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Child language and parent discipline mediate the relation between family income and false belief understanding

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Abstract

Achieving false belief understanding is an important cognitive milestone that allows children to understand that thoughts and reality can differ. Researchers have found that low-income children score significantly lower than middle-income children on false belief understanding but have not examined why this difference exists. We hypothesized that children's language and parent discipline mediate the income–false belief relation. Participants were 174 3- to 6-year-olds. False belief understanding was significantly correlated with family income, children's vocabulary, parents' self-reported discussion of children's behavior, discussion of emotions, and power assertion. Family income had a significant indirect effect on false belief understanding through children's vocabulary and parent discipline when examined independently, but only through children's vocabulary when using parallel multiple mediation. This study contributes to our knowledge of individual differences in false belief understanding.

Keywords

False belief understanding; Vocabulary; Parent discipline; Family income; Social cognition; Cross-sectional study

Introduction

Theory of mind refers to the understanding of mental states, such as desires, emotions, and beliefs, as well as the understanding of how these mental states motivate behavior. The hallmark test of theory of mind during the preschool years is the test for false belief understanding or the understanding that mistaken beliefs can guide our behavior (e.g., an actor will search for an object in a container that she thinks holds the object rather than where it truly is; Wellman, Cross, & Watson, 2001). Wellman and colleagues (2001) viewed false belief understanding as a “genuine conceptual change” given that most typically developing children achieve this understanding by the age of 5 years regardless of task manipulations. However, several researchers have also focused on the individual differences that predict false belief understanding during the preschool years (e.g., Hughes & Devine,

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2015a). Children's false belief understanding is significantly correlated with socioeconomic status (SES), as measured by family income, parents' occupational status, parents' education, or composite measures of these variables (e.g., Cole & Mitchell, 1998; Cutting & Dunn, 1999; Galende, de Miguel, & Arranz, 2011; Hughes, Deater-Deckard, & Cutting, 1999; Hughes, Dunn, & White, 1998; Pears & Moses, 2003; Ruffman, Slade, Devitt, & Crowe, 2006). These researchers have found that children from higher-SES families tend to have higher false belief understanding. In addition, when directly contrasting false belief understanding scores for low-SES and high-SES children, higher-SES children perform significantly better (Shatz, Diesendruck, Martinez-Beck, & Akar, 2003; Weimer & Guajardo, 2005).

Researchers have not yet directly examined why there are SES-related differences in false belief understanding, although researchers have suggested that this relation be explored (Holmes-Lonergan, 2003; Seidenfeld, Johnson, Cavadel, & Izard, 2014). In the current study, we hypothesized that child language and parent discipline mediate the relation between SES and false belief understanding. Researchers have shown that children's own language skills and parents' discipline predict false belief understanding (e.g., Milligan, Astington, & Dack, 2007; Ruffman, Perner, & Parkin, 1999), and there are SES-related differences in both child language and parent discipline (e.g., Dotterer, Iruka, & Pungello, 2012; Hart & Risley, 1995). Thus, child language and discipline are potential explanations for why there are SES-related differences in children's false belief understanding. Below we review the research on parent discipline and children's language skill in relation to children's false belief understanding, as well as SES-based differences in the environments of young children regarding these two variables. We acknowledge that SES, our construct of interest, is multifaceted and can include measures of income, education, occupational status, or some combination of these. We refer to SES when discussing results of previous studies that used any of these assessments for conciseness. However, we examined family income specifically in the current study because our low-SES sample comprised children attending Head Start, whose enrollment is based primarily on family income.

Parent discipline and false belief understanding

Although the current study focused on a specific aspect of parenting—parent discipline—the relation between parent discipline and false belief understanding can also be understood by considering parenting style more broadly, which includes parent discipline as well as other parenting dimensions such as warmth. Thus, we distinguish between *parenting* or *parenting style* and *parent discipline* when discussing previous research depending on which construct was measured. Research on parenting style and false belief understanding has often focused on Baumrind's (1967) classic categorization of authoritative and authoritarian parenting styles. On the one hand, researchers argue that the authoritative parenting style, which includes high warmth and a tendency for explanation and discussion when disciplining children, is facilitative of false belief understanding (e.g., Cole & Mitchell, 1998). On the other hand, researchers argue that the authoritarian parenting style, which includes less warmth and more punitive controlling measures such as physical discipline, should predict lower false belief understanding (e.g., Cole & Mitchell, 1998). In support of these arguments, Shahaeian, Nielsen, Peterson, and Slaughter (2014) found that mothers who

reported a tendency to respond to disciplinary situations with general discussion and discussion of feelings had children with better false belief understanding. In addition, Farrant, Devine, Maybery, and Fletcher (2012) found that mothers' tendency to encourage children to take the perspective of others during conflict was significantly related to children's cognitive empathy (a composite of false belief understanding and other theory of mind tasks). Similarly, Ruffman and colleagues (1999) found that mothers' self-reported discipline involving discussion of how others' actions would make children feel significantly predicted children's false belief understanding even after controlling for child age, verbal ability, SES, and number of siblings. They argued that although these discussions were focused on emotions and not beliefs per se, this relation may reflect mothers' tendencies to discuss mental states more generally. More broadly, researchers argue that discussing children's behavior or how their behavior affects others is a mechanism by which parents can teach children about mental states by considering children's own perspective and helping them to understand others' perspectives; these discussions also model to children how to predict others' thoughts and behaviors (Farrant et al., 2012; Ruffman et al., 1999; Vinden, 2001).

Regarding the relation between authoritarian parenting and false belief understanding, researchers have shown that parents who have a harsh disciplinary style, such as use of physical control and yelling, tend to have preschoolers with lower false belief understanding (Galende et al., 2011; Hughes et al., 1999; Olson, Lopez-Duran, Lunkenheimer, Chang, & Sameroff, 2011; Shahaiean et al., 2014). Pears and Moses (2003) found that parents who reported using more power assertive disciplinary practices tended to have children with lower false belief understanding scores even after controlling for children's age, cognitive ability, and SES. Researchers argue that this type of discipline does not facilitate children's false belief understanding because it does not encourage children to understand others' mental states or to reflect on how their actions affect others (Ruffman et al., 1999). Pears and Moses (2003) further argued that these power assertive parenting techniques do not allow children to learn to resolve conflicts on their own and focus children's attention on parental control rather than on their own behavior, which is relevant to promoting children's understanding of how behavior affects others' thoughts and feelings. Similarly, Laible (2004) argued that parents' power assertion evokes anxiety in children, which may interfere with processing the intent of parents' message.

Parent discipline and SES

In the current study, parent discipline was examined as a mediator of the relation between family income and false belief understanding. Several researchers have found that lower-SES parents tend to show more negative parenting behaviors such as punitive and harsh discipline, physical discipline, anger, and rejection (e.g., Dotterer et al., 2012; Lee & Kim, 2012; Linver, Brooks-Gunn, & Kohen, 2002; Mistry, Vandewater, Huston, & McLoyd, 2002; Pinderhughes, Dodge, Bates, Pettit, & Zelli, 2000; Shaw, Criss, Schonberg, & Beck, 2004; Straus & Stewart, 1999). Researchers using the Baumrind classifications of authoritarian and authoritative parenting styles also find that parents with lower SES tend to be more often authoritarian (e.g., Iruka, 2009; Querido, Warner, & Eyberg, 2002), and parents with higher SES tend to be more authoritative (e.g., Querido et al., 2002). Fitzgerald and White (2003)

also found that children from higher-SES families had parents who more frequently discussed the perspective of the victim of children's negative behavior (e.g., making another child cry). Similarly, Dekovic and Gerris (1992) found that higher-SES parents tended to show greater reasoning complexity when discussing child development and discipline with a researcher.

Although not directly tested in studies of false belief understanding, other researchers have found that the relation between SES and young children's cognitive skills and school readiness is mediated through parenting (Dotterer et al., 2012; National Institute of Child Health and Human Development [NICHD] Early Child Care Research Network [ECCRN], 2005). Thus, differences in parent discipline may explain the relation between family income and children's false belief understanding.

Child language and false belief understanding

Children's language skills were also examined in the current study as a mediator of the relation between false belief understanding and family income. Researchers consistently find that children's language ability is related to false belief understanding (see Milligan et al., 2007, for a metaanalysis). Although it is possible that this relation is merely "skin deep"—that is, that language predicts false belief understanding simply because language is required to follow the tasks—some researchers argue for a more fundamental relation between language and false belief understanding (Hughes & Devine, 2015b). Evidence of this latter view comes from longitudinal studies, which demonstrate that earlier language is a stronger predictor of later false belief understanding compared with the reverse relation (Hughes & Devine, 2015b; Milligan et al., 2007). In addition, changing the linguistic demands or supports of false belief tasks does not significantly alter performance (Hughes & Devine, 2015b; Milligan et al., 2007; Wellman et al., 2001).

As Milligan and colleagues (2007) pointed out, language is multifaceted, and language in relation to children's theory of mind has been assessed in many ways. In the current study, we examined children's receptive vocabulary because numerous studies have examined this aspect of language in relation to false belief understanding. In Milligan and colleagues' meta-analysis, they reported more than 50 studies examining children's receptive vocabulary as measured by the Peabody Picture Vocabulary Test (PPVT) or the British equivalent, the British Picture Vocabulary Scale (BPVS). In addition, researchers have found that the PPVT predicts false belief understanding in samples ranging widely in SES (e.g., Cutting & Dunn, 1999; Garner, Curenton, & Taylor, 2005).

Child language and SES

Children's receptive vocabulary was examined also because SES particularly affects vocabulary. Several researchers have found that there is a gap in vocabulary during early childhood between low-income and middle-income children, with low-income preschoolers entering school with smaller vocabularies on average than their middle-income peers (e.g., Hart & Risley, 1995; Kohen & Guèvremont, 2014; Lee & Kim, 2012). Researchers have found that these SES-related differences in children's verbal ability are due to differences in the quality of the linguistic interactions and general home environment of children and their

parents of different SES backgrounds (e.g., Hart & Risley, 1995; Kohen & Guèvremont, 2014). Given the relation between vocabulary and false belief understanding, higher average vocabulary scores in middle-income children may explain the relation between family income and false belief understanding.

Researchers have not directly examined child language as a mediator of the relation between SES and false belief understanding, although researchers have suggested this mechanism (e.g., Hughes et al., 2005; Seidenfeld et al., 2014). Hughes and colleagues (1999) found an association between children's false belief understanding and a composite measure of SES; however, this relation was no longer significant after controlling for children's language abilities. In addition, Weimer and Guajardo (2005) found that SES was no longer a predictor of children's false belief scores after controlling for verbal ability. This suggests that children's language skills mediate the SES–false belief relation; however, mediation was not directly tested in these studies. Thus, in the current study, we directly examined children's vocabulary as a mediator of the family income–false belief relation.

Practical importance

Understanding what variables predict false belief understanding is important given that preschoolers with lower false belief understanding tend to also have lower social skills (e.g., greater disruptive behavior and disturbances in school, greater aggressive behavior, more internalizing problems, more immature behaviors; Capage & Watson, 2001; Holmes-Lonergan, 2003; Hughes et al., 1998) and lower teacher-rated social skills and peer popularity (Cassidy, Werner, Rourke, Zubernis, & Balaraman, 2003). Researchers have argued that false belief understanding underlies social competence and that children who cannot appreciate false beliefs will have difficulty in understanding that others can have different perspectives (e.g., Capage & Watson, 2001; Eggum et al., 2011). Capage and Watson (2001) argued that exhibiting prosocial behaviors and inhibiting negative behaviors (e.g., aggression) relies on children's ability to make accurate attributions regarding others' behaviors—attributions that are based on the understanding that people can have internal representations that differ from reality or from another's perspective.

Further work is needed to better understand socioemotional development in economically disadvantaged children so that we can better understand how to promote these skills. There are several programs aimed at improving the socioemotional skills of low-income children given the importance of these skills for academic success (e.g., Izard, Trentacosta, King, & Mostow, 2004). However, false belief understanding has not been a focus of early intervention for low-income children. All typically developing children will ultimately pass the false belief understanding tasks used in the current study, and so we do not intend to suggest that low-income children have a deficit in false belief understanding. However, the importance of theory of mind appears to extend beyond the preschool years; for example, theory of mind at age 5 years predicts lower peer rejection and higher peer acceptance at age 7 years (Caputi, Lecce, Pagnin, & Banerjee, 2012). Thus, improving false belief understanding could be a novel approach to enhancing the social skills of at-risk children. The current study presents a first step at identifying why low-income children may perform

lower on these tasks that could inform future research aimed at improving false belief understanding.

The current study

The current study aimed to assess false belief understanding, child language, and parent discipline in a socioeconomically diverse sample of families. We accomplished this by recruiting from Head Start classrooms as well as parents and children visiting a science center. Head Start is a federally funded preschool program for low-income children. Thus, we expected that children would come from primarily low-income families. The science center was chosen because we aimed to include an ethnically diverse middle-income group, thereby addressing the confound between race and SES that is often found in research (e.g., Hill, 2006; Nelson et al., 2013). We expected that because of the cost of admission, families would be more likely than the Head Start sample to be middle income. Because the initial sample—the Head Start sample—was almost exclusively European American and African American based on the demographics of the area, we recruited from the same racial groups at the science center. We expected that because the center is located in the downtown area of a large city, these two racial groups would be represented at the center.

We had two primary research aims. First, we aimed to examine the relations among false belief understanding, family income, children's receptive vocabulary, and parents' reported discipline as assessed by Pears and Moses (2003)—power assertion, general discussion, discussion of emotions, and consequences. Few researchers have examined the relations among SES, theory of mind, and parent discipline in the same study, although Hughes and Ensor (2007) examined all three in a study of toddlers' theory of mind understanding. They found that families with greater social disadvantage were more likely to use harsh parenting and to have children with lower theory of mind; harsh parenting was also negatively related to theory of mind. Based on the previous literature, we predicted that false belief understanding would be positively related to family income, children's vocabulary, and the parent discipline variables general discussion and discussion of emotions. We predicted that false belief understanding would be negatively related to parents' power assertion. Finally, we predicted that false belief understanding would be unrelated to parents' use of consequences given that Pears and Moses (2003) found no relation between these two variables, which they suggested was because this approach does not necessarily include discussion of others' thoughts or feelings and thus does not teach children about mental states.

Second, we aimed to examine child language and parents' reported discipline as mediators of the relation between family income and false belief understanding. We examined these mediators independently as well as by using a parallel multiple mediator analysis. In other words, we examined whether children's receptive vocabulary mediated the family income–false belief relation when considering each of the parent discipline variables. Likewise, we examined whether each parent discipline variable mediated the family income–false belief relation when considering children's language ability. We hypothesized that children's vocabulary and parent discipline would independently explain the relation between family income and false belief understanding; by also examining both types of variables

simultaneously, we assessed which variable provides a better explanation for the income–false belief relation.

Method

Participants

Participants were drawn from two sources. In total, 86 participants were recruited from Head Start (HS) centers as part of a false belief training study (Tompkins, 2015) and 88 participants were recruited at a science center (SC), for a total of 174 participants (91 female). The SC sample represents 88% of those originally recruited ($n = 101$), and the HS sample represents 74% of those originally recruited ($n = 116$).¹ The primary reasons for missing data were missing parent survey responses and because children moved before testing began for the HS sample. Only participants with complete data were included in the current analysis given that missing data were primarily from the same measure (i.e., family income and parent discipline from parent surveys) or no data were available. Children ranged in age from 41 to 72 months ($M = 56$ months, $SD = 6$). Although this was a wide age range, 93% of children were 4- or 5-year-olds and age was controlled in all analyses. The majority of children (68%) were Caucasian, 20% were African American, 10% were biracial, less than 1% were Asian, and less than 1% were Alaskan Native. As part of the consent process, all participants were screened to ensure that they spoke English as their primary language and that children did not have speech, language, or hearing difficulties.

General procedure

All children completed the PPVT and a battery of false belief tasks. Parents also completed the parent survey, which included questions about family composition and family income as well as questions about disciplinary practices. The HS data used for the current study were from pretest measures prior to implementing false belief training (Tompkins, 2015). All assessments for HS and SC samples were identical and given in the same order; thus, HS participants' performance on the assessments included in the current study was not influenced by any assessments presented later in the training study.

HS participants were recruited at parent meetings and through flyers sent home to parents. After obtaining parents' consent, the PPVT and false belief tasks were administered to children in a quiet space outside of their classrooms. Parent surveys were sent home with children with postage-paid return envelopes. Parents received up to three surveys if they did not return them. SC participants were recruited by approaching parents and children visiting the SC. The PPVT and false belief tasks were completed in an enclosed laboratory space in the SC. Parents completed surveys while at the SC.

Measures

Receptive vocabulary—Children completed the fourth edition of the PPVT (PPVT-4; Dunn & Dunn, 2007). This task requires children to select one of four colored pictures corresponding to the examiner's target word. Items are divided into sets of 12; the examiner

¹This number excludes participants who failed the screening ($n = 3$) or who moved before testing began ($n = 9$).

begins the assessment on the set corresponding to the child's age. The examiner stops testing after children make eight or more errors in a set.

False belief understanding—Children completed three standard false belief tasks—the unexpected contents task (Bartsch & Wellman, 1989), the unexpected locations task (Wimmer & Perner, 1983), and the deception task (Lalonde & Chandler, 1995) adapted from Guajardo and Watson (2002)—as well as a false belief explanation task (Peskin & Astington, 2004). The last task, which was relevant for the training study (Tompkins, 2015), was not included in current analyses because other studies examining parent discipline and false belief understanding have not used such assessments and because the results of the mediation analyses were the same whether this task was included or not. Because the HS sample later participated in a training study, we assessed false belief understanding using the tasks that have been used in other similar training studies (Guajardo & Watson, 2002; Peskin & Astington, 2004), although we acknowledge that there are other variations of the standard false belief tasks (e.g., Wellman & Liu, 2004). These tasks are described in detail in Tompkins (2015); thus, we describe the tasks more briefly here. False belief tasks were administered in the order in which they are described.

Unexpected contents.: This task involved presenting children with a familiar container, asking children what they thought was inside the box, showing children the unexpected contents, and then asking children what was inside the box. The experimenter then replaced the contents and asked the first false belief question: “What did you think was inside the box before I took the top off?” Children were then presented with a puppet and were asked the second false belief question: “[The puppet] has never looked inside the box. What does [the puppet] think is inside the box?” Children were given a forced choice for the two false belief questions if they did not respond. Finally, children were asked, “What is really in the box?”

Unexpected locations.: Children were presented with a puppet, a box, and a bag. Children were told a story in which the puppet played with a car and then put it in the box and went outside to play. With the first puppet out of sight, a second puppet played with the car and placed it in the bag. Children were then asked three questions to ensure that they followed the story; children were corrected if they provided incorrect responses or did not respond.² Next, the experimenter told children that the first puppet came back inside to play with his car and he remembers where he put it. Finally, children were asked the false belief question: “Where will [the puppet] first look for the car when he comes back?” followed by a forced choice between the box and the bag if children did not respond.

Deception.: In the first deception task, children were presented with a puppet and two boxes. The experimenter told children a story in which a puppet took candy out of a candy box and placed it in a crayon box so that another puppet would not find it. Children were told that the first puppet did not want the second puppet to eat the candy. When the second

²We acknowledge that other researchers use control questions in a different way on this task. However, because the HS sample participated in a training study modeled after Guajardo and Watson (2002), we used the unexpected locations tasks as described in their study, which used corrective feedback on the control questions for the unexpected locations task but not for the unexpected contents task.

puppet came into the room, she asked the first puppet where to find the candy, and the first puppet decided to tell her something wrong so that she would not find it. Children were then asked the false belief question: “Where will [the puppet] say the candy is?” and were given a forced choice between the candy box and the crayon box if they did not respond. In the second deception task, children were presented with a puppet and a red box with a piece of candy in it. The experimenter told children a story in which the puppet leaves the room and then elicits children’s help in playing a trick on the puppet by moving the candy to a blue box. Children were then asked the false belief question: “When [the puppet] comes back into the room, where will he first look for the candy?” followed by a forced choice between the red box and the blue box if they did not respond.

Scoring summary.: There were a total of five false belief questions across the three tasks. Children were given 1 point for each false belief question for a range of 0 to 5 points on this measure. Children were awarded a half point (0.5) when answering correctly only after the forced choice questions.³ For the unexpected contents task, children were only awarded 1 point for the second false belief question if they also answered the reality question correctly (“What is really in the box?”).

Parent survey: All parents included in the current study completed a parent survey. The survey indicated that the adult who was closest to the child and responsible for most of the child’s daily care should complete the survey. Fully 85% of survey respondents were the child’s mother, 13% were the child’s father, fewer than 1% were the child’s legal guardian, and fewer than 2% did not indicate their relationship to the child.⁴

Demographic information.: Parents reported information regarding who lives in their home because this was relevant for calculating an income-to-needs ratio. Specifically, parents reported how many adults and children lived in their home as well as their ages and the relationship of those individuals to the child (e.g., grandparent, sister).

Family income.: Parents reported their total family income per month with an open-ended question. Parents could also select forced choice categories that included less than \$250, between \$251 and \$500, between \$501 and \$1000, between \$1001 and \$1500, between \$1501 and \$2000, between \$2001 and \$2500, and more than \$2500. Total yearly income was then calculated from either the open-ended response or the median of the categorical response (e.g., we used a family income of \$1250 per month for the choice: Between \$1001 and \$1500). Similar to other studies examining poverty and child outcomes (e.g., Linver et al., 2002; NICHD ECCRN, 2005), we calculated an income-to-needs ratio for each family based on the poverty thresholds for the year during which most data were collected (U.S. Census Bureau., 2013). Income-to-needs ratios were calculated by dividing family annual income by the U.S. Census Bureau poverty threshold based on number of adults and

³We acknowledge that other researchers do not use the forced choice scoring. However, we retained this scoring because few children (11%) answered correctly only after the forced choice; giving full points for these items did not change the pattern of significance among variables, and children did not differ in number of forced choice questions used between the two sampling techniques (i.e., HS vs. SC), $\chi^2(1, 174) = 0.18, p > .05$.

⁴Although we cannot know the relationship of these respondents ($n = 3$) to the child, we assume that they are the primary discipliners based on the survey directions. The pattern of relations among variables was the same when excluding these participants.

children in the family such that a family living at the poverty threshold would have an income-to-needs ratio of 1.0.

Parent discipline.: Parents reported how they have handled, or would handle, 12 discipline situations adapted from previous research on false belief understanding and parent discipline (e.g., Pears & Moses, 2003; Ruffman et al., 1999). The situations were children lying; teasing, hitting, or biting other children; taking something that was not theirs; shouting, making fun of, or saying something mean; damaging something on purpose; touching something that should not be touched; being moody or throwing a tantrum; being selfish; being noisy or yelling; doing something dangerous; being clingy or whiny; and not minding. Parents were instructed to report how they would respond even if one of the given scenarios had not happened recently. We then coded parents' open-ended responses into four categories: *power assertive responses*, which involved physical or verbal control such as spanking or shouting; *general instructional responses*, such as explaining that lying is bad and the importance of being an honest person; *feeling responses*, which included explanations of how the behavior would make the child feel or how the child's actions would make another person feel; and *consequence responses*, such as time out or removal of privileges. This coding was nearly identical to that of Pears and Moses (2003) with the exception that they examined feeling responses focused only on others' feelings. We included both the child's own and others' feelings as did Ruffman and colleagues (1999), who examined parents' tendency to focus on how the behavior would make the child feel and found a positive relation between parents' feeling responses and false belief understanding. Consistent with Pears and Moses (2003), we coded multiple responses to the same behavior using the most power assertive response given; for example, if a parent reported giving a spanking and using time out for a particular behavior, it was coded as "power assertive" rather than as "consequence." We did not include in our analyses any responses that were ambiguous (i.e., parents provided responses that were not specific enough to determine the coding category such as "Let her know it was wrong"). We calculated proportion scores for each of the four categories because not all parents responded to all 12 scenarios. On average, parents responded to 74% ($SD = 31$) of the scenarios. Inter-rater reliability for coding was calculated by two researchers for 20% of participants. Percentage agreement was 87% ($\kappa = .82$).

Results

Preliminary analyses

Similar to other studies using a battery of different false belief tasks (e.g., Meins, Fernyhough, Arnott, Leekam, & de Rosnay, 2013), Cronbach's alpha was .64 for the three false belief tasks. A composite false belief score ranging from 0 to 5 was created because other researchers argue that using summed scores when multiple theory of mind tasks are given improves reliability (Devine & Hughes, 2014; Hughes et al., 2005). We examined the frequency with which children answered the false belief question correctly but failed the control question (i.e., "What is really in the box?"). This occurred for only 3% of participants ($n = 6$) and did not differ significantly between the low-income and middle-income samples, $\chi^2(1, 174) = 2.15, p > .05$. As described in Method, children were not

given credit for this question when this occurred. Finally, to address selective attrition, we conducted independent samples *t* tests on children's characteristics (i.e., age, language, and false belief score) for those who did and did not have complete datasets and thus were excluded from analyses. We did this separately for the HS and SC groups given different sampling techniques. The only significant difference was for children's standard PPVT scores in the HS sample; children who were included ($n = 86$) had slightly higher PPVT scores ($M = 98.84$) compared with children who were excluded ($n = 29$, $M = 92.28$), $t(113) = 2.74$, $p < .01$.

Descriptive data

Descriptive data for children's age, PPVT-4 scores, false belief scores, family income, and parent discipline are provided in Table 1 for low-income and middle-income families as well as for the sample as a whole. Children's mean standard PPVT scores were above average at 107.03 in the full sample, and children's false belief scores averaged 2.80 out of 5 points. The average income-to-needs ratio was 1.29; however, values ranged widely, with the highest score at 6.13. In terms of income-to-needs ratios, 94 participants (54%) were at or below the poverty line (i.e., 1.0) and 80 participants (46%) were above the poverty line. Based on this division, we conducted independent samples *t* tests comparing key study variables in the low-income and middle-income subsamples, also shown in Table 1. Children from middle-income families were approximately a third of a year older on average, which was a significant difference. Children in the middle-income group scored significantly better on receptive vocabulary and false belief understanding. In addition, middle-income parents reported using general instruction and feeling responses significantly more than low-income parents and reported using power assertive responses significantly less than low-income parents. There was no significant difference in parents' consequence responses. Because the middle-income group was older on average, group comparisons were repeated using an analysis of covariance (ANCOVA), controlling for children's age. The pattern of findings was the same, with significant differences between low-income and middle-income groups on all variables except parents' consequence responses. In addition, the independent samples *t* tests were repeated with sampling locations as the grouping variable (i.e., HS vs. SC). The pattern of results was identical, suggesting that this was a valid way in which to sample low-income and middle-income families.

Because the sample comprised primarily European American and African American participants, the latter of which are disproportionately poor in America (Nelson et al., 2013), we also examined the frequency of these two racial groups in the low and middle income-to-needs ratio groups. Whereas European Americans were roughly equal in the low-income and middle-income groups ($n = 50$ and $n = 68$, respectively), African Americans were overrepresented in the low income-to-needs ratio group ($n = 29$) compared with the middle-income group ($n = 6$). This could be problematic if family income differences are really racial differences. Although we could not compare race and income together, we examined differences in our study variables based on family income within the Caucasian participants. The patterns of income-based differences were identical to those reported in Table 1 when examining only Caucasian low-income and middle-income participants.

Relations among study variables

Our first research aim was to examine the relations among false belief understanding, family income, children's receptive vocabulary, and parents' reported discipline. Because of the age range of children in this sample, age was controlled in all correlations. Consistent with our hypothesis, false belief understanding was significantly and positively related to PPVT standard scores, income-to-needs ratio, and parents' instructional and feeling responses, as shown in Table 2. False belief understanding was also significantly and negatively related to parents' power assertion responses and was unrelated to consequences. Regarding the relation between family income and child language and parent discipline, we found that income-to-needs ratio was significantly and positively correlated with parents' instructional and feeling responses and was negatively correlated with parents' power assertion responses. Finally, income-to-needs ratio was positively related to children's PPVT scores.

Results of mediation analyses

Our second aim was to examine children's vocabulary and parent discipline as mediators of the relation between family income and false belief understanding. Our first model (Table 3) examined these mediators independently; our second model (Table 4 below) examined these mediators simultaneously to examine the relative importance of these two variables for explaining the income-false belief relation. We did not examine parents' use of consequences further because this variable was unrelated to false belief understanding, and children's age was controlled in all analyses. Current best practices in mediation modeling focus on the importance and statistical significance of the indirect relationship of the predictor X on the outcome Y as it operates through the mediator. To do so, all mediation models were conducted using PROCESS for SAS, which is a freely available, macro-based program developed for examining the significance of the indirect effect in mediation modeling (Hayes, 2012).

In Table 3, there are separate columns for each of three parent discipline categories as well as one column for child vocabulary. Across all four analyses, several variables of interest (identified by the title of each column) significantly predicted false belief understanding. Specifically, children's greater false belief understanding was predicted by lower power assertive discipline (estimate = 0.95, $p = .04$), higher general instruction discipline (estimate = 1.20, $p = .03$), and children's greater vocabulary (estimate = 0.05, $p < .01$) after controlling for income-to-needs ratio and child age. However, we also found that parents' discussion of feelings was not associated with false belief understanding after controlling for income-to-needs ratio and child age (estimate = 2.46, $p = .07$). In addition, income-to-needs ratio significantly predicted false belief understanding after controlling for each of the parent discipline variables and child age (all $ps = .01$), but not when controlling for vocabulary (estimate = 0.05, $p = .53$).

The mediation model was also used to examine whether income-to-needs ratio had an *indirect* effect on false belief understanding through its associations with parent discipline or vocabulary (see the row labeled "Discipline/Vocabulary indirect" in Table 3). A significant indirect path would indicate that income-to-needs ratio was related to false belief understanding as a function of its predictive relation with parent discipline or children's

vocabulary. For example, income-to-needs ratio is related to child vocabulary, which is then related to children's false belief understanding. Results suggested that income-to-needs ratio did demonstrate a significant indirect effect on false belief understanding through the power assertive strategy (estimate = 0.05, $p < .05$), general instruction (estimate = 0.05, $p < .05$), others' feelings (estimate = 0.04, $p < .05$), and child vocabulary (estimate = 0.22, $p < .05$), although estimates were small in magnitude for the parent discipline variables.

We next conducted a parallel multiple mediator analysis to examine the relative role of children's vocabulary and parent discipline as mediators of the relation between family income and false belief understanding. In other words, two mediators were included simultaneously to test whether family income was predictive of false belief understanding through either children's vocabulary or parent discipline. In these analyses, we first sought to determine whether income-to-needs ratio, parent discipline, or vocabulary was a unique predictor of false belief understanding after controlling for the other variables. Children's age was also controlled in all analyses. The results of the mediation models are presented in Table 4.

In Table 4, there are separate columns for each of three parent discipline strategies, each including children's vocabulary, children's age, and income-to-needs ratio as predictors. Across all parent discipline categories, children's vocabulary significantly predicted false belief understanding (estimate = 0.05, $p < .01$). However, none of the three parent discipline variables predicted false belief understanding after controlling for income-to-needs ratio, children's age, and children's vocabulary. Income-to-needs ratio was similarly not a unique predictor of false belief understanding. The mediation model was also used to examine whether income-to-needs ratio had an *indirect* effect on false belief understanding through its associations with parent discipline or vocabulary. Income-to-needs ratio did demonstrate an indirect effect on false belief understanding through children's language (estimate = 0.22, $p < .05$). None of the parent discipline variables had a unique indirect effect on false belief understanding after controlling for child language and age.

Discussion

Our first research aim was to examine the relations among false belief understanding, family income, children's receptive vocabulary, and parents' reported discipline (i.e., power assertion, general discussion, discussion of emotions, and consequences). As predicted, children's false belief understanding was positively correlated with receptive vocabulary, income-to-needs ratio, and parents' general instruction and feeling responses. Children's false belief understanding was negatively related to parents' power assertion responses and was unrelated to parents' use of consequences. In addition, parents' income-to-needs ratio was significantly and positively correlated with children's vocabulary and parents' instructional and feeling responses and was negatively correlated with parents' power assertion responses. These relations are largely consistent with previous work on the positive relation between false belief understanding and children's receptive vocabulary (e.g., Garner et al., 2005), family income (e.g., Galende et al., 2011), and parents' general instruction and feeling responses (e.g., Ruffman et al., 1999; Shahaeian et al., 2014) and the negative relation between parents' power assertion and false belief understanding (e.g., Pears &

Moses, 2003). Although examining these relations was not the primary aim of the current study, they were important to examine as the basis for our mediation analyses and because results have not always been consistent in previous studies (e.g., Pears & Moses, 2003; Ruffman et al., 1999) in terms of which discipline variables predicted false belief understanding.

Because our primary interest was in explaining family income differences in false belief understanding, we also compared our low-income and middle-income subsamples on all study variables. We confirmed that children in the middle-income sample had significantly higher receptive vocabulary and false belief understanding. The middle-income sample also had parents who reported more instructional and feeling responses and fewer power assertive responses to disciplinary situations. Although the current study did not examine why parent discipline may differ based on family income, it is important to acknowledge that this relation is complex and likely due to several factors such as greater parental stress (e.g., Rafferty & Griffin, 2010), less education about parenting and different occupational experiences (e.g., Hill, 2006), and lower psychological well-being (e.g., Mistry et al., 2002) in low-income families. Researchers have also found that parents reporting greater life stress (e.g., financial stress, single-parent stress) tend to have preschoolers with lower theory of mind understanding (Cole & Mitchell, 1998; Guajardo, Snyder, & Petersen, 2009). Thus, we acknowledge that family income is likely a proxy for other types of family circumstances and do not intend to suggest that low-income parenting skills are deficient.

Our second and primary aim was to examine children's vocabulary and parent discipline as mediators of the relation between false belief understanding and family income. In our first model, these mediators were examined independently. We first examined vocabulary and discipline as predictors of false belief understanding, controlling for family income and children's age. We found that children tended to have higher false belief understanding when parents used less power assertive discipline and more general instruction and discussion of feelings and when children had higher receptive vocabulary. Similarly, other researchers have found that false belief understanding remained significantly related to parent discipline and child language after controlling for SES, including parents' general discussion (Shahaeian et al., 2014), parents' power assertive responses and negative control (Hughes et al., 1999; Pears & Moses, 2003), and children's verbal ability (Galende et al., 2011; Hughes & Ensor, 2006). These findings suggest that regardless of SES, children tend to have higher false belief understanding when parents engage in discussions of children's behavior and adopt less punitive disciplinary practices and when children have higher language skills.

Next, we examined whether parent discipline and child language mediated the relation between false belief understanding and family income. We found that all three parent discipline categories were significant mediators when examined independently of child language. Higher family income predicted fewer power assertive responses and greater general instruction and others' feelings responses, which in turn predicted children's false belief understanding. Although other researchers have examined SES in relation to parenting and false belief understanding, SES is often used only as a control variable (e.g., Galende et al., 2011; Hughes & Ensor, 2006; Pears & Moses, 2003). This was the first study to directly assess whether parent discipline explains the relation between SES and false belief

understanding. These results suggest that middle-income parents are more likely to discuss children's behavior with their children and to adopt a less punitive style of punishment, which in turn predicts children's false belief understanding. Alternatively, lower-income parents may be less likely to engage children in the type of discourse that highlights different perspectives; this may be because low-income parents are more likely to expect obedience from children and are less likely to value a democratic style of parenting in which children's behavior is discussed. We also found that child language was a significant mediator of the family income–false belief relation when examined independently of parent discipline, a finding we return to below.

In our second mediation model, child vocabulary and parent discipline were examined as simultaneous mediators. We first examined vocabulary and discipline together as predictors of false belief understanding, controlling for family income and children's age. Only child language significantly predicted false belief understanding when accounting for parent discipline, income-to-needs ratio, and child age. Similarly, other researchers have found that false belief understanding was significantly related to child language when controlling for SES (Galende et al., 2011; Hughes & Ensor, 2006). These findings suggest that regardless of SES, children with better verbal ability tend to have higher false belief understanding. However, we found that none of the parent discipline variables remained a significant predictor of false belief understanding after controlling for children's vocabulary, family income, and age. This finding contrasts with Pears and Moses (2003), who found that power assertive discipline remained negatively related to children's false belief understanding after controlling for children's age, general cognitive ability, and SES. Similarly, Shahaeian and colleagues (2014) found that general discussion and discussion of feelings remained positively related to children's false belief understanding after controlling for children's age and SES. Importantly, however, neither of these studies controlled for children's language ability. These findings suggest that after controlling for children's age and family income, children's language skill is a better predictor of false belief understanding compared with parent discipline.

An important finding of the current study was that when examining the indirect effect of parent discipline and child vocabulary on the family income–false belief relation, only child language was a significant mediator of the family income–false belief relation. Higher family income predicted higher vocabulary, which in turn predicted children's false belief understanding. Thus, as suggested by other researchers (e.g., Hughes et al., 2005; Seidenfeld et al., 2014), children's verbal ability does explain SES-related differences in children's false belief understanding. This finding was important because few studies have examined SES, false belief understanding, child language, and parent discipline in the same analysis. The current study offers important new insight into the relative role of child language and parent discipline as potential explanations of family income differences in false belief understanding. Results suggest that regardless of how children are disciplined, family income has an influence on false belief understanding through children's language skills.

As discussed in the Introduction, several researchers argue that language plays a fundamental role in children's false belief understanding (e.g., Hughes & Devine, 2015b). Language affords children the ability to mentally represent and compare people's behavior

across different situations; thus, language helps children to understand invisible mental states such as desires and beliefs (Baldwin & Saylor, 2005). If children from low-income families have lower average language skills, they may be slower to come to this realization compared with their more advantaged peers. Researchers find that children's general vocabulary is a better predictor of false belief understanding than children's comprehension of mental states specifically (Meins et al., 2013; Ruffman, Slade, & Crowe, 2002), suggesting that there is something unique about children's general language competence in the false belief–language relation. Meins and colleagues (2013) suggested that the reason why receptive vocabulary and false belief understanding are related is that assessments of receptive vocabulary reflect children's ability to be flexible about thinking of the different ways in which concepts can be represented linguistically. Similarly, Nelson and colleagues (2003) argued that language allows children to “maintain two internal representations of the same external state” (p. 42), which is necessary for passing false belief tasks. In addition, Zelazo, Muller, Frye, and Marcovitch (2003) argued that language facilitates theory of mind development by facilitating the ability to flexibly shift between conflicting perspectives.

It is important to note that the results do not exclude the possibility that parent behaviors explain these differences. Much of the research on SES differences in child language skill focuses on children's family environment such as the level of cognitive stimulation in the home or the amount of talk children hear (e.g., Hart & Risley, 1995; Linver et al., 2002). Thus, although child language was the better explanation of the income–false belief relation, this could be interpreted in light of explanations for why child language differs based on family characteristics. For example, theory of mind researchers argue that children's vocabulary is a proxy for the types of linguistic environment to which children are exposed (Nelson, 2005). In other words, children who are engaged in the types of conversations that promote the awareness of mental states will also have advanced receptive vocabulary through these enriched linguistic interactions. Thus, it may be that middle-income parents are more likely to provide children with greater language stimulation, which influences children's developing false belief understanding. Related to this hypothesis, Linver and colleagues (2002) found that cognitive stimulation in the home mediated the relation between family income and preschoolers' cognitive ability.

Another possibility is that aspects of parent language specific to mental states mediate the family income–false belief relation. Several researchers have found that parent–child discussion of mental states predicts children's false belief understanding independently from children's age and language skill (e.g., Adrián, Clemente, & Villanueva, 2007; Howard, Mayeux, & Naigles, 2008; Ruffman et al., 2002). There is also evidence that higher-SES parents use more metacognitive language when talking to preschoolers, controlling for child age and language (Thompson & Foster, 2014). In addition, Ruffman and colleagues (2006) found that mothers' mental state talk had a stronger influence on children's later theory of mind than parenting. Peterson and Slaughter (2003) argued that parents' mental state talk may be a better predictor of children's false belief understanding because disciplinary interaction can be stressful and confrontational for children, which could detract from discipline as an opportunity to learn about the mind. However, their measure of parenting was based on parent–child observation and coded for behaviors such as mother

responsiveness and warmth and thus was different from the disciplinary responses used in the current study.

Limitations

A limitation of this study was the focus on European American and African American families; it is unclear whether these results would extend to other minority groups. There is evidence that the relation between parent discipline and false belief understanding differs among ethnic minority groups (e.g., Vinden, 2001). Another limitation of this study was that African American families were disproportionately poor. This is potentially problematic if income-related differences in parent discipline or child language are really racial differences. However, the sample was primarily Caucasian, even for the lower-income group, which consisted of nearly twice as many Caucasian as African American participants. Thus, this concern was somewhat alleviated by the fact that the majority of participants, both low income and middle income, were Caucasian and that income-based differences remained when examining only Caucasian participants. In the current study, it was not possible to tease apart race and family income given the small number of middle-income African Americans, which is similar to the work of other researchers who recruited from this subsample (e.g., Nelson et al., 2013). Future work could consider findings ways in which to include a more diverse group of African American families to better understand how both race and SES relate to parent discipline and children's false belief understanding.

Another limitation of this study was the use of self-report for parent discipline. We selected this measurement because it was more feasible to obtain from a large sample compared with direct observations of parent discipline. Peterson and Slaughter (2003), who developed a self-report measure of parents' mental state talk to children, argued that questionnaires can be useful tools, especially when sampling a wide range of families for measures that are time-consuming (e.g., parent talk to children, discipline). Time was a particular concern in the current study given that we asked some participants to complete these assessments while they visited the SC; thus, adding a naturalistic observation to the language task, false belief tasks, and parent survey was unrealistic. However, we acknowledge that there are other ways in which to assess parent discipline. In a study of parents and their preschoolers, Arney (2004) directly compared self-report and direct observations of the same parenting behaviors and suggested that direct observations were more valid for some, but not all, parenting behaviors. She suggested that when parents self-report, they might not be completely aware of their own behaviors, may interpret the questions differently, and/or may be biased to report their parenting behaviors in a particular way. A related limitation is that child language was directly assessed, whereas parent discipline was self-reported; thus, vocabulary may have been a better mediator in the current study because of its greater construct validity.

Finally, this study was limited by a cross-sectional design and so cannot address potential bidirectional relations between false belief understanding and child language or parent discipline or how changes in family income may influence false belief understanding. Children's language skill seems to precede false belief understanding and not the reverse (e.g., Milligan et al., 2007). However, regarding SES, an interesting avenue for future work

could be examining how changes in SES affect false belief understanding through child language given that Dearing, McCartney, and Taylor (2001) found that changes in income-to-needs ratio were associated with better language skills for low-income children. As these researchers point out, assessments of family income across years better predict child outcomes compared with single assessments of family income.

Conclusion

This study was the first to directly examine potential explanations for the relation between false belief understanding and SES (i.e., family income). Although the results supported our hypothesis that this relation could be explained by parent discipline (specifically, power assertion, general discussion, and discussion of emotions) as well as child language, the simultaneous mediation model further refined these results by showing that child language emerged as the better explanation for this relation. Given the potential importance of false belief understanding for aspects of school readiness, such as social competence, and the predictive relation between false belief understanding and later outcomes, such as greater peer acceptance (e.g., Caputi et al., 2012), it is important to identify possible reasons why low-income children may be at a disadvantage. The current results suggest that this disadvantage stems from lower average language skills. Researchers argue that poverty exerts the largest effect on child outcomes during the preschool years (Dearing et al., 2001); thus, the preschool years or even earlier may be the best time to mitigate the effects of poverty on child outcomes. Results of the training study in which the HS sample participated was the first to show that false belief understanding could be improved in low-income children (Tompkins, 2015). However, this was a small-scale, short-duration training study implemented by researchers. Future work could incorporate family- and teacher-driven environmental changes, examine longer-term impacts, and examine whether improvements in false belief understanding lead to changes in skills with broader importance such as social competence.

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Table 1

Descriptive data for child variables, family income, and parent discipline.

	<u>Low income (<i>n</i> = 94)</u>		<u>Middle income (<i>n</i> = 80)</u>		<u>Total sample (<i>N</i> = 174)</u>		<u>Group comparisons</u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
Child variable								
Age (years)	4.52	0.44	4.87	0.59	4.70	0.55	4.56	<.001
PPVT-4 standard score	100.43	12.73	114.79	14.73	107.03	15.42	6.90	<.001
False belief understanding (out of 5)	2.36	1.58	3.31	1.56	2.80	1.64	4.00	<.001
Income-to-needs ratio	0.46	0.27	2.26	1.39	1.29	1.31	12.33	<.001
Parent discipline (proportions)								
Power assertion responses	.23	.27	.06	.20	.15	.26	4.55	<.001
Instructional responses	.18	.20	.35	.21	.26	.22	5.25	<.001
Feeling responses	.03	.06	.08	.10	.05	.09	3.93	<.001
Consequence responses	.34	.27	.33	.22	.33	.25	0.31	.76

Note. Low income refers to children from families at or below 1.0 of the poverty threshold. PPVT, Peabody Picture Vocabulary Test—4th edition.

Table 2

Partial correlations among false belief understanding, child language, income, and parent discipline after controlling for child age.

	1	2	3	4	5	6	7
1. False belief understanding	–						
2. PPVT standard score	.58 ^{**}	–					
3. Income-to-needs ratio	.28 ^{**}	.41 [*]	–				
4. Power assertion responses	–.18 [*]	–.25 ^{**}	–.26 ^{**}	–			
5. Instructional responses	.26 ^{**}	.31 ^{**}	.25 ^{**}	–.33 ^{**}	–		
6. Feeling responses	.19 [*]	.20 ^{**}	.25 ^{**}	–.08 ^{**}	.17 [*]	–	
7. Consequence responses	–.09	–.11	.03	–.32	–.39 ^{**}	–.34 ^{**}	–

Note. PPVT, Peabody Picture Vocabulary Test–4th edition.

^{*}
 $p < .05$.

^{**}
 $p < .01$.

Table 3

Mediation by parent discipline or vocabulary.

	<u>Power/Assertive</u>		<u>General instruction</u>		<u>Others' feelings</u>		<u>Vocabulary</u>	
	Estimate	<i>p</i>	Estimate	<i>p</i>	Estimate	<i>p</i>	Estimate	<i>p</i>
Intercept	1.95	.00	1.52	.00	1.67	.00	1.76	.00
Predictor	−0.95	.04	1.20	.03	2.46	.07	0.05	.00
Income-to-needs ratio	0.23	.01	0.23	.01	0.24	.01	0.05	.53
Age 4 years	0.99	.00	0.97	.00	1.01	.00	0.91	.00
<i>R</i> ²	.22		.22		.22		.36	
	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Discipline/ Vocabulary indirect	.05 [*]	(.01 to .11)	.05 [*]	(.01 to .12)	.04 [*]	(.00 to .10)	.22 [*]	(.14 to .34)

Note. CI, confidence interval.^{*}*p* < .05.

Table 4

Simultaneous mediation by parent discipline and vocabulary.

	Power/Assertive		General instruction		Others' feelings	
	Estimate	<i>p</i>	Estimate	<i>p</i>	Estimate	<i>p</i>
Intercept	1.90	.00	1.68	.00	1.74	.00
Parenting	−0.51	.23	0.52	.30	1.59	.20
Vocabulary	0.05	.00	0.05	.00	0.05	.00
Income-to-needs ratio	0.04	.69	0.04	.64	0.03	.71
Age 4 years	0.88	.00	0.88	.00	0.89	.00
<i>R</i> ²	.36		.36		.36	
	Estimate	95% CI	Estimate	95% CI	Estimate	95% CI
Total indirect	.24 *	(.15 to .34)	.24 *	(.14 to .34)	.25 *	(.15 to .38)
Parenting indirect	.03	(−.01 to .08)	.02	(−.01 to .08)	.03	(−.00 to .08)
Vocabulary indirect	.22 *	(.14 to .34)	.22 *	(.12 to .32)	.22 *	(.14 to .35)

Note. CI, confidence interval.*
p < .05.