IMPACT OF MOTHERS' AND TEACHERS' TESTIMONIES AND SCIENTIFIC EXPLANATIONS ON CHILDREN'S JUDGMENTS

Abstract: The purpose of this study is to examine the impact of mothers' and teachers' testimonies that conflict with scientific facts and scientific explanations on kindergartners' judgments. The participants consisted of 104 young children in Şanlıurfa province in Turkey. Their ages ranged from 48 to 79 months, with a mean age of 61.48 months (SD = 5.58). The participants were randomly assigned to the following four groups: 1) Scientific explanation followed by teacher's testimony, 2) teacher's testimony; 3) scientific explanation followed by mother's testimony, 4) mother's testimony. The children responded to a question about a scientific fact. After the response, they watched their mothers' or teachers' testimonies which contradict the scientific fact. Findings revealed that when a scientific explanation was not provided, the children tended to show deference to their teachers' and especially mothers' testimony. A week later, a follow-up measurement revealed that this impact did not last a week.

Keywords: Mothers' testimony, teachers' testimony, children's judgment, scientific explanation, early childhood

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INTRODUCTION

It is not practically possible to learn everything through first-hand experiences. Therefore, other people's testimonies are a necessary source of much of the new information (Jaswal, 2010). However, other people's testimonies are not always right. Therefore, it is critical to know to what extent and under what conditions people rely on others' testimonies. Young children are dependent on outside information (Corriveau & Harris, 2009a). For kindergartners, their mothers and teachers are very important sources of information (Alpaslan, Ulubey & Ata, 2021; Kiuru et al., 2012; Thornberg, 2008; 2007). Therefore, it seems reasonable to question what would happen to kindergartners' judgments if their mothers or teachers provide them with testimonies containing wrong information. This study aims to examine whether a teacher's or a mother's contradicting testimony to a child's response would change the child's judgment. Also, how would providing a scientific explanation before the exposure of teachers' or mothers' contradicting testimonies would affect children's judgments?

IMPACT OF OTHERS' TESTIMONY ON CHILDREN'S JUDGMENTS

A plethora of studies have revealed that young children, especially those older than 3.5 years, are sensitive to a speaker's reliability (Luu, De Rosnay & Harris, 2013; Corriveau & Harris, 2009a; Clement, Koenig & Harris, 2004; Nurmsoo & Roinson 2009; Kim, Kalish & Harris, 2012) and level of knowledge (informedness) (Lopez-Mobilia & Woolley, 2016; Robinson & Whitcombe 2003; Sabbagh & Baldwin, 2001). For example, Kim, Kalish and Harris (2012) conducted a study where two puppets, one reliable and one unreliable, labeled things for children between the ages of 3 and 5. The reliable puppet gave the correct labels to objects and the unreliable puppet provided wrong labels. In test trials, both puppets provided labels for novel objects which were not familiar to the children. Their findings revealed that children in the reliable puppet group used the information they had received from the puppet to make an inductive inference about the unknown subject significantly more than the children in the unreliable puppet group. In another study, Lee et al. (2013) found that all age groups preferred to accept the accurate tester's testimony over that of the inaccurate tester. Preference for accuracy in 4- to 5-year-olds were stronger than 3-year-olds because the former preferred the accurate tester over the novel one in accuracy versus novel tester conditions. These studies emphasized the sensitivity of young children to informants' reliability in several domains.

Beside the reliability of an informant, children are also sensitive to an informant's level of knowledge (Lopez-Mobilia & Woolley, 2016; Robinson & Whitcombe 2003; Sabbagh & Baldwin, 2001). For example, in Robinson and Whitcombe (2003)'s study, researchers and children (between 3 and 5 years) played a guessing game where they had to guess what was inside a tunnel with two choices. In one condition, the children were more informed than the researchers because they could look inside the tunnel and the researchers just felt with their hands. The researchers contradicted the children's responses and a puppet asked the children "what is inside the tunnel?" again. They found that the children changed their responses if a researcher was more informed than they were. They have concluded that children are sensitive to the informedness of a speaker.

In summary, all the above-mentioned studies have revealed that young children are sensitive to the reliability and expertise of an informant. Mothers (Kiuru et al., 2012) and teachers (Cote et al., 2013; Croninger et al., 2007) are dominant figures in kindergartners' lives. Mothers and teachers are reliable figures for young children. For kindergartners, teachers are trusted experts (Thornberg, 2008; 2007). Therefore, their testimonies on a subject may be effective on children's judgments.

EXPLANATION

When a child encounters a new problem, he or she will accept the testimony of someone he or she considers knowledgeable on the subject or will just trust the testimony of someone he or she knows. In this case, the child just accepts the information, he or she does not process it in order to learn it. Providing an explanation facilitates the learning process (Crowley, & Siegler, 1999). The explanation provides an input to be considered and finally judged (Brem, & Rips, 2000). Crowley and Siegler (1999) have pointed out that "the current findings suggest that knowing the right explanation is what makes learning powerful, regardless of where the explanation came from (314)." To be effective, explanations should be explicit, rational and loyal to facts rather than personal ideas or ideological beliefs that are accepted without evidence. Otherwise, an explanation can be harmful because it can lead to overconfidence and fixation, especially in lack of evidence (Brem, & Rips, 2000). Therefore, scientific explanations may be effective in the process of judgment formation in children.

Several studies have shown that young children (3- to 4-year-olds) benefit from scientific explanations. Thus, even 3-year-olds are capable of providing scientific explanations for scientific concepts (Bascandziey & Harris, 2010; Legare, 2012; Legare, Wellman & Gelman, 2009). For example, Legare, Wellman and Gelman, (2009) provided 3- to 5-year-olds with vignettes where they had to explain why one child became sick and the other did not. They found that even 3-year-olds were able to provide explanations that contained biological terminology. Of course, in order to provide these explanations, children had to hear these explanations from someone else. Therefore, the study has revealed that young children are able to understand and make use of scientific explanations. Lombrozo (2006) has pointed out that, by guiding reasoning, explanations facilitate judgment process because knowing an underlying process for a phenomenon such as flying makes it easier to understand why human beings cannot fly like birds. This study tested how children would respond when they faced a scientific explanation that supported their judgments but their mothers' or teachers' testimonies conflicted with them.

In summary, people are dependent on information coming from other people. Young children mostly trust their mothers and accept their teachers as trusted experts. What would happen if mothers and teachers provided contradicting information for children prior to knowledge and scientific facts? Would children show deference to their teachers' and mothers' testimonies? What would happen if children's responses were backed with scientific explanations which revealed underlying principles of the facts children uttered with his/her first response? Would scientific explanation prevent children from accepting scientifically untenable acts and deeds even if they came from the most trusted people they knew?

IMPORTANCE OF STUDY

Several studies examined children's trust to their mothers' (Corriveau, Harris, Meins et al. 2009; Corriveau & Harris, 2009b) and teachers' (Enesco, Rodríguez, Lago, Dopico, & Escudero, 2016; Guerrero, Sebastián-Enesco, Pérez, & Enesco, 2019; Chan & Tafdif, 2013) testimonies. In their longitudinal study Corriveau et al. (2009) investigated impact of perceptual cues and secure attachment young children's epistemic trust for informant. They have found that although children considered perceptual cues their pattern of responding varied by attachment status. Securely attached children evaluated perceptual cues better than their unsecurely attachted peers. In another study, Guerrero et al. (2019) examined impact of contradicting testimony of teachers for non-conventional uses of common objects and labelling new objects on pre-schoolers' judgments. In their first study they have compared impact of testimonies of a stranger and children's teacher. In their second study they examined impact of majority. They have found that 3-year-old children were not influenced neither by their teacher nor by the context. On the other hand 5-year-olds sticked with conventional explanations in both situations. They inferenced that children's previous beliefs

have more strength than their compliance with the authority. These studies revealed mothers and teachers impact on young children's decision about information. Studies usually recruited mothers and teachers separately. Similarly, to the authors' knowledge, no former studies compared the impact of teachers' and mothers' testimonies on children's judgments about a scientific fact. Most of the time mothers and teachers are most effective and trusted adults in young children's lives (Kiuru et al., 2012; Thornberg, 2008; 2007). Therefore, misleading information that are provided by these adult may negatively affect young children's factuality judgments.

The study also examines the role of strengthening children's prior knowledge with scientific explanations on children's judgments when they hear scientific explanations and their mothers' or teachers' testimonies conflict with the explanations. Examining the impact of scientific explanations is especially important because, in some cases of a religious context, trusted experts like teachers may present children scientifically untenable acts and deeds as facts. Kotaman (2016) has found that of the 108 teachers, 61 (57%) stated that if their students asked about a scientifically untenable act or deed in a religious story, they would provide a religious explanation for them. Thus, the study provides a hint for thinking and learning processes of young children to find out whether or not they are influenced by testimonies or scientific explanations. To the authors' knowledge, the impact of strengthening children's prior knowledge with scientific explanations and contradicting testimonies of a loved and/or expert one on children's factuality judgment has not been studied before. Finally, the study aims to test how testimonies and explanations affect children's judgments about a familiar fact that children are confident of and an unfamiliar fact that children are not confident of. Sum of familiar and unfamiliar questions also tested because in reality children may encounter both situations. Thus, we wanted to whole picture. The purpose of the study is to examine the impact of mothers' and teachers' testimonies that conflict with scientific facts on children's judgments with and without scientific explanations.

1) Will children in teacher testimony with scientific explanation change their judgments after they hear a scientific explanation of their responses and then watch their teachers' testimonies conflicting with their responses?
2) Will children in teacher testimony change their judgments after they watch their teachers' testimonies conflicting with their responses?
3) Will children in mother testimony with scientific explanation change their judgments after they hear a scientific explanation of their responses and then watch their teachers' testimonies conflicting with their responses?
4) Will children in mother testimony change their judgments after they watch their teachers' testimonies conflicting with their responses?

METHOD

A pretest, post-test and follow-up test design was deployed in this study. A pilot study was conducted to test whether or not children were knowledgeable about test questions.

PILOT STUDY

In order to test whether or not mothers' or teachers' testimonies will change children's judgments on an issue, mothers' and teachers' testimonies should conflict with children's responses. The purpose of the pilot study was to see children's responses to the test questions. Two questions were selected for testing change in children's judgments. Questions were: 1) Can people fly like birds? 2) Can birds live without air? Our assumption was almost all the children would know that people cannot fly like birds and respond accordingly. On the other

hand, while responding to the second question, they would not be as confident as the first question.

For the pilot study, two schools with similar parent and child profiles to the four schools in the actual study in terms of socio-economic levels were selected. The parents and the teachers of six classes in these two schools were informed about the study. Eighty three parents signed the informed consent letter. Among the eighty three children whose parents had signed the informed consent letter, fifty were randomly selected to participate in the pilot study. One child did not want to participate. Finally, the pilot study was conducted with forty nine children. Among the forty nine children, forty seven (96%) provided the right answer for the first question. For the second question, 39 children (79%) provided the right answer. One-way ANOVA revealed that a statistically significant difference between means of two questions in favor of first question [mean for first question=0.96 SD=0.20 versus mean for second question=0.79 SD=0.41 ($F=6.35$; $df=1$; $p<.05$)]. The results were as expected. While almost all the children were certain about the fact that people cannot fly like birds, they were not that certain about whether birds can live without air or not. Therefore, two questions were regarded as appropriate for the purposes of the actual study.

PARTICIPANTS

The population of this study consisted of 4 to 6 years old young children. This group was targeted for two reasons: 4 to 6 years old children are able to differentiate the factual from the nonfactual. Therefore, they are able to give correct answers to test questions. In Turkey, schooling before 4 years is very rare. Therefore, testing the impact of teachers would be practically impossible.

The participants were accessed through the administrations of four schools who were informed and agreed to participate in the study. Participation for the study was voluntary. The children whose parents submitted the consent form and approved of their participation were included in this study. Initially, 127 mother submitted the consent form. Three Syrian children were discarded because they were not competent in Turkish. The remaining 124 children were randomly assigned to the following four groups: 1) Scientific explanation followed by teacher's testimony videos (teacher scientific TS), 2) teacher's testimony video (teacher T); 3) scientific explanation followed by mother's testimony videos (mother scientific MS), 4) mother's testimony video (mother M). Then, the children were assigned to the groups some mothers did not want to record a video. Therefore, eight children were withdrawn from the study. One child from the mother testimony group and two children from each of the other three groups failed to provide the right answer for at least one of the test questions before watching the videos. Therefore, seven children were discarded from the study. Finally, four groups contained 29, 28, 23, 24 children respectively.

Table 1. Demographic comparison

Groups	Male	Female	Mean Age	Std. Age	Mean Mother Education	Mean Income ($)
1	18	11	62	6.85	6.86	665.43
2	21	7	61	4.67	6.92	682.43
3	17	6	60	5.35	8.39	685.07
4	16	8	61	5.25	5.42	644.05

Table 1 presents the demographic characteristics of the final participant sample of 104 young children. The final participants consisted of 104 young children enrolled in four public kindergartens. Their ages ranged from 48 to 79 months, with a mean age of 61.48 months (SD=5.58). Of the 104 children, 32 (30.7%) were female and 74 (69.3%) were male. Of the 104 children, 73 (70.2%) were in their first year in school and 31 (29.8%) were in their second year in school. Among the participants, only nine (8.7%) knew their teachers for two

years and the rest met their teachers at the beginning of the semester. Therefore, they had known their teachers for less than three months.

Years of education among mothers ranged from 0-17, with a mean of 6.9 years (SD=4.8). Monthly income level ranged between 400 (approximately 110$) and 10000 (approximately 2500$), with a mean of 2452.4 (approximately 640$) (SD=2068.2). According to the Turkish Statistical Institute (an official government organization), the monthly per capita in Turkey is approximately 771$ (www.tuik.gov.tr/PreIstatistikTablo.do?istab_id=2218). However, because Turkish currency has lost value against US dollar currently, this average is around 650$. Average time of schooling in Turkey is 6.5 years (http://www.hurriyet.com.tr/bu-haritanin-rengi-degismedikce-turkiye-21-yuzyila-zor-girer-25177632). Accordingly, descriptive statistics revealed that participants came from a variety of socio-economic groups. This strengthens the generalizability of the study.

MATERIALS

Mothers' and teachers' contradicting testimonies to the test questions, which included "….. (child's name) listen to me carefully, I am sure that people can fly just like birds" "….. (child's name) again listen to me very carefully, I am sure that birds can live without air", were recorded with camera. All of them were recorded in an available room in the kindergartens by the investigator. The mothers and the teachers memorized their words and the investigator recorded them. The investigator assured that all the mothers and the teachers used same words in the video. Therefore, in some cases, repeated records for the mothers and the teachers who made mistakes were taken out. Other than two test questions, six more questions were prepared for warming up and testing whether or not children were able to differentiate the real from the unreal. These questions are explained in the procedure section.

PROCEDURE

The investigator informed the kindergarten administrations and teachers about the study. After the administrators and the teachers agreed to participate in the study, the teachers informed parents about the study and asked them to sign a consent letter and fill in a demographic questionnaire. After the consent letters were received, the investigator and a research assistant who was unaware of the purpose of the study began to visit the kindergartens to gather data.

The study was conducted in a play room in each kindergarten. The classroom teachers introduced the research assistant to children as a university student who would ask them a few questions. The research assistant received each child one by one and tested each child individually. The research assistant and the child sat by a child-size table on which a smiley face and a sad face were placed. The research assistant gave the following instructions to children: "Now I will ask you some questions. If your answer is yes, point to smiley face. If your answer is no, point to sad face." After the instructions, the research assistant asked six warm-up questions. Beside warming up and establishing rapport between the participant and the research assistant, the warm-up questions served the following purposes. Through warm-up questions, it was possible to see whether the participant understood how to respond to the questions or not. Moreover, the fifth and the sixth questions tested the participants' ability to differentiate between the real and the unreal. This was done to guarantee that the children were able to understand the basic scientific facts. Following were the warm-up questions: 1) If the participant was a boy, the question was "Are you a girl?" 2) The assistant pointed to a pencil and asked: "Is this a pencil?" 3) The assistant pointed to an eraser and asked: "Is this an eraser?" 4) The assistant pointed to a pencil sharpener and asked: "Is this a school bag?" 5) Can dogs speak just like people do? 6) Can trees speak just like people do?

After the warm-up questions, the assistant asked the test questions without any interval: 1) Can people fly just like birds? 2) Can birds live without air? In the scientific explanation groups, the assistant provided the following explanation after the participant's response to the question seven: Birds have strong wings. Their wings are bigger than their bodies. When birds clap their wings, they make wind. This wind helps them to fly. People's arms cannot produce wind. Therefore, they cannot fly like birds. For the question eight, the assistant provided the following explanation: In our bodies we have very tiny things that cannot be seen with eye called cells. Cells need oxygen to live. If there is not air, that means there is no oxygen. Without oxygen, birds' cells cannot live. If their cells cannot live, birds cannot live, either. Therefore, birds cannot live without air.

After the participants responded to the test questions (questions 7 "familiar" and 8 "unfamiliar"), the participants in the mother groups watched their mothers' contradicting testimonies and the participants in the teacher groups watched their teachers' contradicting testimonies. After the participants watched the testimonies for both questions, they were asked the same questions again. A follow-up measurement was conducted a week after the first measurement. This time, the assistant just asked two warm-up questions (are you a boy? Is this a pencil?) and the test question (questions 7 and 8). After each test question, the assistant demanded an explanation from the participants for their answers. At the end of the session, the assistant made the following explanation to the participants: "Your mother (or teacher) and I made you a joke by showing you joke videos" and then the assistant provided the scientific explanation for each test question.

SCORING

For right answers children received one point and for wrong answers they could not get any point. For example in question 7 "Can people fly just like birds?" if child said "no people cannot fly like birds" than child received one point. As it was mentioned above only children who provided at least one right answer to questions 7 and 8 remained in the study. Providing right answer is sign of higher comprehension thus it was possible rank children's judgment capacity and consistency in their judgment. Therefore we did not consider data as categorical data. That was why we used one way ANOVA and regression analysis to analyze the data.

FINDINGS

A preliminary analysis of one way ANOVA and a regression analysis were conducted for several variables such as gender, age, mother's education, child's schooling experience, child's experience with teacher. Among these analyses, only gender appeared as a significant variable for pre-measurement of the question 7. ANOVA showed that for the question 7 of pre-measurement, boys scored significantly higher than girls. Although Taylor (2013) found that "children displayed significant preference to learn new information from a same-sex adult when both adults are equally reliable/unreliable (680)", because further analysis did not reveal any impacts of gender on children's judgment change, gender wasn't included as another variable. The preliminary analysis of one way ANOVA did not reveal any difference among four groups' mean scores for questions 7 and 8. This finding revealed that at the beginning of the study groups were similar in terms of their answers. Of the 624 responses provided for the warm-up questions, 607 (97%) were right. Therefore, it is reasonable to claim that children were ready for testing.

Table 2. Frequencies and Percentages for Correct and Wrong Answers

		Pretest7	Posttest7	Followup7	Pretest8	Posttest8	Followup8
Teacher Scientific Exp.	Correct	28(96.6%)	25(86.2%)	28(96.6%)	23(70.3%)	16(55.2%)	23(79.3%)
	Wrong	1 (3.4%)	4(13.8%)	1(3.4%)	6(20.7%)	13(44.8%)	6 (20.7%)
Teacher without Exp.	Correct	28(100%)	23(82.1%)	25(89.3%)	22(78.6%)	12(42.9%)	22(78.6%)
	Wrong	0	5(17.9%)	3(10.7%)	6(21.4%)	16(57.1%)	6(21.4%)
Mother Scientific Exp.	Correct	23(100%)	19(82.6%)	22(95.7%)	16(69.6%)	13(56.5%)	17(26.1%)
	Wrong	0	4(17.4%)	1(4.3%)	7(30.4%)	10(43.5%)	6(73.9%)
Mother without Exp.	Correct	23(95.8%)	16(66.7%)	24(100%)	15(62.5%)	6(25%)	15(62.5%)
	Wrong	1(4.2%)	8(33.3%)	0	9(37.5%)	18(75%)	9 (37.5%)

Table 2 presents frequencies and percentiles for correct and wrong answers for pretest, posttest and follow up tests of questions seven and eight. Similar to pilot test one-way ANOVA revealed a statistically significant difference between the pretest mean scores of questions 7 and 8 at 0.01 level in favor of question 7 [mean for question 7=0.98 SD=0.14 versus mean for question 8=0.73 SD=0.45 ($F=29.86$; $df=1$; $p<.01$)]. This finding provided evidence for difference in familiarity of two questions for children.

Table 3. One-way ANOVA comparison of Group Teacher Scientific Explanation (TS), Mother Scientific Explanation (MS) and Mother without Explanation (M) Groups

Groups	Posttest Question 8					Posttest Sum of Questions				
	Mean	Std.	F	Sig	η2	Mean	Std.	F	Sig	η2
TS	0.55	0.50	5.22	0.026	0.093	1.41	0.68	6.66	0.013	0.12
MS	0.56	0.50	5.17	0.028	0.103	1.39	0.78	4.70	0.035	0.095
M	0.24	0.44				0.91	0.71			

Series of one way ANOVAs and post hoc were conducted to compare the four groups' pre, post and follow-up responses for the questions 7 and 8 and sum of the questions. Table 3 showed that one way ANOVA did not reveal a significant difference among the groups. Mean averages of the four groups for the pre, post and follow-up tests did not differ significantly. Table 3 presented significant differences calculated in post hoc comparisons using LSD. Post hoc LSD indicated that group in which teacher provided scientific explanation (TS) mean score (M=0,55, SD=0,50) for the post measurement of the question 8 was significantly higher than mother group that did not get scientific explanation coded as group M (M=0,25, SD=0,44) mean score for post measurement of the question 8 at 0.05 level. For this comparison, Partial Eta Square results showed that watching teachers' testimony with a scientific explanation explained 9.3% of the whole variance.

Another significant difference for post measurement of the question 8 appeared between group in which mothers provided scientific explanation group MS (M=0,56, SD=0,50) and group M (M=0,25, SD=0,44) at 0.05 level. For this comparison, Partial Eta Square results showed that watching mother's testimony with a scientific explanation explained 10.3% of the whole variance. Similar findings occurred when the sum of the questions were compared. Again, there were significant differences between group TS (M=1,41, SD = 0,68) and group M (M=0,91, SD=0,71); also between group MS (M=1,39, SD=0,78) and group M (M=0,91, SD=0,71) post measurement of the sum of the questions at 0.05 level. Partial Eta Square results for comparison of group TS and group M showed that watching teachers' testimony with a scientific explanation explained 12% of whole variance. Partial Eta Square results for group MS and group M showed that watching mothers' testimony with a scientific explanation explained 9.5% of whole variance. The results showed that for the question 8 and the sum of the questions, the scientific explanation helped children not to change their testimonies.

DISCUSSION AND CONCLUSION

The purpose of this study was to examine the impact of mothers' and teachers' testimonies and scientific explanations on children's judgments about scientific facts when they were confident of their knowledge and when they were not too confident of their knowledge. For all the groups, the findings revealed a decrease from the pre to post measurements and an increase from the post to follow-up measurements. When the groups were compared with each other, it appeared that group TS and group MS obtained significantly higher scores than group M in the unfamiliar question and the total of questions.

These findings showed that when a scientific explanation was not provided, the children tended to show deference to their teachers', as in group T, and especially mother's testimony, as in group M. When the children were not confident of their answers, they were more inclined to adapt their responses to their teacher's and mother's testimonies. These findings were partially in accordance with several studies which showed that children younger than 4 years old showed a tendency to change their initial responses and tended to show deference to an adult's testimony when they were not completely confident of their answers (Jaswal; 2010; Jaswal, 2004; Jaswal, & Markman, 2007). As it was mentioned above, Jaswal (2004) found that when children encountered a hybrid picture, they tended to change their initial decisions about the picture when they heard the label for the hybrid. The author mentioned that this was especially true for 3-year-olds rather than 4-year-olds. The current study extended these findings by adding that 4-5-years-olds also showed deference to a testimony when the testimony was told by their mothers and teachers.

Many studies have shown that children are sensitive to speakers' reliability (Luu, De Rosnay & Harris, 2013; Corriveau, & Harris, 2009; Clement, Koenig, & Harris, 2004; Nurmsoo, & Roinson 2009; Kim, Kalish, & Harris, 2012). One of the main strategies that children used to select whom to trust as an informant depend on children's evaluation of the informant's former reliability and consistency (Tong, Wang & Danovitch 2019). In this case, the speakers' reliability worked against the children. The children even replaced their right answers with wrong ones. The good news is that the negative impact of mother's and teacher's testimonies which contradict scientific facts did not last a week. These findings yielded that when the exposure to a scientifically wrong testimony was not permanent, its effects diminished even if it was provided by a very trusted source such as a mother and a teacher.

Young children prefer to learn from competent informants (Kuzyk, Grossman & Poulin-Dubois, 2019). Young children usually consider their mothers and teachers competent people (Cote et al. 2013). In line with the literature, these findings emphasize the importance of mothers and teachers as sources of information for kindergartners (Croninger et al. 2007; Kiuru et al. 2012; Thornberg, 2008; 2007). Signs of the positive impact of the scientific explanation appeared in the findings. Post hoc comparison among the groups showed that the scores of the scientific groups for the unfamiliar and the total questions in the post measurement were significantly higher than the score of the mother without explanation groups. This finding was consistent with former studies (Bascandziey & Harris, 2010; Legare, 2012; Legare, Wellman, & Gelman, 2009). Corriveau et al. (2009) showed that young children could consider perceptual cues while they were making decisions about facts. Our findings also in line with these findings because the current study revealed that young children could consider scientific explanations while they were deciding to trust or not to trust to a new information. Even a single scientific explanation protects children from being misled outside the information provided by a trusted individual such as a mother or a teacher.

Children learn a lot of things from their families until they come to school (Kiuru et al. 2012). Among those things that they have learned from their parents, there may be misconceptions,

wrong information and scientifically untenable acts and deeds accepted as facts (Corriveau, Chen, & Harris, 2015; Kotaman, & Tekin 2015). Sometimes, a teacher might provide information contradicting what children have learned at home (Kotaman, 2014). In such cases, scientific explanations can help the teacher to reach children. Chinn and Brewer (1993) emphasized the critical function of scientific explanations in changing rooted assumptions of elementary school age children. They mentioned that school children even resisted first-hand physical evidences that they directly experienced when they encountered a scientific fact contradicting their previous assumptions. Children started to leave their misconceptions after a teacher provided scientific explanations which uncovered why and how the physical fact actually occurred. Therefore, we suggest that early childhood teachers should provide scientific explanations of the phenomenon that they are teaching to protect their children from being misled and from decisive testimonies that contradict with scientific facts.

In summary, the study provided some evidence for the immediate impact of a teacher's and mother's testimony contradicting scientific facts on children's judgments. The children tended to show deference to their teacher's and especially their mother's testimony, especially when they were not confident of their knowledge. The impact of unscientific testimonies did not last a week. Therefore, we have concluded that hearing correct information once does not affect children's long-term knowledge. The scientific explanations provided for the responses of the questions protected the children from showing deference to their mothers' unscientific testimonies, especially when the children were not confident of their answers. Therefore, we suggest that early childhood teachers should provide scientific explanations which answer why and how questions about the subjects that are taught. Thus, children would be more equipped against the decisive information coming from outside.

LIMITATIONS

The teacher without explanation group displayed a significant decrease from the pre to post measurements for the question 8 and the total of questions. However, among the groups, comparison did not show a significant difference from other groups at any measurements. Although teachers are trusted experts for kindergartners (Thornberg, 2008; 2007), the findings have shown that their testimonies are not as effective as those of mothers in changing children's judgments. This may be because the vast majority of children (91.3%) have known their teachers for less than three months. Future studies would target children who have more acquaintance and deeper relations. Thus, it would be easier to compare with mothers.

In the pilot study we have found that 79% of the children answered the second question correction although this was significantly lower than the first question 79% right answer may be considered as relatively high for unknown question. Therefore, future studies should select questions that young children are less familiar with.

Finally, the reasons underlying the children's responses weren't examined in this study. For example, we did not ask children "why do you think people cannot fly just like birds?" Future studies can focus on the reasoning process. Thus, the impact of self-explanation on children's judgments compared to contradicting testimonies provided by trusted adults can be examined.

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