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Improving Low-Income Preschoolers' Theory of Mind: A Training Study

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Abstract

This study examined the efficacy of training theory of mind via storybook interactions focused on characters' mental states (i.e., beliefs and emotions) in a sample of 73 low-income preschoolers, and determined if training transferred to social competence. Children in the experimental group participated in experimenter-led book interactions in which characters' false beliefs and emotions were discussed. Children in the first control group were read the same stories, but without the embedded discussions; children in the second control group were not read books. Children's false belief understanding, emotion understanding, and social competence were assessed at pretest, an immediate posttest, and a delayed posttest two months later. Children in the experimental group outperformed both controls on false belief understanding, but not emotion understanding or social competence, at both posttests.

Keywords

false belief understanding; emotion understanding; social competence; training; book reading

1. Introduction

The ability to understand ourselves and other people as mental beings who have beliefs, desires, emotions, and intentions, and the understanding of how these mental states motivate behavior, termed theory of mind understanding (Wellman, Cross, & Watson, 2001), is a good predictor of success in school in domains such as social competence (e.g., Cassidy, Werner, Rourke, Zubernis, & Balaraman, 2003; Razza & Blair, 2009; Watson, Nixon, Wilson, & Capage, 1999; Weimer & Guajardo, 2005) and even math and literacy (e.g., Blair & Razza, 2007). Thus, theory of mind is a potentially useful skill to target in preschool. However, the literature on training theory of mind understanding, at least in typically developing children, has focused on training this skill as a means to answer theoretical questions rather than practical ones (e.g., Guajardo & Watson, 2002; Slaughter & Gopnik, 1996), such as whether training one theory of mind task transfers to gains in other theory of

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mind tasks (e.g., Melot & Angeard, 2003). Low-income children may particularly benefit from training in theory of mind given that they fall behind their middle-income peers in this ability (e.g., Weimer & Guajardo, 2005), and given the current focus of early childhood programs aimed at improving school readiness in this population (e.g., Bierman et al., 2008; O'Connor, Cappella, McCormick, & McClowry, 2014; Raver et al., 2011). The purpose of this study was to improve low-income preschoolers' theory of mind understanding through discussions about story characters' mental states while listening to storybooks, as well as to determine whether this training transfers to social competence.

1.1 Theory of Mind Development

The term theory of mind is often used broadly to refer to all aspects of understanding the mind, including emotions and beliefs (e.g., Ensor & Hughes, 2008), although others separate emotion understanding from false belief understanding (Seidenfeld, Johnson, Cavadel, & Izard, 2014) recognizing that they are related but distinct. This broader term is used throughout this paper only when reporting results of studies that combine false belief and emotion understanding or when discussing aspects of the current study that focused on both emotions and beliefs. However, the more specific terms of false belief understanding and emotion understanding are used where these specific components of theory of mind were examined. False belief understanding, which concerns children's realization that events in the world can be represented correctly or incorrectly in one's mind, reflects a key achievement in children's theory of mind development (Flavell, 2000). In one typical false belief task—the unexpected contents task—the child is asked what is inside a familiar container (e.g., a crayon box) while the box is still closed. The box is opened to reveal unexpected contents (e.g., ribbons). With the box closed again, the child is asked what another person will think is inside. Thus, the child must keep in mind his or her own representation (that there are ribbons inside) as well as another representation (that there are crayons inside). Research on theory of mind in the preschool years has largely focused on false belief understanding as this is an important conceptual change that demonstrates the child's ability to understand representational mental states (Wellman et al., 2001).

Middle-class children typically pass false belief tasks between 4 ½ to 5 years of age (Wellman et al., 2001), and several researchers have shown that low-income children score lower than middle-income children on false belief understanding (Cicchetti, Rogosch, Maughan, Toth, & Bruce, 2003; Cutting & Dunn, 1999; Holmes, Black, & Miller, 1996; Seidenfeld et al., 2014; Shatz, Diesendruck, Martinez-Beck, & Akar, 2003) even after controlling for age and language (Weimer & Guajardo, 2005). For example, Weimer and Guajardo (2005) found that children attending private preschools performed significantly better than children attending Head Start on unexpected change, unexpected contents, and active deception false belief tasks. Lower performance on false belief tasks is relevant because low-income preschoolers' false belief understanding is related to teacher ratings of social competence (Holmes-Lonergan, 2003; Razza & Blair, 2009; Weimer & Guajardo, 2005). Specifically, these researchers have found that low-income preschoolers with better false belief understanding tend to be rated by teachers as being more compliant and as having fewer internalizing problems, anxious/obsessive behaviors, and immature behaviors.

In terms of developing emotion understanding, children begin to identify others' emotions even when they differ from their own during the preschool years (Denham, 1986; Wellman & Banerjee, 1991). Several researchers have found that preschoolers' false belief understanding is related to emotion understanding in low- and middle-income children (e.g., Cassidy et al., 2003; Choe, Lane, Grabell, & Olson, 2013; Cutting & Dunn, 1999; Harwood & Farrar, 2006; Pears & Moses, 2003) using the affective perspective-taking task (Denham, 1986), which involves labeling basic emotions and identifying emotional reactions in short vignettes. Similar to false belief understanding, researchers have also found that low-income preschoolers may be at a disadvantage in terms of emotion understanding. Denham et al. (2012) found that preschoolers in private childcare centers performed better than Head Start preschoolers on the affective perspective-taking task. Additionally, researchers have found an association between environmental risk (e.g., socioeconomic status) and emotion understanding with more disadvantaged children scoring lower on assessments of emotion understanding (Bennett, Bendersky, & Lewis, 2005; Hughes, Dunn, & White, 1998).

Emotion understanding is also important to social competence. Researchers have found that children with better emotion understanding tend to have better peer relationships and are rated as more socially competent by their teachers (e.g., Denham et al., 2003; Ensor, Spencer, & Hughes, 2011; Schultz, Izard, Ackerman, & Youngstrom, 2001). Emotion understanding in lowincome preschoolers also predicts later school adjustment and academic success (e.g., Denham et al., 2012; Shields et al., 2001). Because both false belief and emotion understanding predict children's social competence, which is important for school success (Denham, 2006; Mashburn & Pianta, 2006), both are relevant targets for programs with at-risk children and both are the focus of the current training study.

Note that much of the research aimed at improving emotion understanding and social competence in low-income preschoolers has used the term intervention given that these children are at risk for lower social and academic competence (e.g., Bierman et al., 2008; O'Connor et al., 2014; Raver et al., 2011), whereas research aimed at training false belief understanding in samples not at risk have used the term training (Clements, Rustin, & McCallum, 2000; Hale & Tager-Flusberg, 2003). The current study uses the term training in keeping with the literature on experimental studies aimed at improving false belief understanding through experimenter-child interactions. However, researchers often refer to work aimed at promoting cognitive and social skills in low-income populations as intervention, regardless of whether children show an existing deficit in the targeted skill. This term is used in the current paper only when discussing this broader meaning and is not meant to imply that low-income children have a deficit in theory of mind, but that they may particularly benefit from programs aimed at improving social understanding.

1.2 Training Theory of Mind

There have been several false belief training studies that have targeted the specific skill to be improved using tasks that were very similar to the posttest assessments; researchers have shown gains in children's performance on these tasks using this approach (e.g., Melot & Angeard, 2003; Slaughter & Gopnik, 1996; Slaughter, 1998). Emotion understanding has similarly been improved through experimental studies that have engaged children in

discussion of emotions, such as the understanding of conflicting emotions (e.g., Bennett & Hiscock, 1993; Ornaghi, Brockmeier, & Grazzani, 2014). Another approach is to improve children's theory of mind understanding through discussion of mental states in naturally occurring conversational contexts, such as storybook reading (e.g., Guajardo & Watson, 2002).

Researchers have trained preschoolers' false belief understanding, emotion understanding, or both, through the use of mental state language in storybook interactions. Guajardo and Watson (2002) read storybooks one-on-one with preschoolers while highlighting episodes involving mental states and asking children questions about the characters' beliefs. They found that after 13 to 15 sessions, preschoolers in the training group performed significantly better on false belief understanding compared to a control group who did not participate in storybook interactions. In a similar study, Peskin and Astington (2004) found that training did not improve children's false belief understanding. They conducted a 20-session training study in which preschoolers (in small groups) were read six books that had been rewritten to contain many mental state terms; preschoolers in the control group were read the same stories, but without mental state terms. At posttest there was no difference between the two groups on unexpected contents and unexpected locations false belief tasks, and surprisingly the control group outperformed the experimental group on a false belief explanation task.

Researchers have also focused on training preschoolers' emotion understanding through storybook interactions. Salmon et al. (2013) engaged 3- to 4-year-olds in four storybook sessions over two weeks in which the experimenter emphasized labeling characters' emotions and explaining causes of emotions. They found that children in the experimental group performed significantly better at labeling emotions relative to a control group receiving no training and a group who was read the same storybooks, but with a focus on non-emotional talk. Additionally, Gavazzi and Ornaghi (2011) engaged preschoolers in 12 storybook interactions focusing on talk about emotions over a two-month period. After each story, they engaged children in language games that focused on children's use of the targeted emotion terms. They found that children in the experimental group outperformed a control group on emotion understanding. In a similar study, children in experimental and control groups were read 16 stories containing many mental state terms, including emotion and belief terms (Ornaghi, Brockmeier, & Gavazzi, 2011). They found that training improved 3-year-olds' emotion understanding and 4-year-olds' false belief understanding. Thus, several researchers have utilized naturalistic adult-child storybook interactions as a mechanism for improving preschoolers' emotion understanding and false belief understanding with few studies targeting both skills simultaneously.

The facilitation of theory of mind in the context of storybook interactions is an important component of the proposed study for several reasons. Given the practical importance of book reading in low-income preschool classrooms (e.g., Bracken & Fischel, 2008; Wasik, Bond, & Hindman, 2006), this is an approach worthy of further examination in this population. The storybook approach was used in this study because targeting language may be a particularly beneficial strategy for classroom-based programs with low-income populations considering the implications for language growth in terms of later academic success (e.g., Hindman, Skibbe, Miller, & Zimmerman, 2010; Zucker, Cabell, Justice,

Pentimonti, & Kaderavek, 2013) as well as the association between narrative ability and false belief understanding in low-income children (Curenton, 2004). Additionally, researchers argue that low-income children in particular may have difficulty understanding false beliefs when not situated within the context of a story (Holmes et al., 1996; Razza & Blair, 2003). Finally, because storybook interactions are already integral to the preschool classroom, strategies to improve theory of mind in this way would be more feasible than directly training false belief for teachers to include in their existing curriculum. With this ultimate goal in mind, commercially-available children's storybooks, not lab-specific stories (e.g., Ornaghi et al., 2011; Peskin & Astington, 2004), were used.

An important component of the current study was the explanation of characters' false beliefs and emotions as well as the elicitation of information from children to actively engage them in thinking about characters' mental states, including correcting children when they give incorrect information. Researchers have shown that children show greater improvement on false belief understanding when experimenters explain why children's responses to false belief questions are correct or not during training, and when children explain their own or others' false beliefs or emotions during training (Appleton & Reddy, 1996; Clements et al., 2000; Guajardo, Petersen, & Marshall, 2013; Pillow, Mash, Aloian, & Hill, 2002; Tenenbaum, Alfieri, Brooks, & Dunne, 2008). This was also the key difference between the approaches used by Ornaghi et al. (2011) and Peskin and Astington (2004), suggesting that the former's approach to engaging children in discussion of mental states facilitated their theory of mind development. Based on the literature demonstrating an association between theory of mind and certain aspects of language skills, training in the experimental group focused specifically on mental state terms referring to emotions and beliefs (e.g., Adrián, Clemente, Villanueva, & Rieffe, 2005; Guajardo & Watson, 2002; Ruffman, Slade, & Crowe, 2002), as well as the use of complement syntax to explicitly contrast belief and reality (e.g., Hale & Tager-Flusberg, 2003; Lohmann & Tomasello, 2003).

1.3 Improving Social Competence

Given that children's false belief and emotion understanding are related to social competence in low-income children (Holmes-Lonergan, 2003; Razza & Blair, 2009; Weimer & Guajardo, 2005), it is particularly relevant to determine whether a training approach that focuses on characters' beliefs and emotions improves not only false belief understanding, but also social competence. Although other theory of mind training studies have shown transfer effects, these are typically a near transfer from a trained false belief task to a different false belief task at posttest, such as transfer from an unexpected locations task to a deception task (Appleton & Reddy, 1996) or from an emotion understanding training to false belief tasks (Ornaghi et al., 2014). However, these training studies have not examined transfer to social competence. Ornaghi et al. (2014) argued that there are basic skills, such as perspective taking, underlying the three interrelated abilities of emotion understanding, false belief, and empathy, and thus examined all three abilities as outcomes of their emotion understanding training.

A similar approach was taken here; the aim was to examine a theory of mind training approach that focused on children's understanding of others' perspectives through talk about

characters' beliefs and emotions as a means to improve social competence. Although social competence behaviors (e.g., sharing) were not specifically targeted in the storybook interactions, other researchers have demonstrated that social competence can be improved through storybook interactions (e.g., Jones, Brown, & Aber, 2011). Additionally, researchers showing that false belief understanding and social competence are related often interpret this relation causally, suggesting that the ability to represent mental states underlies the ability to engage in positive social interactions (Capage & Watson, 2001; Razza & Blair, 2003), although Razza and Blair (2009) found bidirectional correlations between false belief understanding and social competence. Similarly, researchers argue that emotion understanding underlies children's social competence (e.g., Denham et al., 2012). The current study would be the first to examine experimentally whether increasing theory of mind (i.e., false belief and emotion understanding) causes increases in social competence.

1.4 The Current Study

In summary, this study aimed to improve low-income preschoolers' theory of mind understanding through storybook interactions focused on characters' mental states (i.e., false beliefs and emotions), as well as to determine whether this training transfers to social competence. This study expands on the prior literature by targeting a low-income sample. Although other researchers have successfully improved low-income preschoolers' emotion understanding (e.g., Izard, 2002; Izard, Trentacosta, King, & Mostow, 2004), the only false belief training study targeting low-income children was Peskin and Astington's (2004) study, in which the training was not successful in improving false belief understanding. Additionally, Ford, McDougall, and Evals (2009) found no significant effect of their program on low-income preschoolers' false belief understanding. However, their training phase was not focused on theory of mind, but was very broad, focusing on language, literacy, numerical skills, and general knowledge. Researchers have called for research on ways to promote false belief understanding for low-income children as a means to promote socioemotional understanding (Capage & Watson, 2001; Seidenfeld et al., 2014). Seidenfeld et al. (2014) argued that because both emotion understanding and false belief understanding tend to be delayed in low-income children it is important to determine how best to improve these skills in this group. We should not assume that the same training that is effective in promoting theory of mind in other populations would be successful in low-income children without first testing this as there are relevant differences in these groups, such as lower language skills in low-income children (e.g., Hart & Risley, 1995; Kohen & Guèvremont, 2014). Additionally, intervention programs need to be evidence-based (U.S. Department of Health and Human Services [HHS], 2013). Thus, with the ultimate goal of designing socio-emotional programs that can be implemented in low-income classrooms, further research is needed to determine which approach may be effective. It is necessary to determine which "core components" of a program are effective before scaling up a program (HHS, 2013). Other recent work has focused on strategies aimed at improving social and emotional competence in Head Start, such as classroom management or peer interactions with different social-emotional outcomes depending on the particular strategy (Administration for Children and Families, 2014). The focus on theory of mind understanding is a novel approach to improving low-income children's social skills. A benefit of this approach is that false belief and emotion understanding are discrete, specific skills, making the identification of "core

components" feasible and future classroom implementations manageable within existing classroom practices.

The storybook approach was used in this study for several reasons as mentioned in section 1.2. Given that low-income children tend to develop false belief more slowly as mentioned in section 1.1, improving these skills has theoretical and practical importance. As Izard et al. (2004) argue, low-income children have greater risk factors and fewer protective factors compared to their more advantaged peers, and classroom-based programs may be particularly helpful for reducing problem behaviors. Because false belief understanding is predictive of the social skills that low-income children are more likely to have difficulty with (Denham et al., 2012; Razza and Blair, 2009), increasing false belief understanding may be one mechanism for improving low-income children's social understanding and social skills. However, as of yet, no training studies have demonstrated a successful approach to facilitating false belief in this population.

Another issue explored in this study was the use of different types of control groups. Researchers using the storybook approach to training theory of mind have typically used two type of controls. Guajardo and Watson (2002) used only a *non-treatment control group* in which no storybook interaction took place. Ornaghi et al. (2011) used only a *storybook control group* in which children were read the same stories as the experimental group, which contained mental states, but did not engage in added discussion about the mental states. Salmon et al. (2013) used both types of controls and found that the experimental group outperformed both controls on an emotion labeling task. A similar approach was taken in the current study because without both types of control groups, we cannot determine the benefit of reading storybooks as they are written versus reading storybooks with additional discussion of mental stats. It was predicted that the experimental group would outperform both controls, which is consistent with prior research; however, both controls were included to rule out the possibility that simply being exposed to the mental state talk in the text without further discussion (*storybook control group*) is more beneficial than no experience with mental state talk (*non-treatment control group*). Thus, in the current study, there were three groups: an *experimental group*, which received the theory of mind training; a *storybook control group*, which engaged in storybook interactions as they are written; and a *non-treatment control group*, which did not engage in storybook interactions.

Another issue with previous training studies is the short duration between training and posttests; thus, it is unclear whether training theory of mind has longer benefits. The posttests of most prior theory of mind training studies occurred immediately after training or one month after training at the most (Appleton & Reddy, 1996; Clements et al., 2000; Melot & Angeard, 2003; Peskin & Astington, 2004; Slaughter, 1998; Slaughter & Gopnik, 1996). In an exception to this trend, Ornaghi et al. (2014) examined the effects of their emotion understanding training at six months; however, they did not include the false belief measures that were included at the first posttest, which occurred two weeks after training. It is important to determine whether training theory of mind leads to gains over longer periods of time, for both false belief and emotion understanding. Thus, in the proposed study, children were given a posttest one week after the training sessions as well as two months later.

1.5 Research Questions

The first research question was: Does training targeting children's false belief and emotion understanding improve children's false belief understanding at posttest 1 (one week after training) and at posttest 2 (two months after training)? The second question was: Does training improve children's emotion understanding at posttest 1 and posttest 2? The third question was: Does training transfer to children's social competence at posttest 1 and posttest 2? It was hypothesized that the children in the experimental group would outperform children in the two control groups on false belief understanding, emotion understanding, and social competence at posttests 1 and 2.

2. Method

2.1 General Procedure

Children ranging in age from three to five were recruited from 21 Head Start classrooms in Ohio through parent meetings and flyers. Several inclusionary/exclusionary criteria were then applied to obtain the final sample. To ensure that children had adequate language skills to understand the tasks, children were excluded from participating if they had a standard score of 75 or below on the Picture Vocabulary Test-4th edition (PPVT-4; Dunn & Dunn, 2007). Children were also excluded if they passed the false belief pretest (i.e., scored a five or greater out of nine points). Further inclusionary criteria were that children could understand and speak English and that they had no visual or hearing impairments (based on a brief teacher pre-screening survey).

All pretests, posttests, and training books were completed in a quiet space at the child's center outside of the classroom. All experimenters at posttest 1 (one week after training) and posttest 2 (two months after training) were different from the experimenter engaged in the book reading training and were unaware of participants' group assignments. For any classroom with participating children, teachers were invited to participate in filling out social competence surveys for those children at pretest and both posttests. Parents were also asked to complete a survey at pretest in order to obtain descriptive information for this sample (e.g., family income, parents' education), given the focus on a specific population (i.e., low-income children) in this study. Additionally, parents were asked about their book reading interactions with children in the home to ensure groups did not differ at pretest on this variable. Parents were given a choice of a gift card or children's books for returning the parent survey and for completing the study if the child qualified. Teachers were given a gift card or two children's books for completing the social competence surveys at each time point.

2.2 Participants

Consent forms were returned for 128 children. Of those children included in the study, 23 passed the false belief pretest, five had a standard PPVT-4 score of 75 or below, and two children were not included in the study because there was not a quiet space outside of their classroom to complete testing. The remaining children (n=25) were not included in the study because they did not complete the posttests, primarily because they moved or were absent for testing. Thus, data are presented for the 73 children (40 males) who completed both

posttests for false belief understanding; 69 completed both posttests for emotion understanding. Although all teachers of children in the study consented to participating, teachers returned social competence forms for only 46 children for all three time points. Teachers reported knowing children on average 8.40 months (*SD* = 6.45; range: 1 to 24 months). Children (N = 73) ranged in age from 3.36 to 5.32 years (*M* = 4.42, *SD* = 0.43). The majority of children were Caucasian (*n* = 37) or African American (*n* =27), 8 children were biracial, and 1 child was an Alaskan Native.

2.3 Measures

2.3.1 Parent Survey—Parents completed a written survey at pretest to obtain information regarding family demographics and home environment adapted from the Head Start Family and Child Experiences Survey (FACES; 2005). The survey indicated that the primary caregiver should complete this survey and took about 15 minutes to complete. The variables of interest in this study were parents' education, family income, and frequency of reading books to the child in the study. Frequency of book reading was assessed with two forced-choice questions. One asked parents how frequently they read to their child in the past week. Answer choices included: not at all, once or twice, three or more times, and nearly every day. The second question asked parents how many minutes they read to their child on a typical day. Answer choices included: 0 minutes, 1–10 minutes, 11–20 minutes, and more than 20 minutes. Responses ranged from 1 to 4, with a higher number indicating higher frequency.

2.3.2 Receptive vocabulary—Children's receptive vocabulary was assessed at pretest only using the standardized Peabody Picture Vocabulary Test-4th edition (PPVT-4; Dunn & Dunn, 2007). In this assessment, an experimenter provides the child with a target word and he or she must select the correct picture from four colored pictures. Target words are divided into sets of 12; children begin on the set corresponding to their age and testing stops when children answer incorrectly on 8 or more in a set. The test takes about 15 minutes to administer.

2.3.3 False belief—Four false belief tasks were used based on prior training studies that were similar in design to the current study (Guajardo & Watson, 2002; Peskin & Astington, 2004)—full scripts for these tasks are described in the original sources and so are only briefly summarized below. The four tasks took approximately 15 minutes to administer, and included adaptations of Bartsch and Wellman's (1989) unexpected contents task, Wimmer and Perner's (1983) unexpected locations task, Lalonde and Chandler's (1995) deception task, and Peskin and Astington's (2004) false belief explanation battery. Tasks were always presented in the order listed below. Similar to other multiple time point false belief studies (e.g., Peskin & Astington, 2004), alternate versions of these tasks were given at posttests 1 and 2 with different puppet characters and props. For the first three tasks, children were always given a forced choice between two responses if they did not respond to the false belief question.

2.3.3.1 Unexpected Contents: Children were presented with a familiar box (e.g., a cookie box), asked what was inside, and shown the true contents (e.g., ribbons). Children were

provided with the correct answers to these two questions if they did not respond correctly to ensure they followed the story. Children were asked two false belief questions: “What did you think was inside the box *before* I took the top off?” and “[Character name] (e.g., Elmo) has never looked inside the box. What does [character name] think is inside the box?” Finally, children were given the memory question: “What is really inside the box?” Children were not given credit for the false belief questions if they answered the memory question incorrectly.

2.3.3.2 Unexpected Locations: Children were presented with a character, an object (e.g., car) and two containers (e.g., a box and a bag). Children were told a short story in which the character leaves the object in one container and goes outside to play; while the character is outside another character moves the object to the other container. Consistent with Weimer and Guajardo (2002), children were asked three memory questions and given the correct answers to these questions if they did not respond correctly. Next, the experimenter told the child: “Now Ernie comes back inside, and wants to play with the car. He remembers where he put it.” Finally, children were asked the false belief question: “Where will Ernie *first* look for the car when he comes back?”

2.3.3.3 Deception: There were two deception tasks. In the first, children were presented with a character, a candy box with a piece of candy inside, and a second box. Children were told a short story in which the character moves the candy from the candy box to the other box so that the second character would not find it. Children are told that the first character does not want the second character to find the candy and so tells him/her something wrong so he/she will not find the candy. Then children were asked the false belief question: “Where will [character name] *say* the candy is?” In the second deception task, children were presented with a character and a box, and were told and shown the character leaving the candy in the box and leaving the room. Children were asked to help play a trick on the character and move the candy to a second box. Children were then asked the false belief question: “When [character name] comes back into the room, where will he/she first look for the candy?”

2.3.3.4 False Belief Explanation: Finally, children were presented with four false belief explanation scenarios with identical scripts and scoring to Peskin and Astington (2004). Each story was told with two to three laminated 5×7 cards with drawings depicting the story. There were two sets—one with Caucasian characters and one with African American characters—to match the child’s race. In one story, Mary’s Candy, children were shown the first picture and told: “This is Mary. She finds a little ball on the floor. It looks like a candy, but it’s really a little ball.” The experimenter then presented the second picture and said: “Mary is putting it in her mouth. She’s trying to eat it.” Finally, children were asked the false belief question: “Why is she doing that?” To answer correctly, children must correctly refer to the character’s thinking, knowing, or seeing (e.g., she thinks it’s candy, she didn’t know it’s a little ball, or she wants to see if it’s a candy). If children answered incorrectly, they were prompted by acknowledging what the child said, summarizing the story, and asking the question again (e.g., Yes, that’s right, but it looks like a candy but it’s really a little ball. So why is Mary trying to eat it?).

2.3.3.5 Scoring: There were nine false belief questions total; children were given one point for each correct answer for a total possible score of nine points. Children were given half of a point for answering correctly to the forced choice questions in the first three tasks or prompted questions in the false belief explanation task.

2.3.4 Emotion understanding—Emotion understanding was assessed using Denham's (Denham, 1986; Denham et al., 2002; Denham et al., 2012) affective perspective taking task, which assesses children's ability to label emotions and identify emotions in others using four subtests. In the first subtest, *expressive labeling*, children are asked to label four emotions (happy, sad, angry, and mad) using line drawings of four faces (Caucasian or African American to match the child's race). In the second subtest, *receptive labeling*, children were asked to point to the face corresponding to the experimenter's label. The third and fourth subtests involved the experimenter/puppets (mother, son, and daughter, again matched for race) acting out short vignettes with exaggerated facial and vocal expression and body language to express the emotional reaction. In the third subtest, *stereotypical puppet situations*, children were told four short stories containing a stereotypical (i.e., expected) emotional reaction (e.g., happiness after getting ice cream) with two or three of the puppets. Children were asked to label each emotional reaction both expressively and by pointing to one of the four faces. In the fourth subtest, *nonstereotypical puppet situation*s, the experimenter told six short stories in which the character's emotional reaction was opposite of the child's typical response (as reported by parents on the consent form), such as being scared to get in a swimming pool when the child would typically be happy. Different stories were used at each time point for the last two subtests similar to other studies that have repeatedly tested emotion understanding (e.g., Denham et al., 2002). This task takes about 15 minutes to complete.

2.3.4.1 Scoring: Consistent with Denham (1986), children received two points for each correct emotion, one point for a response that was incorrect, but the correct valence (e.g., mad instead of sad), and a zero for a response that was incorrect and of opposite valence (e.g., mad instead of happy). There were 18 items total; thus, children could score up to 36 points.

2.3.5 Social competence—Social competence was assessed using the Social Skills Improvement System (SSIS) Rating Scales (Elliott & Gresham, 2008), which asks the teacher to reflect on the child's behavior during the past two months in three areas, and to report how often the child engaged in each behavior (ranging from never to almost always). The Social Skills scale includes 46 items and 7 subscales—communication, cooperation, assertion, responsibility, empathy, engagement, and self-control. Example items from this scale include: acts responsibility when with others, feels bad when others are sad, and follows classroom rules. The Competing Problems scale includes 30 items and 5 subscales—externalizing, bullying, hyperactivity/inattention, internalizing, and autism spectrum. Example items from this scale include: has temper tantrums, acts lonely, and is inattentive. These two scales were examined separately in analyses as they were expected to be inversely related (e.g., Cassidy et al., 2003). These two scales take about 10 minutes to complete per child. Teachers were asked to rate children's social competence at the pretest

and two posttests for each participating child in their classroom, limiting the participating children to no more than six per teacher. This particular assessment of social competence was used because it has been used successfully with Head Start teachers (e.g., Miller, Gouley, Seifer, Dickstein, & Shields, 2004; Spritz, Sandberg, Maher, & Zajdel, 2010), has well-established internal consistency and test-retest reliability (Spritz et al., 2010), and because it is related to preschoolers' false belief and emotion understanding (e.g., Cassidy et al., 2003).

2.4 Training Phase

Approximately one week after pretesting, the training phase began. Children were assigned to one of three groups—experimental, storybook control, and non-treatment control, balancing for age, gender, and classroom (e.g., if three children were enrolled in the study from a particular classroom, each child was assigned to a different group). Other than this balancing, children were randomly assigned to groups. Children in the *experimental group* participated in one-on-one book reading interactions with the same female experimenter across all readings. Children were seen individually rather than in groups as Guajardo and Watson (2002) found that children who participated in group storybook interactions study did not increase in false belief understanding (Study 1), whereas employing the same training in one-on-one interactions increased children's false belief understanding (Study 2). Consistent with Guajardo and Watson (2002), the goal was that each child received 13 to 15 storybooks on separate days, approximately 3 books per week over 5 weeks. Because of absences and school cancellations, the number of books ranged from 8 to 15; however, over 90% of children received 12 or more books. The content of these interactions was very similar to Guajardo and Watson (2002) with an introduction to the topic of the story, several statements and questions throughout the story regarding characters' mental states, and a summary statement to reiterate the nature of the false beliefs contained in the story. Unlike Guajardo and Watson (2002), the experimenter discussed characters' emotions in addition to false beliefs. All 15 commercially-available storybooks had false beliefs as a major theme throughout the story allowing for several statements and questions highlighting characters' mental states. The total number of experimenter-child discussions of emotions and beliefs were equal across the 15 books. Story scripts were constructed for each book such that each child in the experimental group heard the same questions and same number of questions. The experimenter stopped at these predetermined points, which ranged from 6 to 14 depending on the book, to explain a character's mental state and ask children questions about characters' mental states. Mental state terms, such as *know*, *think*, and *feel*, were emphasized by the experimenter. Additionally, complement syntax was used to highlight the contrast between belief and reality (e.g., they *thought* it was a spook, but it was *really* Mama dressed up like a scary monster). Deception was highlighted where relevant (e.g., The chickens are tricking him so that they won't get eaten). Finally, the connection between seeing and knowing was made clear where relevant (e.g., Does the cat *know* the dog took her sandwiches? No, she doesn't. She didn't *see* him take the sandwiches). Children were always provided with the correct information if they did not respond to a question or gave an incorrect answer. An example of a story script is provided in the Appendix. Books were read in one of two orders, with approximately half of children receiving each order.

The *storybook control group* was read the same storybooks by the same female experimenter; however, there was no introductory statement, embedded statements or questions, or summary statement. Thus, these children were exposed to stories containing false beliefs and emotions, but were not engaged in any additional discussion about these mental states. Because this activity was presumably not as engaging as it was for the experimental group, the experimenter rated each child's behavior in both groups in terms of attention and activity level for each book. Attention was rated on a scale from 1 to 3, with 1 indicating the child was attentive for the whole (or most of the) book and 3 indicating the child did not pay attention to more than half of the story. Activity level was rated on a scale from 1 to 3, with 1 indicating the child sat calmly for the whole (or most of the) book and 3 indicating the child was restless and could not sit still for more than half of the book. The author accompanied the experimenter to 12 sessions at a variety of locations and with a variety of books at the beginning of the study to assess interrater reliability using this scale; percentage agreement was 100%. An average activity level and attention score was calculated for each child in the experimental and storybooks control groups. Mean activity level was 1.11 (SD=0.17, range: 1.00–1.75) and mean attention was 1.20 (SD=0.24, range: 1.00–1.83); thus, children in both groups were easily engaged in this activity. Finally, the *non-treatment control group* engaged in no interaction with the experimenter during the training phase.

3. Results

3.1 Preliminary Analyses

Several group comparisons were made to ensure that the three groups were comparable on relevant characteristics at the pretest; means and standard deviations are shown in Table 1. There was no significant group differences in age, $F(2, 70) = 0.47$, $p = .63$, PPVT-4 standard scores, $F(2, 70) = 0.74$, $p = .48$, or months teachers had known children, $F(2, 52) = 1.17$, $p = .32$. There were no significant differences in distribution of gender between groups, $\chi^2(2) = 0.94$, $p = .62$, or racial differences between groups, $\chi^2(2) = 2.76$, $p = .84$. Finally, there was no significant difference between the experimental and treated control group in terms of children's activity level, $t(45) = 1.17$, $p = .25$, or attention, $t(45) = 0.66$, $p = .51$, during book reading interactions with the experimenter. Groups were also compared in terms of information from the parent survey. Of the 73 participating children, 56 parents (95% of whom were mothers) returned surveys. Reported yearly family income averaged $12,639 ($SD$ = $8,779), and did not differ between groups, $F(2, 53) = 1.52$, $p = .23$. Family income was substantially less than the median income for this county, which was $43,194 (U.S. Census Bureau, 2014). Parental education averaged 12.55 years (SD = 1.40), and did not differ between groups, $F(2, 53) = 0.81$, $p = .45$. Average minutes per day spent reading to the child averaged 2.95 (SD = .70), with a 3 indicating 11–20 minutes, and did not differ between groups, $F(2, 53) = 0.88$, $p = .42$. Finally, frequency of reading to the child in the past week averaged 3.11 (SD = .85), with a 3 indicating three or more times, and did not differ between groups, $F(2, 53) = 0.57$, $p = .57$.

Groups were also compared on their pretest performance on the three dependent variables—false belief understanding, emotion understanding, and social competence. Table 2 provides

a summary of scores at pretest and both posttests for these three variables. There was no significant group differences in false belief pretest, $F(2, 70) = 0.43$, $p = .65$, emotion understanding pretest, $F(2, 70) = 0.50$, $p = .61$, the social skills scale of the SSIS, $F(2, 51) = 0.66$, $p = .52$, or the problem behaviors scale of the SSIS, $F(2, 51) = 1.72$, $p = .19$.

3.2 Correlations Among Study Variables

Because the foundation of this study is based in the literature showing interrelations among emotion understanding, false belief understanding, and social competence, as discussed in section 1.1, basic correlations were examined among these variables at pretest. As shown in Table 3, children's false belief and emotion understanding scores were significantly and positively related. In terms of social competence, children's scores on the SSIS social skills subscale were significantly and positively related to children's false belief and emotion understanding. Finally, although the SSIS problem behaviors subscale was negatively related to the other variables as would be expected, these correlations were not significant. With the exception of the SSIS problem behaviors subscale, the effect sizes of correlations among the three dependent variables were all above .30 and were thus medium in magnitude (Cohen, 1988).

3.3 False Belief Understanding

Because the primary interest of this study was to compare posttest scores between groups assuming equal pretest scores, repeated measures ANCOVAs were conducted with pretest scores as covariates in order to reduce the number of comparisons and to improve power. No other covariates were included as groups did not differ significantly on any measured pretest variables (e.g., receptive vocabulary, age). With time (i.e., posttest 1 and posttest 2) as the within subjects factor, and group as the between subjects factor, there was a significant main effect of group on false belief understanding, $F(2,69) = 5.24$, $p < .01$, $\eta_p^2 = .13$. When examining the simple main effects, the pairwise comparisons at each posttest showed that the experimental group outperformed the storybook control group ($p < .01$) and the non-treatment control group ($p = .01$) at posttest 1, $F(2, 69) = 4.99$, $p < .01$, $\eta_p^2 = .13$; the experimental group also outperformed the treated control group ($p = .04$) and the control group ($p = .01$) at posttest 2, $F(2,69) = 3.62$, $p = .03$, $\eta_p^2 = .10$. There was no significant difference between the two control groups at posttest 1 ($p = .73$) or posttest 2 ($p = .63$). There was also no significant main effect of time (i.e., posttest 1 to posttest 2), $F(1, 69) = 0.23$, $p = .63$, $\eta_p^2 = .003$. Figure 1 shows these means graphically and suggests that the experimental group did make significant gains relative to the two control groups, especially at posttest 1. At posttest 2, the gains of the experimental group relative to the storybook control group appear to narrow.

3.4 Emotion Understanding

With time as the within subjects factor, and group as the between subjects factor, there was no significant main effect of group on emotion understanding controlling for emotion understanding at pretest[1], $F(2, 64) = 0.83$, $p = .44$, $\eta_p^2 = .03$. There was also no significant main effect of time (i.e., posttest 1 to posttest 2), $F(1, 64) = 0.10$, $p = .76$, $\eta_p^2 < .01$. Figure 2 shows these means graphically; although the experimental group did have higher means

compared to the two control groups, especially at posttest 2, the experimental group also had higher means at pretest. As an exploratory post-hoc analysis, only the nonstereotypical portion of the emotion understanding section was examined given that this section most resembles false belief understanding as it involves dual representation (i.e., the child's typical emotional reaction is contrasted with the puppet's opposite emotional reaction). There was also no significant main effect of group on children's nonstereotypical emotion understanding, $F(2, 64) = 1.52$, $p = .23$, $\eta_p^2 = .05$.

Because children were near ceiling on emotion understanding, answering 33.61 out of 36 (93%) correctly in the experimental group, it was possible that children in this study were simply too old to gain from this particular type of training. Thus, difference scores between pretest and posttest 2 were calculated for emotion understanding and examined in relation to age group: 3-year olds (n=11), young 4-year olds (i.e., 4.0 to 4.49 years, n=33), old 4-year-olds (4.5 to 5.0 years, n=12), and 5-year-olds (n=10). At posttest 2, the mean difference score was 4.64 (SD = 3.55) for young 4-year-olds, and was lower for 3-year-olds (M = 1.45, SD = 9.94), old 4-year-olds (M = 1.86, SD = 5.24), and 5-year-olds (M = 1.30, SD = 2.67). However, with only 33 young 4-year-olds in the study, the sample size did not permit further examination of group differences in emotion understanding within this particular age group. These descriptive differences suggest that this particular approach may be more beneficial for young 4-year-olds' emotion understanding compared to younger or older preschoolers.

3.5 Social Competence

With time as the within subjects factor, and group as the between subjects factor, there was no significant main effect of group on the social skills scale of the SSIS controlling for pretest scores[2], $F(2, 42) = 0.75$, $p = .48$, $\eta_p^2 = .03$. There was a significant main effect of time (i.e., posttest 1 to posttest 2) for the social skills scale, $F(1, 42) = 12.49$, $p < .01$, $\eta_p^2 = .23$. Teachers rated children's social skills significantly higher at posttest 2 compared to posttest 1, $p = .02$. Figure 3 shows these means graphically; although the experimental group had higher means than the control groups at both posttests, the experimental group had higher pretest scores compared to the non-treatment group. The experimental group did appear to make gains relative to the storybook control group at both posttests, although this trend was not statistically significant.

There was no significant main effect of group on the problem behaviors scale of the SSIS controlling for pretest scores[3], $F(2, 41) = 0.39$, $p = .68$, $\eta_p^2 = .02$. There was no significant

[1]To improve power, two additional one-way ANOVAs were conducted for posttest 1 and 2 separately such that all participants with scores on one of these assessments could be included. This increased the sample size from 69 to 72 for posttest 1 and from 69 to 76 for posttest 2. With pretest emotion understanding scores as the covariate, and group as the between subjects factor, the main effect of group remained insignificant for posttest 1, $F(2,68) = 0.57$, $p = .57$, $\eta_p^2 = .02$, and for posttest 2, $F(2,72) = 0.39$, $p = .68$, $\eta_p^2 = .01$.

[2]To improve power, two additional one-way ANOVAs were conducted for posttest 1 and 2 separately such that all participants with scores on one of these surveys could be included. This increased the sample size from 46 to 58 for posttest 1 and from 46 to 49 for posttest 2. With pretest SSIS social skills scores as the covariate, and group as the between subjects factor, the main effect of group remained insignificant for social skills at posttest 1, $F(2,54) = 1.27$, $p = .29$, $\eta_p^2 = .05$, and for posttest 2, $F(2,45) = 0.70$, $p = .50$, $\eta_p^2 = .03$.

[3]To improve power, two additional one-way ANOVAs were conducted for posttest 1 and 2 separately such that all participants with scores on one of these surveys could be included. This increased the sample size from 46 to 58 for posttest 1 and from 46 to 48 for posttest 2. With pretest SSIS problem behaviors scores as the covariate, and group as the between subjects factor, the main effect of group remained insignificant for problem behavior at posttest 1, $F(2,54) = 0.71$, $p = .50$, $\eta_p^2 = .03$, and for posttest 2, $F(2,44) = 0.01$, $p = .99$, $\eta_p^2 = .00$.

main effect of time (i.e., posttest 1 to posttest 2) for the problem behaviors scale, $F(1, 41) = 0.09$, $p = .78$, $\eta_p^2 < .01$. Figure 4 shows these means graphically; although the experimental group did have the lowest mean ratings for problem behaviors relative to the control groups at both posttests, they also had the lowest means at pretest.

Follow-up analyses were also conducted for each of the seven subscales of the social competence scale and five subscales of the problem behaviors scale given that some of these subscales, such as empathy, have been targeted in prior theory of mind training studies (e.g., Ornaghi et al., 2014). There were no significant main effects of group for any of the subscales of the SSIS, all p's > .05. Because the SSIS asks teachers to reflect on children's behavior in the past two months and five teachers reported knowing children for less than two months, the analyses were repeated excluding these teachers; the pattern of results did not differ.

4. Discussion

The current study utilized a storybook approach to improve three interrelated skills—false belief understanding, emotion understanding, and social competence—through discussion of characters' beliefs and emotions with low-income preschoolers. The integrative linkages among false belief understanding, emotion understanding, and social competence allow systematic investigation of whether improving understanding of beliefs and emotions has more generalized impacts to preschoolers' social competence. The results indicated that training was effective at improving low-income preschoolers' false belief understanding relative to two control groups. However, training was not effective at improving their emotion understanding or social competence as it was assessed in this study. Possible explanations for these findings are discussed below as well as suggestions for future research on this topic.

4.1 False Belief Understanding

The results of this study indicate that reading commercially-available children's books and focusing on characters' mental states is a feasible way to improve low-income preschoolers' false belief understanding. These results replicate those of prior researchers using a similar approach (Guajardo & Watson, 2002; Ornaghi et al., 2011), and expand on this research by targeting low-income children, including two control groups, and including a two-month followup. Guajardo and Watson (2002) used only a non-treatment control group, while Ornaghi et al. (2011) used only a storybook control group. Both studies showed gains in the experimental group relative to these controls. Interestingly, however, Peskin and Astington (2004), who used only a storybook control group, found that this group outperformed the experimental group on the false belief explanation battery, but did not differ on unexpected locations or unexpected contents false belief tasks. They argued that in their control group (which they termed the control-implicit group), children were better able to construct their own understanding of false beliefs through discourse that drew attention to conflicting perspectives, which led to a deeper understanding of false beliefs compared to children who were given more explicit information regarding characters' mental states. This was a

surprising finding, especially considering that all metacognitive language was removed from the books in the control-implicit group.

A few characteristics of Peskin and Astington's study that may explain why their control and experimental groups did not differ on the unexpected locations and unexpected contents false belief tasks include: that children's active participation did not appear to be a central feature of the design; the small selection of storybooks (i.e., six); and that storybooks were read by teachers, graduate assistants with children in small groups, and children's parents, potentially leading to a great deal of variability in how these stories were delivered or in how children paid attention to these stories. Thus, the one-on-one interactions adopted in the current study may be an important component of training false belief understanding, which was also suggested by Guajardo and Watson (2002) who found that a one-on-one, but not a group approach, was effective at improving preschoolers' theory of mind understanding. In the current study, a number of relevant variables were examined or controlled, such as age, gender, race, classroom, vocabulary, frequency of book reading at home, children's attention and activity during the story, and the delivery of the training by the same female experimenter using identical story scripts for each child to ensure that the experimental manipulation was causing group differences. Thus, the current study provides convincing evidence that false belief training delivered in this way promotes low-income children's false belief understanding above and beyond other potential confounding variables.

Another contribution of the current study is that it included both a non-treatment control and a storybook control group, which prior false belief training studies have not done. The experimental group outperformed both control groups on false belief understanding at posttest 1 and 2 after controlling for pretest scores, and there were no differences in the two control groups on false belief understanding. This suggested that simply being exposed to stories containing false beliefs did not facilitate growth in false belief understanding. Children only appeared to benefit from an approach in which the experimenter explicitly highlighted these mental states and discussed them with children. The results also suggested that there was no gain in children's false belief understanding when children were simply read these stories relative to children who heard no stories containing false beliefs during the training phase. The results of this study may be helpful for future researchers to justify decisions about what types of controls to use in similar studies.

These results have important implications for how teachers and parents discuss mental states when reading books with children, and extend the results of other studies showing that children's false belief understanding is better predicted by parents' explanations of mental states compared to simple mentions of mental states in conversations with children (e.g., Adrián, Clemente, & Villanueva, 2007; Slaughter, Peterson, & Mackintosh, 2007). Several researchers have also found that training theory of mind is more effective when children are encouraged to reflect on others' mental states and when experimenters provide corrective feedback compared to passively listening to explanations (e.g., Clements et al., 2000; Guajardo et al., 2013; Pillow et al., 2002, Tenenbaum et al., 2008). In the current study, questions regarding characters' mental states were scripted into each storybook reading. Although the experimental group included a combination of experimenter explanations and questions to the child and so cannot tease apart the relative influence of the two, the results

of the current study lend support for the viewpoint that children's active engagement in discussing others' mental states is a mechanism explaining their advancement in theory of mind.

These results also suggest that the same types of false belief training studies that have been successful for middle-class samples (e.g., Guajardo & Watson, 2002) also facilitate false belief understanding in low-income children despite their lower average language skills or prior linguistic interactions (e.g., Hart & Risley, 1995). The current results fit within the social-constructivist perspective of theory of mind development, which suggests that parents' mental state talk with children promotes children's theory of mind understanding through the child's gradual construction of knowledge through social interaction (Carpendale & Lewis, 2004). Several researchers have shown that parents' mental state talk during book reading predicts children's false belief development regardless of social class (e.g., Ruffman et al., 2002; Symons, Peterson, Slaughter, Roche, & Doyle, 2005). Thus, the mechanism for promoting preschoolers' false belief understanding theory of mind may be similar across social classes regardless of individual differences.

The current study extends prior literature on this topic by examining children's false belief understanding two months after the training, which was a longer interval than prior training studies. While it would not be expected that children would decrease in their false belief understanding in this timeframe, it is noteworthy that the control groups did not catch up to the experimental group either, especially during a time in development when false belief understanding is expected to advance and given that no training was taking place during this two-month period. Of course, two months is still a relatively short duration and future studies could explore longer-term effects. However, most theory of mind training studies have examined posttest effects immediately after training (e.g., Appleton & Reddy, 1996; Clements et al., 2000; Peskin & Astington, 2004; Slaughter, 1998).

Finally, the current study demonstrated that false belief understanding can be improved in a low-income sample, which has not typically been the focus of prior research of this type. There is evidence that the approach used here, which was implemented by researchers, could also extend to parents or teachers of low-income children. Although they did not examine children's false belief understanding as an outcome, Aram, Fine, and Ziv (2013) trained mothers to focus on socio-cognitive themes (e.g., mental state language, mental causality) while reading four books with their low-income preschoolers, and found that mothers and children referred more to socio-cognitive themes relative to controls after four weeks of reading these books together. Additionally, Ziv, Smadja, and Aram (2014) found that parents and teachers from upper-middle socioeconomic status backgrounds used mental state terms (i.e., beliefs, emotions, desires) quite frequently while reading a book with a false belief theme to preschoolers. Specifically, teachers used these terms in over 23% of their utterances on average, which was significantly greater than parents' use of mental state terms. Future research could more directly address whether teachers and/or parents of low-income preschoolers can facilitate improvements in children's theory of mind understanding through storybook interactions focused on mental states. As mentioned in section 1.1, this argument is not meant to suggest that low-income children have a deficit in theory of mind. Rather, given the current focus of promoting social-emotional development in Head Start,

researchers could consider including false belief understanding as one core component of preschool programs.

A potential criticism of the utility of a false belief training approach in low-income preschoolers is the use of traditional false belief tasks in this population. Some have criticized using these tasks in low-income samples because they are biased towards affluent Western European tendencies to attribute mental states to others (Curenton, 2004; Lillard, 1998), which explains the social class differences found on these tasks. However, researchers have shown that low-income preschoolers' performance on these tasks is related to teacher-rated social competence (e.g., Holmes-Lonergan, 2003; Weimer & Guajardo, 2005). Thus, these false belief tasks do appear to have some predictive validity in terms of relevant real-world behaviors—the perceptions of children's social skills in the classroom. These traditional false belief tasks were used in the current study because the vast majority of the work cited, especially in regards to prior theory of mind training studies, utilized these assessments. Additionally, the tasks used in the current study were nearly identical to those used by Weimer and Guajardo (2005), who showed socioeconomic status-based differences on these tasks. However, it would be interesting for future work to determine if training studies similar to the one used here also promote variations of the false belief tasks that have been used with low-income preschoolers by other researchers (e.g., Curenton, 2003).

4.2 Emotion Understanding

Although false belief and emotion understanding were correlated at pretest, with effect sizes similar to other studies (e.g., Cassidy et al., 2003), and emotion understanding was directly targeted during training, this approach did not advance children's emotion understanding. The most likely explanation for the present finding is that children were near ceiling on this task. This particular assessment of emotion understanding was selected given its relation to false belief scores in prior studies (e.g., Cassidy et al., 2003). Additionally, in another study aimed at improving emotion understanding in low-income children, Izard et al. (2004) used a very similar emotion understanding task, which only required children to label the four basic emotions, and found improvements in two of the three subcomponents of emotion understanding. However, a limitation of using this assessment for a theory of mind training targeting both false belief and emotion understanding is that children may be more advanced in emotion understanding assessed using this task relative to their false belief understanding. The affective perspective taking task used here (Denham, 1986; Denham et al., 2002) is less demanding than other emotion understanding tasks as it only requires children to identify the experimenter's emotional expression. Examining the mean change scores from pretest to posttest 2 indicated that most children showed little change in their emotion understanding over this timeframe, with the young 4-year-olds showing the most change during this period. This suggests that this particular approach may only facilitate children's growth in emotion understanding during a very specific time in development.

Future studies of this type could use the Test of Emotion Comprehension (TEC), which assesses a broader range of abilities (Pons, Harris, & de Rosnay, 2004). This assessment is appropriate for 3- to 11-year-olds, and includes more advanced aspects of emotional understanding, such as the understanding that people's beliefs, whether true or false, affect

their emotional reactions. Other researchers have found that performance on the TEC (e.g., understanding of external causes of emotions) relates to children's theory of mind skills (e.g., Weimer, Sallquist, & Bolnick, 2012). Additionally, other training studies have been effective at improving young children's emotion understanding using the TEC (e.g., Ornaghi et al., 2014) Thus, future studies of this type might consider using an assessment of emotion understanding that includes a broader range of skills to avoid ceiling effects.

Future studies should also consider using emotion understanding pretest scores as part of the exclusionary criteria. Although it would have been ideal to also exclude children who passed the emotion understanding pretest in the current study, this assessment was not used as part of the exclusionary criteria for several reasons: there were time constraints due to the other exclusionary measurements at pretest (e.g., receptive vocabulary), improving false belief understanding was the greatest priority in the current study given the lack of research on improving this skill in low-income preschoolers, it was not anticipated that children failing the false belief assessment would be near ceiling on emotion understanding, and prior studies training false belief and/or emotion understanding did not use either measurements as exclusionary criteria for participation in training and found significant effects of training (e.g., Ornaghi et al., 2011; Ornaghi et al., 2014).

4.3 Social Competence

Given the relation between theory of mind and social competence (e.g., Capage & Watson, 2001; Razza & Blair, 2003) and the practical importance of improving social competence in low-income children, social competence was targeted in the current study. Although the social skills subscale of the SSIS was significantly correlated with false belief and emotion understanding at pretest, with effect sizes similar to prior research (e.g., Cassidy et al., 2003), the effects of the theory of mind training approach did not transfer to children's social competence. The current study was the first to examine experimentally whether improving theory of mind leads to gains in social competence, although other researchers have implied that false belief understanding should lead to gains in social competence (e.g., Capage & Watson, 2001). There are several explanations for why this training was not effective in promoting this skill. One explanation is that the focus of this training was simply too specific to cause positive changes in social competence, such as lowering aggression or increasing empathy. Researchers argue that the ability to understand one's own and others' false beliefs and to understand different perspectives explains the relation between false belief understanding and social competence (e.g., Capage & Watson, 2001). However, the current training specifically targeted these skills, but without effectively increasing social competence, which suggests there may be more to enhancing social competence than improving mental state understanding or perspective taking. It may be necessary to also provide training that situates children within contexts in which they can learn specific social competence skills, such as turn-taking, following rules, and not reacting aggressively—behaviors that were assessed on the teacher ratings of social competence, but not targeted in the training phase.

Also using a storybook approach, Jones et al. (2011) improved young children's social competence through classroom lessons in which teachers read stories and then engaged

children in discussions of social and emotional themes, such as handling anger, listening, and cooperation; teachers also encouraged children to relate the themes to their own experience. Thus, it may be that studies aimed at improving social competence need to focus specifically on the skills assessed at posttest, and need to engage children in relating the story themes to their own lives. Another possibility is that because increasing social competence is already a goal of Head Start (whereas false belief understanding is not), children gain in social skills more uniformly across groups because all children are exposed to an intervention aimed at increasing this skill. In support of this possibility, the social skills subscale of the SSIS increased from posttest 1 to posttest 2 scores after controlling for pretest scores.

The use of teacher ratings, rather than direct assessments of children's social competence, may have also been problematic because of the low teacher participation and because teachers' ratings may not be as precise in detecting changes in children's social skills over a short period of time (15 weeks). Future work could consider directly asking children what they would do in a given situation (e.g., Capage & Watson, 2001; Jones et al., 2011) or direct observations of children's social competence in the classroom (e.g., Cassidy et al., 2003; Webster-Stratton, Reid, & Stoolmiller, 2008). A final possibility is simply that improving theory of mind understanding does not improve social competence. Although several researchers have shown that theory of mind and social competence are related (e.g., Denham et al., 2012; Weimer & Guajardo, 2005), other researchers have found that false belief understanding did not relate to social competence (e.g., Garner, Curenton, & Taylor, 2005), or that false belief understanding correlated with only certain aspects of social competence (e.g., Lalonde & Chandler, 1995). Thus, improving theory of mind may not be a viable means for improving social competence. It is unclear from the present study whether the lack of an effect of training on social competence was due to measurement issues or because theory of mind is not causally related to social competence. Given that one aim of this study was to determine whether increasing false belief understanding is a possible mechanism for improving social competence, more work is needed to test this possibility.

4.4 Future Directions

In addition to the suggestions for improving the measurement of emotion understanding and social competence mentioned in sections 4.2 and 4.3, another suggestion for future research is to more precisely examine the mechanism(s) by which children's false belief understanding is improved using the storybook approach. One possibility for why this approach improves children's false belief understanding is because this training increases children's conversational perspective taking abilities. Bernard and Deleau (2007) found that preschoolers' conversational perspective taking abilities (assessed with tasks that did not contain false beliefs) were predictive of children's later false belief scores, but the reverse relation was not found. They argue that being able to recognize differing perspectives within conversation, much like the questions required children to do in the experimental group of the current study, contributes to children's developing belief representation. Because of the relation between language and theory of mind (Milligan, Astinton, & Dack, 2007), a related possibility is that discussing characters' mental states improves children's mental state vocabulary or vocabulary in general, and thus improves their comprehension of the vignettes

often used to assess false belief understanding. General vocabulary was assessed in this study primarily for screening purposes; future studies could include general vocabulary or mental state vocabulary at posttests to further examine this possibility. This was not feasible in the current study given the small amount of time children were available for testing.

Another avenue for future research may be to examine whether there are individual differences that predict which children may particularly benefit from theory of mind training programs. For example, Benson, Sabbagh, Carlson, and Zelazo (2013) found that children with greater executive functioning skills benefited the most from training in understanding false beliefs. They argue that children who are better able to inhibit the conflicting thoughts presented in false belief vignettes are better able to pay attention to relevant variables. Training studies also suggest that children with higher initial implicit false belief understanding (i.e., looking in anticipation of a character's action in the false belief assessment) benefit most from false belief training (Clements et al., 2000).

4.5 Conclusions and Practical Implications

This study aimed to improve three interrelated skills—false belief understanding, emotion understanding, and social competence—through storybook interactions focused on characters' mental states. The training approach was successful at increasing false belief understanding one week after training, with effects extending to two months after training. Although typically developing children will ultimately pass false belief tasks in time, this study has practical implications for those preschoolers who may particularly benefit from this approach in an educational setting. The current training did not lead to improvements in children's social competence, and it is unclear whether this was due to measurement issues, the duration of the study, or because theory of mind understanding is not causally related to social competence. However, other studies have suggested that false belief understanding is practically important because of its relation to teacher ratings of social competence (e.g., Holmes-Lonergan, 2003; Watson et al., 1999; Weimer & Guajardo, 2005). Additionally, individual differences in theory of mind are relevant early in life as there continue to be individual differences in more advanced aspects of theory of mind into later childhood (e.g., second-order false belief; Miller, 2009); furthermore, theory of mind in later childhood predicts behaviors relevant to social competence, such as defending victims of bullying (e.g., Caravita, Di Blasio, & Salmivalli, 2010). Researchers have improved false belief understanding in children not at risk for delays in false belief understanding (e.g., Guajardo & Watson, 2002), and researchers have improved emotion understanding and social competence in low-income preschoolers (e.g., Izard et al., 2004). This was the first study to attempt to marry the two approaches. While it is disappointing that training did not improve emotion understanding or social competence, this study can inform future theory of mind training studies in terms of what is and is not effective. It is important for researchers to identify core components of programs that are effective in specific populations and better understand the active ingredients of programs before scaling up to larger samples (HHS, 2013). The current work suggests that discussion of characters' mental states with preschoolers is specific to improvements in false belief understanding. More work is needed to better understand how this approach may facilitate broader social skills either through improved measurement of outcomes or adjustments to the training protocol.

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Appendix

Book: *Where's Jamela?* by Niki Daly (2004)

Starting Question: How would you feel if your mom or dad told you that you were moving to a different house? Would you feel happy or sad? Now we are going to hear a story about a little girl who has to move to a new house.

1. How is Jamela *feeling* here (point to Jamela)? [Yes, that's right], she is sad about moving to a new place.
2. How did Mama *feel* when Jamela dropped the teapot (point to Mama)? [Yes, that's right], Mama was mad because Jamela broke the teapot—that was Mama's only teapot.
3. Did anyone *see* Jamela climb in the box (point to Jamela climbing in box)? [No, that's right], nobody *saw* Jamela climb in the box so nobody *knows* she is in there. [Hold page for later].
4. They *think* that Jamela's things are in this box (point to box). But, is there really something else in there too? [Yes, that's right], Jamela is in the box too and they don't *know* it (point to other characters).
5. Everyone *thinks* that Jamela is lost, but where is she *really*? [Yes, that's right], Jamela is in the box (flip back to #3).
6. What are Mama and Gogo *feeling* here (point to Mama and Gogo)? [Yes, that's right], Mama and Gogo are very worried that Jamela is lost.

7. What is Gogo *feeling* here (point to Gogo)? [Yes, that's right], Gogo is so happy they found Jamela that she starts playing her piano right on the moving truck.

8. How does Jamela *feel* at the end (point to Jamela)? [Yes, that's right], Jamela is happy. At the beginning of the story she wasn't very happy about moving, but now she thinks that their new place will be alright.

Conclusions: So Jamela was fed up with packing and so she climbed into the box. But, then she fell asleep and no one knew where she was. They *thought* she was lost, but *really* she was just in the box the whole time.

Research Highlights

- Examined a theory of mind training program for low-income preschoolers.
- Examined whether training transferred to preschoolers' social competence.
- Training improved false belief understanding at two posttests.
- Training did not improve emotion understanding or social competence.

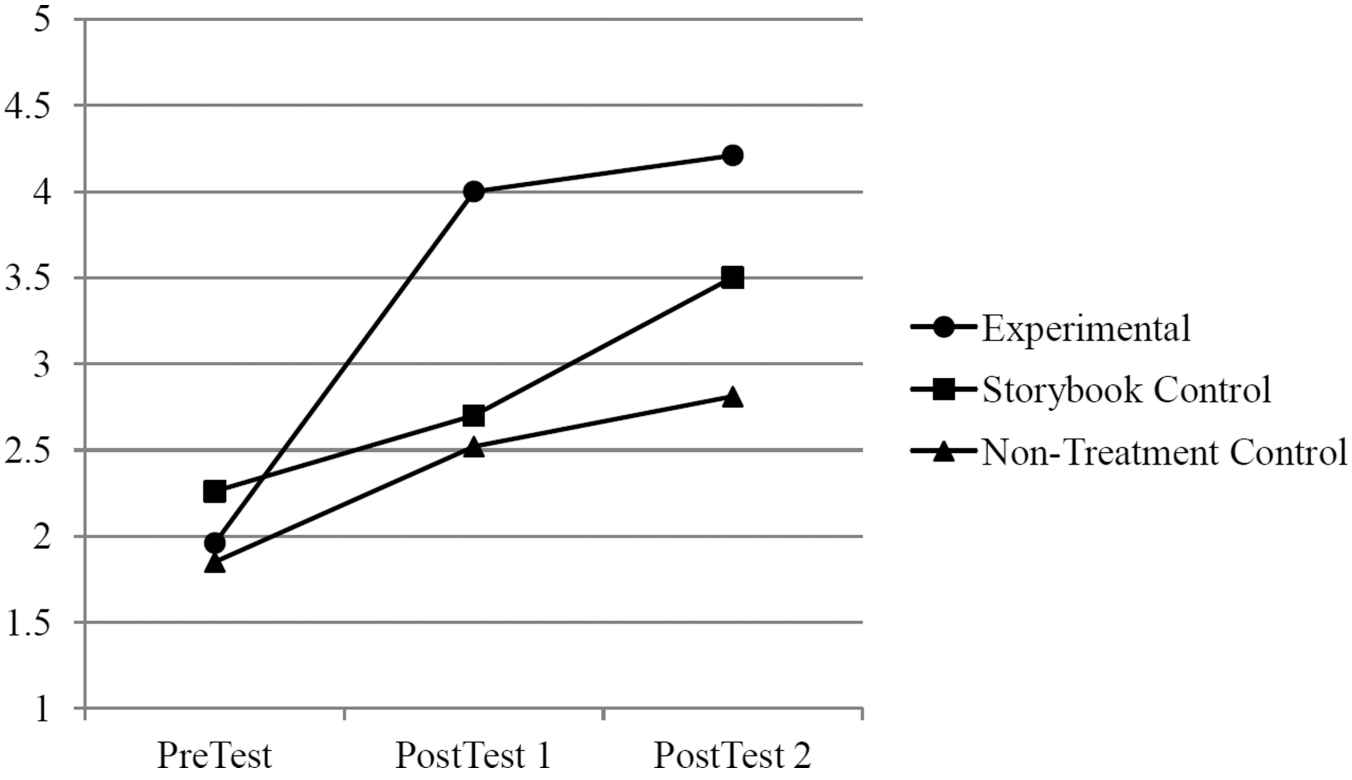

Figure 1.
Mean false belief scores for experimental, storybook control, and non-treatment control groups at pretest, posttest 1, and posttest 2.

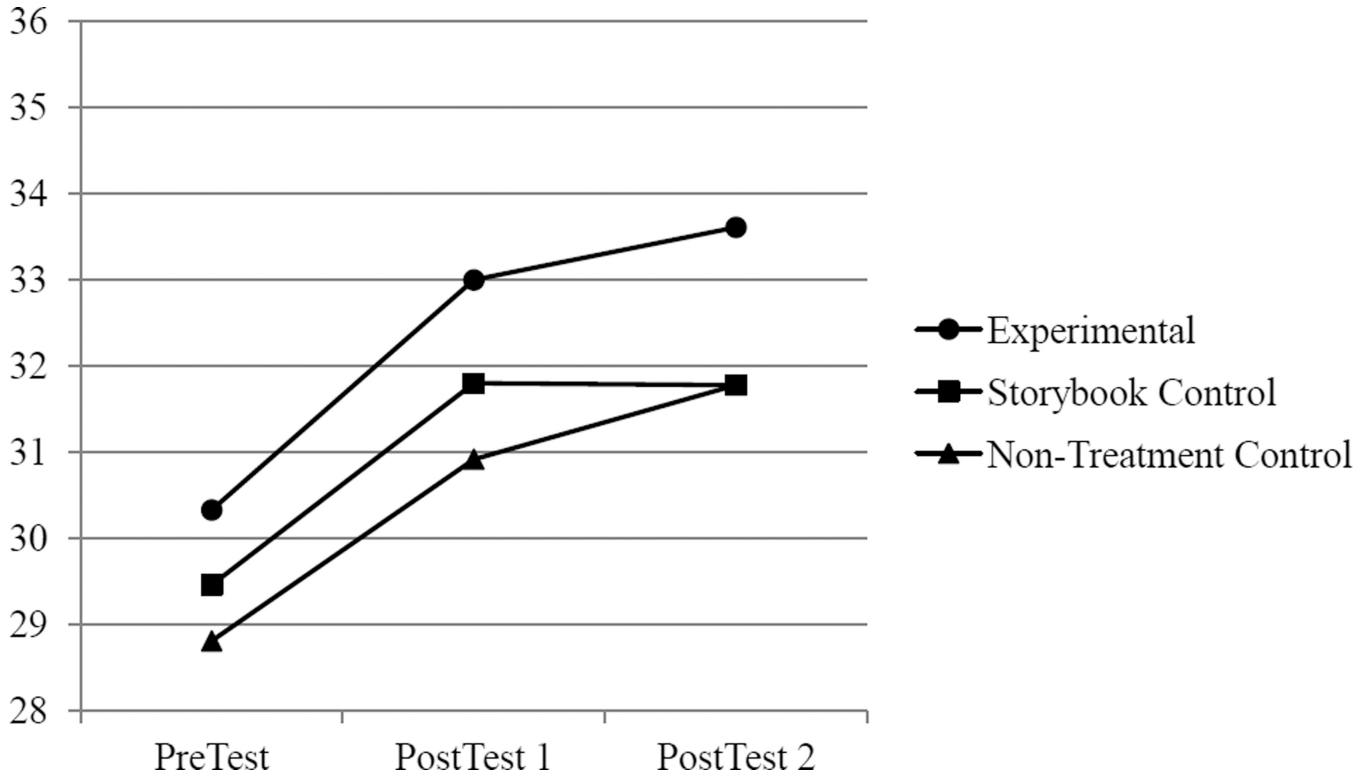

Figure 2.
Mean emotion understanding scores for experimental, storybook control, and nontreatment control groups at pretest, posttest 1, and posttest 2.

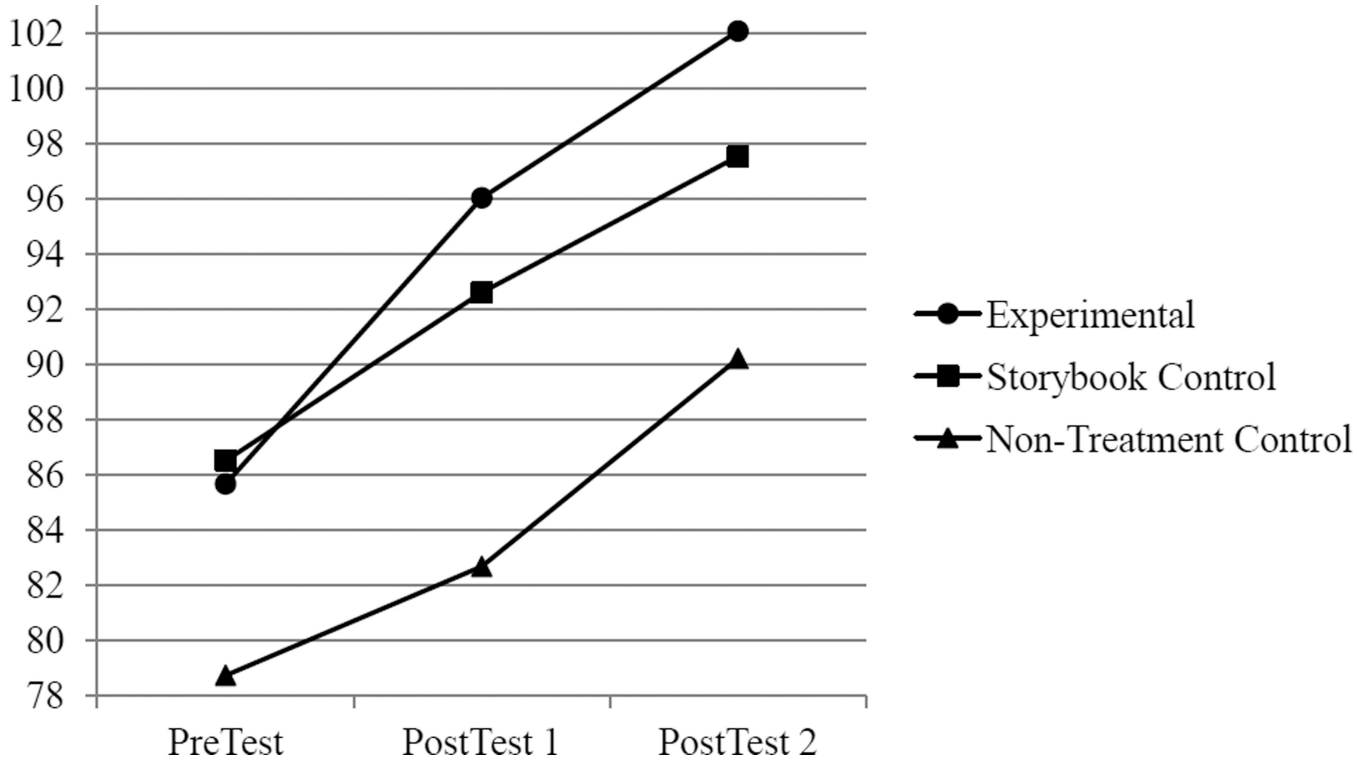

Figure 3.
Mean social skills ratings on the SSIS for experimental, storybook control, and nontreatment control groups at pretest, posttest 1, and posttest 2.

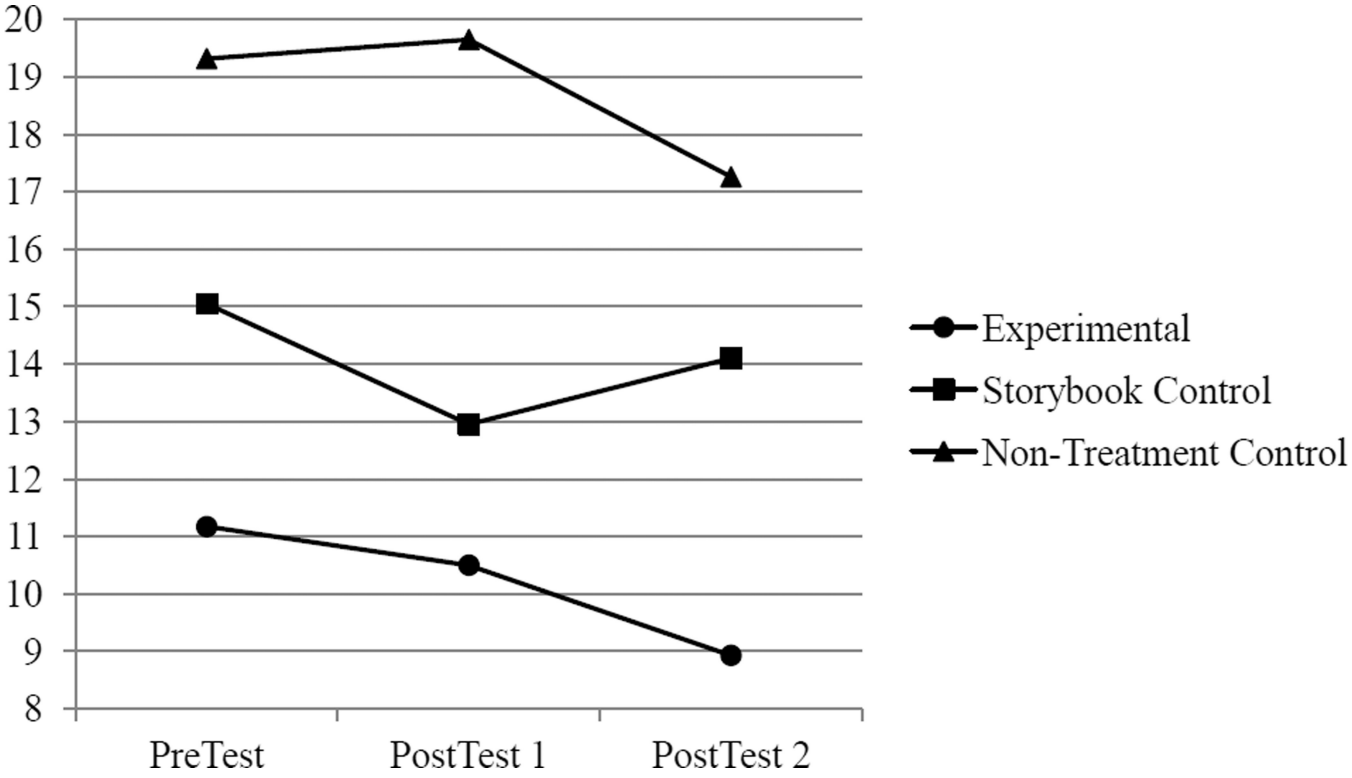

Figure 4.
Mean problem behaviors ratings on the SSIS for experimental, storybook control, and non-treatment control groups at pretest, posttest 1, and posttest 2.

Table 1

Descriptive Data for Groups at Pretest

	Experimental ***M (SD)***	**Storybook Control** ***M (SD)***	**Non-Treatment Control** ***M (SD)***
Age	4.48 (0.36)	4.34 (0.43)	4.43 (0.49)
PPVT-4 standard scores	95.86 (9.56)	98.56 (11.02)	95.23 (10.12)
Gender	46% Female	52% Female	39% Female
Race	46% Caucasian	52% Caucasian	54% Caucasian
Activity Level	1.14 (0.19)	1.08 (0.14)	N/A
Attention	1.22 (0.25)	1.18 (0.24)	N/A
Months Known by Teacher	7.38 (5.80)	7.47 (5.98)	10.28 (7.35)
Annual Family Income	$11,885 ($5,667)	$10,198 ($8,848)	$14,854 ($10,123)
Parental Education in Years	12.93 (1.07)	12.32 (1.36)	12.55 (1.64)
Minutes Per Day Spent Reading to Child (scale of 1 to 4)	2.79 (0.89)	3.09 (0.61)	2.90 (0.64)
Frequency of Reading Books to Child in Prior Week (scale of 1 to 4)	3.14 (0.77)	3.23 (0.75)	2.95 (.99)

Table 2

Group Means (and SD) for False Belief Understanding, Emotion Understanding, and Social Competence

	Pretest			Posttest 1			Posttest 2		
	Experimental	**Storybook Control**	**Non-Treatment Control**	**Experimental**	**Storybook Control**	**Non-Treatment Control**	**Experimental**	**Storybook Control**	**Non-Treatment Control**
False Belief Understanding	2.08 (1.59)	2.43 (1.77)	1.78 (1.63)	4.02 (2.49)	2.78 (1.95)	2.57 (2.42)	4.35 (2.69)	3.72 (2.36)	2.81 (2.27)
Emotion Understanding	30.33 (3.63)	29.46 (4.86)	28.81 (6.94)	33.00 (2.41)	31.80 (5.20)	30.92 (5.95)	33.61 (2.87)	31.78 (7.58)	31.73 (6.69)
SSIS Social Skills	85.67 (20.10)	86.52 (21.28)	78.74 (27.17)	96.03 (21.16)	92.60 (21.57)	82.68 (30.32)	102.07 (21.31)	97.53 (21.22)	90.21 (25.15)
SSIS Problem Behaviors	11.17 (8.51)	15.05 (10.53)	19.32 (15.28)	10.50 (8.78)	12.95 (11.11)	19.65 (15.67)	8.93 (7.32)	14.10 (13.52)	17.26 (13.52)

Note. SSIS=Social Skills Improvement System.

Table 3

Correlations Among False Belief Understanding, Emotion Understanding, and Social Competence at Pretest

	FBU	EU	SSIS SS	SSIS PB
FBU	--			
EU	.31**	--		
SSIS SS	.31*	.40**	--	
SSIS PB	−.19	−.19	−.76**	--

Note. FBU=false belief understanding, EU=emotion understanding, SSIS SS=Social Skills Improvement System Social Skills Scale, SSIS PB=Social Skills Improvement System Problem Behaviors Scale,

* $p < .05$,

** $p < .01$.