to act pro-environmentally. The data presented here points to the importance of taking sociodemographic and socioeconomic characteristics into account.

Understanding the psychological processes that promote pro-environmental attitudes and behaviours in children is critical because young generation will be in charge of confronting environmental challenges in the future (Collado et al., 2013). However, there is a scarcity of research related to the processes that lead children to think, feel and act in environmentally friendly way (Collado et al., 2017). Such knowledge could help strengthen environmental education and develop evidence-based interventions. The aim of this study is thus to investigate the relationship between environmental attitudes and pro-environmental behaviour in primary school age, and to evaluate the role that the school and parents play in the prediction of children's attitudes and behaviour. In this study, we will look only at recycling behaviour as a type of pro-environmental behaviour. Waste recycling actions were chosen as the behaviour that primary school pupils are able to perform on their own and that is visible in the households nowadays. Conceptual model of the study is presented in Figure 1.

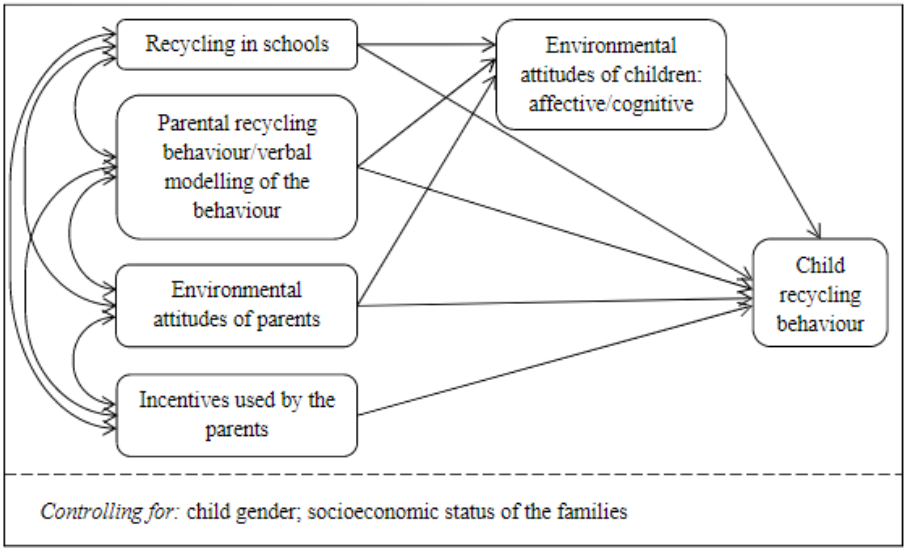

Figure 1.
Conceptual model of the study

Method

Participants. A total of 116 children, their parents (n = 114) and class teachers (n = 11) participated in the study. The children were from 3rd and 4th grades from five primary schools/pro-gymnasiums situated in Vilnius. They were 8 to 11 years old (M = 9.40, SD = 0.56); 55% were girls. An average age of their parents was 39.52 (SD = 5.40); 83.9% were females. Most of the parents had higher university education (80%) and were married (76.8%). Considering the financial situation of the families, 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%), while 11.7% of the families always had extra money. Importantly, 82.3% of the parents noted that there were special containers for sorting plastic, paper and glass nearby their family homes.

Procedure. The data of this study was collected in the schools starting November 2019 until July 2020. Children who wanted to participate were asked to bring the forms of informed consents to their parents together with parents' questionnaires. Only the pupils whose parents gave their consents participated in the study. After collecting the written consents, children participated in structured face-to-face interviews which took place in empty classrooms or staff rooms. At the beginning of each 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. The researcher also presented special answer sheets to the participants and explained that only one of the provided options should be chosen. Based on practice from Larson et al. (2011), the participants were also asked to answer an example statement at the beginning. Furthermore, both parents and teachers filled in the paper-and-pencil instruments. The research was approved by the Ethics Committee for Psychological Research in Vilnius University.

Measures. Given the concrete operational stage of cognitive development (Piaget, 1963) that characterizes our study participants, we aimed to construct the questions for children as concrete and simple as possible. In addition, the phrasing of behavioural items was developed based on the focus group research conducted prior to this study (a part of the results from the focus group research is presented in Šorytė & Pakalniškienė, 2019). Pilot studies were also conducted prior to the main phase of the research to assure that study measures were appropriate for the children in their primary school age.

Child recycling behaviour. Children's self-reported recycling behaviour was measured with 3 items representing recycling of paper, plastic and glass (e.g. "you recycle paper, i.e. you throw it to a special place at home"). Simultaneously, a picture (created for the study) of a recycling child was shown to the participants for greater comprehensibility. Study participants were given five response options, i.e. "never", "rarely", "often", "always", and "I don't know"; the fifth choice was analysed as a missing value for the whole children's questionnaire. Sum of answers was

calculated as a final score of the instrument. Internal consistency for the three-item scale was .92.

Environmental attitudes of children. Children's Environmental Perceptions Scale (CEPS) (Larson et al., 2011) was used to assess pupils' environmental attitudes. CEPS consists of two components of children's environmental orientations – affective, i.e. ecoaffinity (e.g. "I like to learn about nature"), and cognitive, i.e. ecoawareness (e.g. "my life would change if there were no plants and animals"). Originally, 8 eco-affinity and 8 eco-awareness items form the scale with five response choices. Response format for this study was as follows: "totally disagree", "disagree", "agree", "totally agree", and "I don't know". Exploratory factor analysis (EFA) confirmed the original item structure of CEPS (KMO = .70, Bartlett's test $p < .001$), though two items had to be removed because they loaded on a factor of different meaning. Sums of answers were calculated as the final scores of two sub-scales. Internal consistency for eco-affinity and eco-awareness was .76 and .71 respectively.

Recycling in schools. To gain information about the possibility of behavioural modelling at schools, teachers answered a question about recycling in their classroom or school ("waste like paper, plastic and glass is being recycled in your class or school"). 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 the activities carried out in classrooms or schools. However, given a small number of informants, no comparisons could be made and only responses to the closed-ended question were used. Parental recycling behaviour. Self-reported recycling behaviour of parents was measured with 4 items similar to the ones given to children to be able to compare their responses (e.g. "I recycle paper"); an extra item on battery recycling was adapted from Kaiser and Wilson (2004). Response format for the parental items was presented on a five-point scale and ranged from "never" to "always". Sum of answers was calculated as a final score of the instrument. Internal consistency for the four parental recycling items was .88.

Environmental attitudes of parents were assessed with the New Ecological Paradigm (NEP), a revised scale (Dunlap et al., 2000). Fifteen items (e.g. "we are approaching the limit of the number of people the earth can support") were provided along with five response options from "totally disagree" to "totally agree". Since most of the questions were assigned to the first factor in EFA, NEP was treated as a one-factor measure (KMO = .81, Bartlett's test $p < .001$), following the recommendation by Dunlap et al. (2000). However, four items did not load satisfactorily on the factor and were removed from the analysis. Sum of answers was calculated as a final score of NEP. The remaining items had an internal consistency of .85.

Verbal modelling of the behaviour was measured with one-item representing parental teaching of recycling behaviour ("I teach (or used to teach) my child about how to recycle waste"). Study participants were provided with responses on a five-point scale ranging from "totally disagree" to "totally agree".

Incentives used by the parents. To assess external incentives, one-item was used ("I praise or otherwise encourage my child (or used to do it) when she or he recycles waste"); it was adapted from Matthies et al. (2012). Again, five response options ranged from "totally disagree" to "totally agree".

The participating parents also answered questions regarding demographic and socioeconomic variables, i.e. their gender, age, education, marital status and financial situation of their families (Bagdonas et al., 2013). A question about the availability of recycling facilities was also included in the parents' questionnaire. Noteworthy, only families' financial situation was included in the analysis due to uneven distribution among groups of other socioeconomic variables.

Data analysis. Descriptive statistics and EFA were calculated using SPSS 26 software. Because not all of the data satisfied normal distribution, nonparametric tests were applied. Structural equation modelling (SEM) was performed with Mplus 8.2 (using MLR estimator for non-normally distributed data) (Muthén & Muthén, 2017). In total, six models were tested based on the conceptual model presented in Figure 1. Child recycling behaviour was introduced as a dependent variable in all the models. First, recycling in schools was tested as an independent variable and child attitudes – both cognitive and affective – as mediating variables (model 1 without control variables or model 1a in tables). The same model was tested when controlled for child gender (1 – girls; 2 – boys) and families' financial situation (model 1 with control variables or model 1b). Second, parental factors were tested as independent variables and child attitudes as mediators (model 2 without control variables or model 2a). The same model was then controlled for background factors (model 2 with control variables or model 2b). Finally, both school and parental factors were inserted as independent variables to test the general model of the study (model 3 without control variables or model 3a). Again, the same model was tested when controlled for background factors (model 3 with control variables or model 3b). We compared the same models with and without the control variables in order to evaluate if background factors had an additional effect on the models. Considering the theoretical assumptions about the links between child-oriented education and household behaviour (Damerell et al., 2013) and according to the statistical rule, school and parental factors were correlated in the models (when the control variables were not inserted) (Kline, 2016).

Model fit of SEM models was assessed with chi-square test statistic ($\chi 2$), root mean square error of approximation (RMSEA), comparative fit index (CFI) and Tucker-Lewis index (TLI). RMSEA below .06 and CFI/TLI above .95 are recognized to indicate good model fit (Hu & Bentler, 1999). RMSEA below .08 (Hooper et al., 2008) and CFI above .90 (Raykov & Marcoulides, 2006) are also associated with models of acceptable fit. Separate models with and without the control variables were compared using chi-square difference test (Hoyle & Panter, 1995).

Moreover, modification indices were used when necessary and when coincided with theoretical assumptions.

Results

Descriptive statistics and Spearman's correlations between study variables are presented in Table 1. Means of the variables ranged from moderate to high. Child recycling behaviour correlated with the respective parental behaviour (r = .49, p < .001), verbal modelling of the behaviour (r = .33, p = .001) and incentives used by the parents (r = .24, p = .019), but did not relate with children's eco-affinity (r = .11, p = .440) or their ecowareness (r = .01, p = .959). Furthermore, children's eco-awareness correlated with verbal modelling of recycling behaviour by the parents (r = .24, p = .038) and with recycling in schools (r = .40, p = .004). Considering that no significant correlations were found between environmental attitudes of parents and other study variables (see Table 1), parental attitudes were removed from the further analysis.

Table 1.

Means, standard deviations and Spearman's correlations between study variables

	Variables	M (SD)	Min/ Max	1	2	3	4	5	6	7
1	Child recycling behaviour	9.46 (3.05)	3/12	-						
2	Children's eco-affinity	23.2 (2.55)	7/28	.11	-					
3	Children's eco-awareness	23.99 (3.43)	7/28	.01	.02	-				
4	Parental recycling behaviour	16.09 (4.13)	4/20	.49***	.08	.18	-			
5	Verbal modelling of the behaviour	4.08 (1.02)	1/5	.33**	.14	.24*	.64***	-		
6	Environmental attitudes of parents	40.91 (5.68)	11/55	.15	–.04	–.06	.08	.10	-	
7	Incentives used by the parents	3.96 (0.96)	1/5	.24*	–.03	.01	.14	.36***	.08	-
8	Recycling in schools	4.12 (0.84)	1/5	–.04	.03	.40**	.31**	.18	–.09	.11

Note. *p < 0.05; **p < 0.01; ***p < 0.001. M – mean; SD – standard deviation; min – minimum possible value; max – maximum possible value. 1 – child recycling behaviour; 2 – children's eco-affinity; 3 – children's eco-awareness; 4 – parental recycling behaviour; 5 – verbal modelling of the behaviour; 6 – environmental attitudes of parents; 7 – incentives used by the parents; 8 – recycling in schools.

Mann–Whitney–Wilcoxon test was applied to compare the estimates of child-related factors between groups by gender. Girls had higher eco-affinity than boys (mean ranks 34.40 and 25.40; Z = –2.00, p = .046),

though there were no differences regarding their eco-awareness (mean ranks 38.71 and 38.23; Z = –2.00, p = .924) or recycling behaviour (mean ranks 46.07 and 50.34; Z = –0.77, p = .439).

We further tested the six SEM models. Model fit information is presented in Table 2, while standardized model estimates of each path in the models can be seen in Table 3. Results from the model 1 without control variables (model 1a), which tested recycling in schools as an independent variable, showed that it predicted only pupils' eco-awareness (β = .47, p = .003) (see Table 3). This model had an acceptable fit, as indicated in Table 2. When controlled for child gender and families' financial situation (model 1b), the model indicated good model fit and the results remained very similar to the model without control variables, i.e. recycling in schools predicted only the cognitive attitude of children, i.e. their eco-awareness (β = .43, p = .003). Model 1 with and without the control variables did not differ significantly ($\Delta \chi^2 = 7.08$, Δ df = 28). Therefore, recycling in schools was a significant predictor of pupils' eco-awareness but did not predict their affective attitude (eco-affinity) or recycling behaviour.

Table 2.
Model fit information for the six SEM models

	χ^2 (df)	p	RMSEA	CFI	TLI
Model 1a	158.69 (126)	.026	.06	.91	.90
Model 1b	165.75 (154)	.245	.03	.97	.97
Model 2a	290.83 (220)	.001	.05	.92	.90
Model 2b	316.41 (255)	.005	.05	.93	.91
Model 3a	302.63 (236)	.002	.05	.92	.91
Model 3b	346.33 (275)	.002	.05	.92	.90

Note. df – degrees of freedom. Model 1a included only recycling in schools as an independent variable; model 1b refers to the same model when controlled for background variables; model 2a included only parental factors as independent variables; model 2b refers to the same model when controlled for background variables; model 3a included both school and parental factors; model 3b refers to the same model when controlled for background variables.

According to the model 2 without control variables (model 2a), which tested parental factors (i.e. their recycling behaviour, verbal modelling of the behaviour, environmental attitudes and incentives) as independent variables, child recycling behaviour was predicted by parental behaviour only (β = .43, p = .009) (see Table 3). This model showed an acceptable fit (see Table 2). When controlled for child gender and families' financial situation (model 2b), the model was of adequate fit, too, and revealed very similar findings, i.e. parents' self-reported recycling behaviour predicted the recycling behaviour performed by their children (β = .47, p = .005). Again, model 2 with and without the control variables did not differ significantly ($\Delta \chi^2 = 25.58$, Δ df = 35). Results from the model 2 thus showed that parental recycling behaviour played a significant role in predicting child recycling behaviour but not children's environmental attitudes.

Model 3 without control variables (model 3a), which included both school and parental factors as independent variables, was of acceptable fit (see Table 2). As shown in Table 3, it confirmed very similar findings to the prior models, i.e. recycling in schools predicted pupils' eco-awareness ($\beta = .45$, $p = .006$) and parental recycling behaviour predicted child behaviour ($\beta = .48$, $p = .008$). When controlled for child gender and families' financial situation (model 3b), the model also showed an acceptable fit and revealed very similar results. Thus, according to the general research model, parental behaviour remained the only predictor of child behaviour ($\beta = .51$, $p = .002$) and school context continued to predict children's cognitive attitude ($\beta = .43$, $p = .003$).

As revealed by the model 3 with control variables (model 3b), neither pupils' ecoaffinity ($\beta = .02$, $p = .890$) nor eco-awareness ($\beta = .12$, $p = .445$) had any effect on their recycling behaviour (see Table 3). Additionally, girls reported stronger affective attitude, i.e. eco-affinity, than boys ($\beta = -.23$, $p = .036$), while financial situation of the families had a significant effect on recycling in schools, i.e. children from families of better financial situation were more likely to attend schools with higher recycling possibilities ($\beta = .31$, $p = .001$). Model 3 with and without the control variables did not differ significantly ($\Delta \chi^2 = 43.7$, $\Delta df = 39$). From the general research model we can conclude that environ-

Table 3.
Standardized model results from the six SEM models

Paths of the models	β	p	β	p
	Model 1a		**Model 1b**	
Recycling in schools → child recycling behaviour	−.13	.374	−.16	.262
Recycling in schools → children's eco-affinity	−.04	.736	−.10	.460
Recycling in schools → children's eco-awareness	.47	**.003**	.43	**.003**
Children's eco-affinity → child recycling behaviour	.11	.569	.10	.486
Children's eco-awareness → child recycling behaviour	.19	292	.21	.176
	Model 2a		**Model 2b**	
Parental recycling behaviour → child recycling behaviour	.43	**.009**	.47	**.005**
Verbal modelling of the behaviour → child recycling behaviour	.04	.845	.02	.903
Incentives used by the parents → child recycling behaviour	.14	.229	.14	.220
Parental recycling behaviour → children's eco-affinity	.03	.869	.08	.625
Verbal modelling of the behaviour → children's eco-affinity	.16	.330	.14	.406
Parental recycling behaviour → children's eco-awareness	.02	.892	.18	.346
Verbal modelling of the behaviour → children's eco-awareness	.19	.242	.14	.475
Children's eco-affinity → child recycling behaviour	.08	.375	.06	.611
Children's eco-awareness → child recycling behaviour	.02	.846	.01	.960
	Model 3a		**Model 3b**	
Predictor: recycling in schools				
Recycling in schools → child recycling behaviour	−.16	.263	−.24	.090
Recycling in schools → children's eco-affinity	−.08	.480	−.15	.205
Recycling in schools → children's eco-awareness	.45	**.006**	.43	**.003**
Predictors: parental variables				
Parental recycling behaviour → child recycling behaviour	.48	**.008**	.51	**.002**
Verbal modelling of the behaviour → child recycling behaviour	.02	.935	−.02	.899
Incentives used by the parents → child recycling behaviour	.12	.330	.13	.288
Parental recycling behaviour → children's eco-affinity	.05	.747	.12	.452
Verbal modelling of the behaviour → children's eco-affinity	.15	.354	.11	.486
Parental recycling behaviour → children's eco-awareness	.01	.997	.04	.807
Verbal modelling of the behaviour → children's eco-awareness	.25	.329	.22	.222
Predictors: environmental attitudes of children				
Children's eco-affinity → child recycling behaviour	.07	.454	.02	.890
Children's eco-awareness → child recycling behaviour	.04	.835	.12	.445

Note. Statistically significant estimates presented in bold. Model 1a included only recycling in schools as an independent variable; model 1b refers to the same model when controlled for background variables; model 2a included only parental factors as independent variables; model 2b refers to the same model when controlled for background variables; model 3a included both school and parental factors; model 3b refers to the same model when controlled for background variables

mental attitudes of children were not a significant predictor of their recycling behaviour. The findings though revealed that parental recycling behaviour predicted the corresponding child behaviour, while recycling in schools proved to be a significant predictor of pupils' eco-awareness. The results from the final general research model (i.e. model 3b) can be seen in Figure 2.

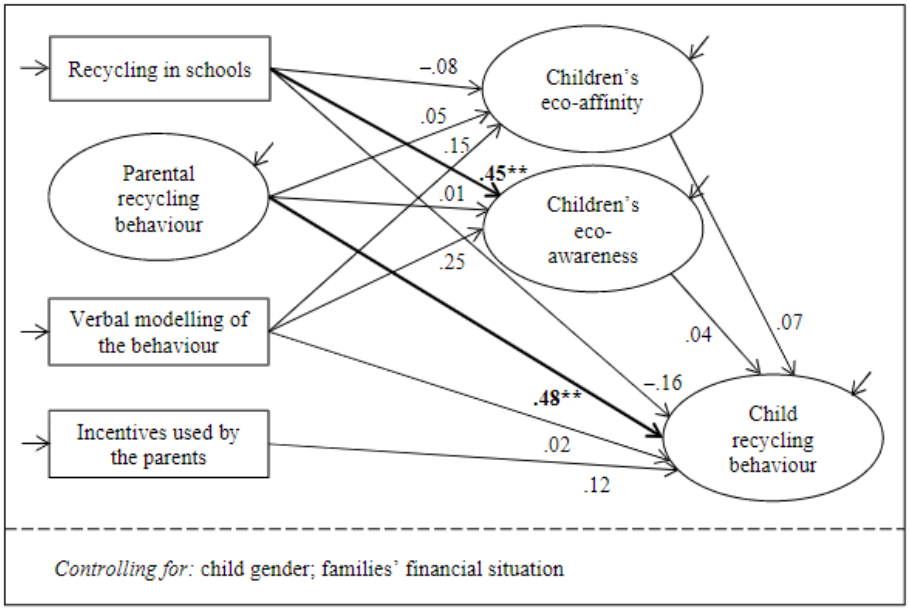

Figure 2.
Final general model of the study

Discussion

This study sought to investigate child-related (i.e. children's environmental attitudes) and external (i.e. school and parents) factors relevant to the prediction of recycling behaviour in primary school age. It broadened the scope of factors that are usually included in the research based on social learning theories and added verbal modelling and school context in addition to other variables. Though we explored the role of few parental factors, namely self-reported recycling behaviour, verbal modelling of the behaviour, incentives and environmental attitudes, the only factor that appeared to be significant for the prediction of child actions was parental behaviour. Furthermore, recycling in schools predicted pupils' cognitive attitude but children's attitudes had no significant links to their behaviour. The findings provide support for the significance of behavioural modelling with regard to pro-environmental actions (Ando et al., 2015; Collado et al., 2017; Matthies et al., 2012). Study results highlight that observation of waste sorting acts is presumably more influential than incentives for recycling, verbal modelling of the behaviour or environmental attitudes of parents. Based on cross-national study by Katz-Gerro et al. (2020), environmental behaviour of adult children was connected with the corresponding behaviour of their parents but not with being taught or controlled in the socialization process, implying the importance of joint participation in environmental activities. The findings are also in line with the evidence about behavioural visibility for recycling is one of the highly visible actions performed in the households (Grønhøj & Thøgersen, 2012; Matthies et al., 2012). This can create opportunities for intent participation, i.e. active observation followed by collaborative participation, which is considered

to be a powerful form to learn new behaviours (Rogoff et al., 2003). Considering that environmental attitudes of parents had no significant links to pupils' attitudes or actions, we may agree with Collado et al. (2017) that children seem to be more strongly influenced by what they can easily observe, rather than by what others think or feel (i.e. attitudes).

Recycling executed in classrooms or schools also appeared important, though it related with pupils' eco-awareness and not with their behaviour. Thus, school context might be particularly important for the formation of children's understanding about environmental issues and the importance of nature. Such findings may suggest that waste sorting behaviour was explained through educational process for the children rather than modelled in the schools. Noteworthy, from the data obtained, we could not evaluate the real extent of recycling behaviour (or the real availability of observation of such behaviour) in participating schools. From the literature related to environmental education, we though know that effective environmental education can be distinguished by promotion of participants' initiatives, active engagement, feelings of competence and success, involvement of role models, encouragement of cooperation, strengthening connection with nature, etc. (Chawla & Flanders Cushing, 2007; McPherson Frantz & Mayer, 2014; Stern et al., 2014). Given a small number of participating teachers, current research could not evaluate such features of environmental education provided in the primary schools. Nevertheless, considering that recycling in schools was a significant predictor of children's attitude, educational context proved to be important for pupils' cognitive grasp about environmentalism.

Interestingly, one of the controlled factors – families' financial situation – appeared to play a role in this regard because children from families of better financial situation were more likely to attend schools with higher recycling possibilities. Such schools could hence have higher opportunities to implement recycling infrastructure. Moreover, we found differences in respect to other controlled factor – child gender, i.e. girls reported stronger affective attitude than boys (Müller et al., 2009). As mentioned, it could be explained by the way girls are socialized to be other-oriented (Zelezny et al., 2000) as well as by empirical work showing that females are more empathetic (Toussaint & Webb, 2005), including stronger dispositional empathy with nature (Tam, 2013). Empathy can be considered to be a part of children's affective attitude toward nature (Chen-Hsuan Cheng & Monroe, 2012). Despite these findings, controlling for background factors did not affect the remaining relationships between studied constructs. It thus supports the results about the significant role that parental recycling behaviour and school context play in the prediction of pupils' attitude and behaviour.

In terms of the links between children's attitudes and behaviour, no relationship was found. On the one hand, it contradicts theoretical assumptions about the connection linking environmental attitudes and actions, especially bearing in mind that attitudinal factors are considered to be less influential in case of demanding (i.e. difficult, time-consuming, expensive) pro-environmental acts (Collado et al., 2013; Stern, 2000),

and recycling behaviour is rather simple in this respect. On the other hand, the results appear to be consistent with the evidence that stronger linkage between environmental attitudes and behaviours is being found in older children of at least 10 years old (Collado et al., 2015; Collado et al., 2017; Otto et al., 2019). More mature children might translate their attitudes into actions more easily (Collado et al., 2017), while younger ones may need more time to develop an understanding and knowledge about the strategies needed to translate their attitudes into behaviours (Evans, Juen, et al., 2007). It is also important to remark that in general, children have fewer possibilities to engage in various pro-environmental actions compared to adults (Collado et al., 2015; Evans, Brauchle, et al., 2007; Evans, Juen, et al., 2007). To summarize, environmental attitudes might be more influential when studying pro-environmental behaviour in groups of older ages.

Based on the findings of the study, it would be worthwhile to test the effects of other social agents on children's pro-environmental behaviours in future research. Due to the broadening social world in middle childhood, children could be influenced by their peers (Collado et al., 2017), especially considering the role of exposure to social comparison in peer groups (Eccles, 2002). Symbolic modelling is also considered to be a highly influential source of learning (Bandura, 2009); therefore, a broader spectrum of social factors could have resulted in a more detailed picture of the influences on children's environmental attitudes and behaviours. Moreover, a more in-depth examination of environmental education in both formal and non-formal sectors could broaden our understanding about the role that external factors play in the development of youngsters' environmentalism. Measuring more diverse pro-environmental behaviours performed by children and their parents could also provide more accurate information about behavioural modelling. Considering practical implications stemming from this study, it would be worthwhile to include more practical training of pro-environmental behaviour into educational process (Matthies et al., 2012). School context appeared to be significant for pupils' cognitive attitude, thus, primary schools could also play a role in the promotion of children's affective attitude (especially in the case of boys) since connectedness to nature has significant relations with sustainable behaviours of children (Barrera-Hernández et al., 2020; Collado et al., 2013). One of the ways to promote eco-affinity in pupils is to provide them with naturebased environmental education (e.g. Collado et al., 2020). Nature-based experiences were shown to have positive effects regarding both children's pro-environmentalism and their psychological well-being (e.g. Barrera-Hernández et al., 2020).

There are few limitations of the study that should be taken into account when considering the obtained results. We measured general environmental attitudes and not the attitudes specific to the recycling behaviour. According to Fishbein and Ajzen (2010), specific attitudes have a stronger and more accurate effect on compatible behaviours.

Furthermore, findings obtained with single item measures should be treated with caution because of the risk of unreliable measurement of particular constructs (Gliem & Gliem, 2003). Similarly, the results should be treated with caution because of the sample size that was small for SEM (Kline, 2016); though various rules-of-thumb exist on the minimum sample size for such models (see Wolf et al., 2013). It also appeared that research instruments did not allow revealing greater differences between the responses of study participants. Specific study sample that was involved in the research could have reinforced this limitation because it was comprised of families from one city and with very similar socioeconomic characteristics. Therefore, the study does not allow the generalization of its findings. Finally, it is important to have in mind that social desirability bias can have an impact on environmental attitudes and self-reported ecological behaviour in children (Oerke & Bogner, 2013). As mentioned, issues regarding children's maturity might have also resulted in some insignificant study findings (e.g. Collado et al., 2017). Nevertheless, to assure that the applied measures were appropriate for the studied children, we carried out qualitative as well as pilot studies prior to this research and conducted individual interviews with the pupils. It is worth continuing investigations on environmental attitudes and behaviours of children in their primary school age, and future research could help searching for more in-depth answers in the field.

In summary, the study showed that environmental attitudes and recycling behaviour of primary school pupils were not interconnected. However, children's cognitive attitude was predicted by the recycling in schools, while recycling behaviour performed by the parents appeared to be a significant predictor of the respective child behaviour. This work contributes to the literature regarding social learning of pro-environmental actions and emphasizes that learning which takes place in families and in schools might have differ ent effects for the development of environmentalism in primary school years. Parental recycling actions appeared to be important as a direct source of behavioural modelling, while school context revealed as a significant factor for pupils' environmental awareness – as discussed, such awareness might transform into pro-environmental actions later in children's life.

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