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Preschoolers' pro-environmental orientations and theory of mind: ecocentrism and anthropocentrism in ecological dilemmas

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ABSTRACT

The globalized problems of this socio-scientific issue result from human behaviour; thus educators aim to enhance children's awareness and knowledge of and attitudes and motivations to create an environmentally sustainable society. Previous studies examine preschoolers' ecological attitudes and reasoning regarding gender and urban versus rural living. This study aims to extend this research to examine the possible associations between theory of mind (ToM), gender and story comprehension and young children's pro-environmental orientations. The study participants were 128 preschoolers. The findings revealed that (a) young children's pro-environmental orientations did not differ regarding gender, (b) the children's ToM scores were not differentiated in terms of gender, (c) children who articulated ecocentric orientations had higher ToM, and (d) story comprehension scores than children who stated anthropocentric orientations. The findings of this study imply that the use of stories in environmental education is an effective and developmentally appropriate activity for young children.

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Young children; theory of mind; pro-environmental orientations; ecocentric; anthropocentric

Introduction

Since the late 1960s, our planet has witnessed a growing number of environmental problems that threaten nature and human life (Hoffman & Sandelands, 2005; Manoli, Johnson, & Dunlap, 2007). Rapid industrialization, advances in technology and urbanization have given rise to deteriorating ecological phenomena such as forest loss, species extinction, degradation of fresh water, soil deterioration, air pollution and global warming (Kortenkamp & Moore, 2001; Net, Delmont, Sempéré, Paluselli, & Ouddane, 2015; Wu, 2012). Human beings are the most effective species at shaping the world and utilizing its natural resources to provide for their needs and comforts (Gifford & Nilsson, 2014). Human activities and attitudes towards nature cause local environmental problems that evolve into global ones (Manoli et al., 2007). Because these globalized problems result from human behaviours, educators are concerned with enhancing children's awareness, knowledge, attitudes and motivations to create an environmentally sustainable society (Liefländer & Bogner, 2014; Wals, 2007; Wells & Lekies, 2006). In order to focus this education successfully, it is important to investigate children's pro-environmental orientations from early childhood years. A fuller understanding of children's interests in this field will allow educators to foster their pro-environmental behaviours. Understanding the factors and motivations of individuals' pro-environmental orientations may provide practical information to educators and teachers to develop successful environmental education programmes.

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Young children's pro-environmental orientations

Much evidence shows that early childhood experiences influence trajectories and are predictors of children's development and learning (Campbell, Pungello, Miller-Johnson, Burchinal, & Ramey, 2001; Luo & Waite, 2005; Walker et al., 2011). The long-lasting and cumulative effects of these experiences are well-studied regarding literacy, math and science education (Clements & Sarama, 2014; Curran, 2017; Hooper, Roberts, Sideris, Burchinal, & Zeisel, 2010; Morgan, Farkas, & Wu, 2011). Wells and Lekies (2006) found a link between early childhood nature experiences and adulthood environmentalism. Similarly, Gifford and Nilsson (2014) asserted that pro-environmental concern is a multidimensional issue, and childhood experiences play a role in adult behaviours. Therefore, young children's pro-environmental experiences, attitudes and orientations are important research foci.

Theoretical underpinning

Social and environmental psychologists have examined individuals' concerns and decision-making processes in relation to pro-environmental behaviours (Joireman, Lasane, Bennett, Richards, & Solaimani, 2001; Park & Ha, 2014; Schultz, 2002; Steg & Vlek, 2009; Stern, Kalof, Dietz, & Guagnano, 1995). To explain these pro-environmental behaviours (Stern, 2000), social scientists developed conceptual frameworks, such as the norm-activation model (NAM) (Schwartz, 1977; Schwartz & Howard, 1981) and the value-belief norm (VBN) theory (Stern, Dietz, Abel, Guagnano, & Kalof, 1999; Stern, Dietz, & Kalof, 1993). Schwartz's (1977) NAM asserted that humans' altruistic (i.e. prosocial) behaviours are associated with three conceptual constructs: *personal norms* (PM), *awareness of the consequences* of behaviour (AC) and *responsibility denial* (RD). AC activates 'personal norms and a feeling of moral obligation' (p. 227), resulting in altruistic behaviour, while RD deactivates this obligation and leads to denial of the need for altruistic behaviour (Schwartz, 1977). Because NAM highlights the role of awareness of the harmful consequences of certain behaviours and interpersonal relations in prosocial behaviour, it has been widely used in environmental research (Bamberg & Schmidt, 2003; De Groot & Steg, 2009; Milfont, Sibley, & Duckitt, 2010; Onwezen, Antonides, & Bartels, 2013; van der Werff & Steg, 2015). Stern et al. (1993) extended the NAM with the VBN theory, which uses beliefs rather than AC and proposes that the negative consequences of behaviours may never arise. Briefly, this theory posits that an individual who believes that an environmental circumstance has consequences for other humans and species will engage in pro-environmental actions (Stern et al., 1993). The detrimental outcomes of beliefs can have *egoistic* (one's own well-being), *social* (others' well-being) or *biospheric* (non-humans' well-being) value orientations (Snelgar, 2006; Stren, 2000; Stern et al., 1993, 1999). Overall, the VBN theory stresses cognitive awareness of the consequences of behaviour and concern for other people and species (Schultz, 2000; Schultz et al., 2005).

Studies have revealed that self-enhancement values are negatively associated with biospheric and social concerns, while self-transcendence values are positively associated with pro-environmental concerns (Coelho, Gouvenia, & Milfont, 2006; Karp, 1996; Schultz, 2001; Schultz & Zelezny, 1999). An individual's perspective-taking, empathy and emotional affinity are substantial factors affecting pro-environmental behaviours (Mayer & Frantz, 2004; Schultz, 2002; Swami, Chamorro-Premuzic, Snelgar, & Furnham, 2010). Research also found that gender is related to pro-environmental orientation; females are more prone to this orientation than are males (Schultz, 2001; Stern et al., 1993; Swami et al., 2010; Zelezny, Chua, & Aldrich, 2000), and females tend to have higher AC scores than males (Stern et al., 1993). In a sample of participants from 14 countries, females performed more pro-environmental behaviours than males (Zelezny et al., 2000). Gender differences in pro-environmental behaviours have been explained in the context of differences in gender socialization and Carol Gilligan's (1982) theory of women's moral development (Dietz, Kalof, & Stern, 2002; Hunter, Hatch, & Johnson, 2004; McCright & Xiao, 2014; Stern et al., 1993; Vicente-Molina, Fernández-Sainz, & Izagirre-Olaizola, 2018). The majority of studies have been conducted with school-aged children and adults (Bamberg & Schmidt, 2003; Cheng & Monroe, 2012; Clark, Kotchen, & Moore, 2003; Han, 2014; Harland, Staats,

& Wilke, 2007; Lee, 2011). To understand the development of environmental concern more broadly, research must address the fact that development of pro-environmental orientations is affected by gender socialization, gender roles and societal concern about the environment in one's childhood.

Research in young children's pro-environmental attitudes and orientations generally builds on the dual ecological paradigm: ecocentric vs anthropocentric orientations (Kahn, 1997; Kahn & Lourenco, 2002; Kahrman-Ozturk, Olgan, & Tuncer, 2012; Kortenkamp & Moore, 2001, 2009; Özen-Uyar & Yilmaz-Genç, 2016). The dual paradigm traces its roots to Aldo Leopold's (1968) concept of land ethics. He expanded on the ethical relations between humans and the environment. According to the concept of land ethics, nature is not only of instrumental value for human welfare, but all species in the ecosystem have intrinsic rights (Kopnina, 2013; Kortenkamp & Moore, 2001; Leopold, 2004; Lundmarck, 2007).

The two orientations are based on different value orientations regarding individuals' environmental concerns (Kortenkamp & Moore, 2009). Anthropocentrism expresses human-centred environmental concerns to protect and preserve nature for human welfare and needs. In contrast, ecocentrism or biocentrism advocates for protecting nature based on its own intrinsic value and respecting its integrity. Human beings are stakeholders in nature and have a responsibility to care about other species' right to live (Gagnon-Thompson & Barton, 1994; Hoffman & Sandelands, 2005; Kortenkamp & Moore, 2001). A substantial body of research has demonstrated that children tend to have anthropocentric attitudes and reasonings more often than they have ecocentric ones (Kahn, 1997; Kahrman-Ozturk et al., 2012; Özen-Uyar & Yilmaz-Genç, 2016). One explanation for the domination of anthropocentrism in children's responses is the association between their cognitive and moral development and egocentrism, which plays a role in their environmental moral reasonings. Ecocentric reasoning emerges gradually (Almeida, Vasconcelos, Strecht-Ribeiro, & Torres, 2013; Boom, 2011; Kahn, 1997; Kahrman-Ozturk et al., 2012). However, empirical results have shown that environmental education programmes have more effect on younger children than they have on older children (Liefländer & Bogner, 2014). Furthermore, young children are capable of articulating ecocentric reasoning when speaking about birds, wild animals, plants, insects and marine life (Kahn, 1997; Kahn & Lourenco, 2002; Kahrman-Ozturk et al., 2012; Özen-Uyar & Yilmaz-Genç, 2016). The above studies compared young children's environmental orientations relating to differences in age, gender, socio-economic status and urban versus rural settings.

The two value orientations for environmental concerns, anthropocentrism and egocentrism, reflect both NAM and VBN's conceptual constructs. Anthropocentrism corresponds with self-enhancement and egoistic value orientation, while egocentrism corresponds with self-transcendent and biospheric orientations. Thus, cognitive awareness and perspective taking may play a role in young children's pro-environmental orientations. Prior studies have addressed the role of cognitive and moral capabilities, but, to the best of the researcher's knowledge, there have been no studies investigating young children's orientations with regards to cognitive aspects.

Theory of mind

The theory of mind (ToM) pertains to the social cognition aspects of children's understanding of themselves and the mental states of others. In contrast to egocentrism, ToM is concerned with children's growing ability to comprehend others' intentions, desires and beliefs in interpersonal relations (Astington, 2004; Astington & Jenkins, 1995; Wellman, 1992).

Agreement regarding the connection between ToM and moral cognition has increased (Bzdok et al., 2012; Knobe, 2005; Lane, Wellman, Olson, LaBounty, & Kerr, 2010; Leslie, Knobe, & Cohen, 2006). Young, Cushman, Hauser, and Saxe (2007) examined the cognitive bases of ToM and moral judgment in young children by using neuroimaging to explore children's attribution of beliefs to characters in a story. They found that belief attribution plays a part in moral judgment (Young et al., 2007). Other studies addressed the partial intersection between ToM and empathy

constructs (Bzdok et al., 2012) and neural processing (Völlm et al., 2006), finding that environmental problems involve socio-moral cognition. The potential association between children's pro-environmental orientations and ToM is supported by Astington (2004), who asserts that both ToM and moral cognition examine how young children reason about beliefs, desires and thoughts when interpreting and judging human behaviour. Similarly, NAM and the VBN theory emphasise beliefs, value orientations and judgment of the consequences of environmental conditions on other people and species. However, further research must be performed to better understand young children's pro-environmental orientations in the context of ToM and how stories read to young children enhance one's awareness of the consequences of environmental behaviours on other people and species in a narrative context. Nonhuman protagonists (animals, plants, etc.) may trigger children's perspective-taking skills and allow them to determine the effect of environmental problems on other species. Therefore, children's comprehension of environmental stories may be related to their AC. This study explores these phenomena.

The present study

This study extends the research to examine the possible association between ToM and young children's pro-environmental orientations. It was motivated by a desire to understand the development of young children's pro-environmental orientations in relation to the cognitive perspective. Researchers have mainly used pictorial cards (Kahrman-Ozturk et al., 2012; Musser & Diamond, 1999; Özen-Uyar & Yılmaz-Genç, 2016), real cases (Kahn, 1997) and short scenarios (Kortenkamp & Moore, 2001) to clarify children's attitudes to and understandings of consumption, environmental protection and recycling issues.

In this study, children's pro-environmental orientations were investigated through story for two reasons. First, storybook reading is not a new activity for children. It is an enjoyable and daily classroom activity. Second, stories allow the teacher to present scenarios or cases in a meaningful context and enable children to make belief attributions about the protagonists' desires, beliefs and points of view. Children provide content when making inferences about the plot (Collins, 2016; Florit, Roch, & Levorato, 2011) and identify relationships between the protagonists and the environment. Studying the children's responses to stories may provide information on their awareness of the consequences of environmental problems. In addition, the text and accompanying illustrations can assist the children with story comprehension (Boerma, Mol, & Jolles, 2016). Therefore, a children's picture book was used as research material in this study. This study sought to answer the following research questions:

- (1) Are there any significant differences between preschoolers' ToM scores based on gender?
- (2) Do ToM scores reveal any significant differences in children's pro-environmental orientations?
- (3) Are there any significant differences between preschoolers' pro-environmental orientations based on gender?
- (4) Do story comprehension scores reveal any significant differences in children's pro-environmental orientations?

Materials and methods

Participants

After receiving permission from the university ethics committee and the Ministry of National Education, 200 informed consent forms were distributed to the parents through five classroom teachers in three public preschools. Parents were asked to sign the consent for their children's participation, and 132 parents provided consent. Four children were excluded from the study due to developmental delays and attendance problems. The final participants were 128 children (66 girls and 62 boys)

with a mean age of 66.80 months (range 63–71). For each of the participating public preschools, 43, 51 and 34 preschoolers were recruited. All preschoolers were monolingual Turkish speakers and were considered normally developed based on their parents' reports.

Measures and materials

Theory of mind tasks

Wellman and Liu (2004) developed scenario-based tasks to measure young children's ToM skills. Gözün-Kahraman (2012) conducted a pilot study with 106 children (four to six years old) to adapt the ToM tasks (diverse desires, diverse beliefs, knowledge access, contents false belief, real-apparent emotion) into Turkish. Each task was presented to the children using a scenario and suggested materials. The tasks were scored with 0 for each incorrect response and 1 for correct answers.

Story comprehension questions

The children's story comprehension was assessed using Paris and Paris's (2003) explicit story questions and rating rubric. Five prompted questions tested the children's understanding of the story elements (characters, setting, initiating event, problem and outcome or solution). Each question was rated from 0 to 2.

Storybook

In this study, *Pollution? No Problem!* by David Morichon (Children's Literature Cited Morichon, D. (2013) (translated by Pınar Dünder) was read to the children to teach them about environmental pollution and its effects on nature. The picture book was selected based on three criteria. First, the fictional story deals with water, air and soil pollution. The protagonists try to find solutions for environmental pollution, but it rapidly spreads. The environmental pollution causes a flower to wither, the forest to get sick and animals to run away from their homes. The story presents causes and effects of environmental pollution. Second, the story is accompanied by lavish illustrations of pollution and its effects. Finally, the picture book was recommended for children older than four years old, so it is appropriate for a preschool level.

Procedures

This study was conducted in two sessions. During the first session, ToM tasks were administered to the children individually. The administration of the five ToM tasks lasted 13 to 25 minutes. During the second session, *Pollution? No Problem!* was read aloud to the children as a small group reading activity (six to eight children per group). After listening to the story, the children were asked to answer prompted story comprehension questions one by one. Finally, the children were encouraged to talk about environmental pollution and asked to express their ideas about why nature should be protected. During the interview, the picture book was available for the children to examine the illustrations and track the story plot for the comprehension questions. To ensure effective communication with the children, strategies included question repetition, giving the children adequate time to think about the questions and taking small breaks based on the children's attention spans and motivations. The children's responses were audio recorded. The duration of the interviews was about 20 minutes. All sessions took place in separate rooms or classrooms in the preschools.

Data analysis

The audio recordings were transcribed for analysis, and the children's names were removed during transcription to assure confidentiality. First, the story comprehension questions were scored and coded for the children's pro-environmental orientations. To ensure inter-rater reliability, 20% of

the data was randomly selected, and a second trained coder rated it independently. The second coder was a graduate student in the Early Childhood department. Pearson's product-moment correlation was 96% between the two coders for story comprehension scores. The agreement between the coders was calculated using the Miles and Huberman (1994) formula. It was 91% for the children's pro-environmental orientations. Finally, samples of the children's responses were selected and then translated into English.

Results

The descriptive statistics of the dataset are presented in Table 1. The skewness and kurtosis values did not exceed the range of -2 to $+2$; therefore, the scores approximated univariate normal distribution.

Table 2 shows the distribution of the children's pro-environmental orientations. Among the preschoolers, 50% of the girls and 43.5% of the boys had anthropocentric orientations, while 51.6% of the boys and 47% of the girls had ecocentric orientations. Only a few of the children ($n = 5$) gave irrelevant responses or no comments. Some examples of the preschoolers' pro-environmental responses are as follows:

- 'If we do not keep nature clean, garbage will accumulate everywhere and make us sick and makes us sick'. (B4, anthropocentric)
- 'If you do not collect the waste, pollution will be everywhere. We will not find a place to play at the park. All our clothes will be filthy'. (G11, anthropocentric)
- 'Waste is everywhere, and the forest is becoming garbage. The animals are homeless. Animals cannot find food'. (B22, ecocentric)
- 'Dirty rain falls. Flowers and trees become polluted; they will be unhappy and die'. (G46, ecocentric)
- 'Because God does not love us'. (B7, irrelevant)
- 'Due to not afraid of in my dream'. (G51, irrelevant)

Children's theory of mind scores by gender

An independent samples t-test was performed to compare ToM scores for girls and boys. A Levene's test showed no statistical significance ($p = .32$); therefore, equal variances were assumed. Table 3 shows that there was no significant difference between scores for girls ($M = 3.45$, $SD = 1.08$) and boys ($M = 3.10$, $SD = 1.11$); $t(126) = 1.87$, $p > .05$. The magnitude of the differences between the means (mean difference = 0.35, 95% CI: -0.021 to 0.73) was high ($\eta^2 = .02$).

Table 1. Descriptive statistics for the study variables.

	<i>N</i>	Min	Max	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
ToM	128	0	5	3.10	1.21	-0.584	0.367
Story Comprehension	128	3	9	6.55	1.37	0.351	-0.459

Table 2. The frequencies and percentages of the children's pro-environmental orientations.

Pro-environmental orientation	Girls		Boys	
	<i>f</i>	%	<i>f</i>	%
Irrelevant/no response	2	3.0	3	4.8
Anthropocentric	33	50.0	27	43.5
Ecocentric	31	47.0	32	51.6
Total	66	100	62	100

Relationship between the children's theory of mind scores and pro-environmental orientations

The children's ToM scores were compared in relation to their pro-environmental orientations. Among the dataset, five children were excluded due to irrelevant answers or for giving no explanation for pro-environmental orientations. Independent samples t-tests revealed that children who articulated ecocentric orientations ($M = 3.82$, $SD = 0.85$) had higher ToM scores than children who had anthropocentric orientations ($M = 2.88$, $SD = 0.95$). Table 4 indicates a significant difference between the groups ($t [121] = 5.76$, $p < .05$). The magnitude of the differences in the means (mean difference = .94, 95% CI: 0.62 to 1.26) was high ($\eta^2 = .21$).

Children's pro-environmental orientations in terms of gender

A chi-square test for independence (with a Yates's continuity correction) revealed that there was no significant difference between the girls' and boys' pro-environmental orientations ($\chi^2 [1, n = 123] = .21$, $p = .64$, $\phi = .06$).

Relationship between the children's story comprehension scores and pro-environmental orientations

An independent samples t-test was conducted to compare the children's story comprehension scores in relation to their pro-environmental orientations. As seen in Table 5, the test results showed that there was a significant difference between ecocentric ($M = 7.14$, $SD = 1.06$) and anthropocentric ($M = 6.06$, $SD = 1.34$) orientation; $t (121) = 4.933$, $p < .05$. The magnitude of the differences between the means (mean difference = 1.07, 95% CI: 0.64 to 1.50) was high ($\eta^2 = .16$).

The relationship between the children's story comprehension and ToM scores was investigated using Pearson's product-moment correlation coefficient. Preliminary analyses were conducted to ensure that there was no violation of normality, linearity or homoscedasticity. There was a positive significant correlation between the two scores ($r = .49$, $n = 128$, $p < .001$).

Discussion

This study builds on previous research on children's pro-environmental orientations. It attempts to further the understanding of children's pro-environmental orientations in the scope of ToM. The findings yielded that young children's pro-environmental orientations did not differ in terms of gender. These findings are in line with the results of prior studies (Haktanır & Çabuk, 2000; Kahn &

Table 3. The independent samples t-test results comparing ToM scores of girls and boys.

ToM Scores	<i>N</i>	Mean	SD	<i>t</i>	<i>p</i>	η^2
Girls	66	3.45	1.08	1.87	.06	.02
Boys	62	3.10	1.11			

Table 4. Independent samples t-test results comparing ToM scores and pro-environmental orientations.

ToM Scores	<i>N</i>	Mean	SD	<i>t</i>	<i>p</i>	η^2
Anthropocentric	60	2.88	0.95	5.76	.000	.21
Ecocentric	63	3.82	0.85			

Table 5. Independent samples t-test results comparing comprehension scores and pro-environmental orientations.

Story Comprehension Scores	<i>N</i>	Mean	SD	<i>t</i>	<i>p</i>	η^2
Anthropocentric	60	6.06	1.34	4.933	.000	.16
Ecocentric	63	7.14	1.06			

Lourenco, 2002; Kahrman-Ozturk et al., 2012; Musser & Diamond, 1999). However, some studies have addressed gender differences in pro-environmental orientations in school-age children (Bunting & Cousins, 1985; Chawla, 1988), and a growing body of research has shown that gender differences emerge in teenage and adult attitudes and orientations in favour of females (Alp, Ertepinar, Tekkaya, & Yilmaz, 2006; Luchs & Mooradian, 2012; Scannell & Gifford, 2013; Taşkın, 2009; Tikka, Kuitunen, & Tynys, 2000). Similarly, Zelezny et al. (2000) conducted a meta-review study examining gender differences in pro-environmental orientations and attitudes across 14 countries. The cross-cultural review found gender differences in favour of females in 10 of the countries. Only three of the studies found males to have higher environmental attitudes than females, and one of the studies revealed no differences regarding gender. There is no clear explanation for gender differences regarding environmentalism, but studies have pointed out the influence of gender roles and gender socialization on pro-environmental orientations (Gifford & Nilsson, 2014; Zelezny et al., 2000). Gender socialization and gender-role acquisition are developmental processes (Bussey & Bandura, 1999), and young children's pro-environmental orientations tend to be gender neutral. This implies the influence of role models, culture and society on the transmission of gender roles and pro-environmental orientations.

Another finding of this study was that young children's ToM scores were not different in terms of gender. Girls had slightly higher ToM scores, but the difference was not significant. Similarly, previous studies on ToM have not found gender differences in scores (Carr, Slade, Yuill, Sullivan, & Ruffman, 2018; Charman & Clements, 2002; Devine & Hughes, 2016; Mathieson & Banerjee, 2011). Although a few studies have reported girls outperforming boys in ToM tasks, the gender differences were attributed to older children who had been exposed to gender roles (Calero, Salles, Semelman, & Sigman, 2013; Devine & Hughes, 2016; Hill & Lynch, 1983). ToM performance differences have been attributed to the number of siblings (Hughes & Ensor, 2005), family environment (Carr et al., 2018; Devine & Hughes, 2016; Farhadian et al., 2010) and language skills (Brooks & Meltzoff, 2015; Grazzani, Ornaghi, Conte, Pepe, & Caprin, 2018). The research on ToM for young children has primarily focused on the role of social interactions in the development of social cognition, rather than on gender.

One of the most interesting findings of this study was that the children's pro-environmental orientations were associated with their ToM performance. Children who expressed ecocentric orientations had higher ToM scores than children who stated anthropocentric orientations. These findings present evidence that children's ability to recognize affective and cognitive consequences of environmental pollution on other species' life conditions is related to their pro-environmental orientations. The study findings are in line with NAM and VBN elucidations that an individual's sense of the impact of environmental circumstances on other species and of other people's and species' experiences are predictors of pro-environmental concerns (Mayer & Frantz, 2004; Schultz, 2000; Stern et al., 1995; Swami et al., 2010). These findings furthered the idea that pro-environmental orientations have foundations in both cognitive and affective roots (Bamberg & Schmidt, 2003; Cheng & Monroe, 2012; Van Liere & Dunlap, 1980). The present study presents preliminary information on young children's pro-environmental orientations from a cognitive perspective but it is necessary to conduct cross-cultural studies and alternative pro-environmental orientation and test ToM models on larger samples.

However, the study presents some important implications for educators. Stories present environmental problems through plot and enable children to make cognitive inferences about the danger of pollution and to take the protagonists' perspectives to explore their feelings and beliefs about the issue. Similarly, Zeidler and Keefer (2003) proposed the socioscientific functional literacy framework to elucidate on the development of children's moral reasoning regarding social, cognitive, emotional and psychological dimensions. According to their framework, cognitive, moral and emotional beliefs play a central role in teaching socioscientific issues. They suggested the use of discourse and case-based scenarios in socioscientific education. In this study, the protagonists are animals and children have the chance to hear the animals' views on environmental problems in a narrative context. The plot may support children's awareness of the consequences of environmental circumstances on

other species. Similarly, NAM and VBN highlighted the role of AC in pro-environmental value orientations (Han, 2014; Schwartz, 1977; Snelgar, 2006; Stren, 2000; Stern et al., 1995). Therefore, children's pro-environmental orientations may be associated with their story comprehension scores; there was also a relationship between story comprehension and ToM performance. These findings agree with previous studies that have found an association between children's story comprehension and ToM skills (Adrian, Clemente, Villanueva, & Rieffe, 2005; Sari & Altun, 2018; Pelletier & Beatty, 2015). There is also evidence that the ability to see other perspectives is associated with deep reading comprehension (LaRusso et al., 2016). Therefore, the findings of this study demonstrate to educators the effectiveness of stories in environmental education as developmentally appropriate activities for young children.

This study had a number of limitations. First, the study examined young children's pro-environmental orientations in the scope of ecocentrism and anthropocentrism. The children were encouraged to talk about their pro-environmental orientations during the interviews. A few children ($n = 3$) articulated orientations related to religion. According to the three children's explanations, their parents advised them on environmental concerns in this way. In this study, the religious explanations were coded as irrelevant and excluded from the analysis, but Hoffman and Sandelands (2005) proposed the three pro-environmental orientations of ecocentrism, anthropocentrism and theocentrism: a 'view of our relationship to nature that reconciles in God our value for resources and our value for nature' (p. 2). Therefore, future studies should examine children's pro-environmental orientations more broadly. Second, the study collected cross-sectional data regarding children's pro-environmental orientations. The stability and changeability of children's pro-environmental orientations resulting from interventions and environmental education programmes should be examined in longitudinal studies.

Disclosure statement

No potential conflict of interest was reported by the author.

Notes on contributor

Dilek Altun is an assistant professor of Early Childhood Education at Ahi Evran University, Kırşehir, Turkey. Particular research interests include early literacy development, children's literature, school readiness, pro-environmental orientations and information communication technologies (ICTs) in early childhood education. She has many presentations and publications.

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