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Theory of Mind Predicts Emotion Knowledge Development in Head Start Children

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Abstract

Research Findings—Emotion knowledge (EK) enables children to identify emotions in themselves and others and its development facilitates emotion recognition in complex social situations. Social-cognitive processes, such as theory of mind (ToM), may contribute to developing EK by helping children realize the inherent variability associated with emotion expression across individuals and situations. The present study explored how ToM, particularly false belief understanding, in preschool predicts children's developing EK in kindergarten. Participants were 60 3- to 5-year-old Head Start children. ToM and EK measures were obtained from standardized child tasks. ToM scores were positively related to performance on an EK task in kindergarten after controlling for preschool levels of EK and verbal ability. Exploratory analyses provided preliminary evidence that ToM serves as an indirect effect between verbal ability and EK.

Practice or Policy—Early intervention programs may benefit from including lessons on ToM to help promote socio-emotional learning, specifically EK. This consideration may be the most fruitful when the targeted population is at-risk.

A growing body of literature demonstrates the benefits of emotion knowledge (EK) in children's functioning. EK is defined as the ability to identify emotion expressions, understand the motivational function of emotions, and apply such knowledge in social situations in accord with developmental expectations (Izard, 1971). EK development relates to academic success, development and maintenance of friendships, and prosocial behaviors (Cunningham, Kliewer, & Garner, 2009; Denham et al., 2003; Eisenberg & Fabes, 1992; Izard et al., 2001; Trentacosta & Izard, 2007), while poor EK development is related to behavior problems and psychopathology (Izard et al., 2008; Keltner & Kring, 1998; Schultz, Izard, Ackerman, & Youngstrom, 2001). These findings reveal the importance EK has on functioning, which highlights the need to identify factors that impact EK development.

The focus of the present study examines the relation between cognitive and emotion development, specifically theory of mind (ToM) and EK. Studies on the relation between ToM and EK are inconclusive, indicating the need for further investigation (J. Dunn, 2000). Exploring this possible relation is of particular relevance to children from disadvantaged

populations since they are at risk for poor socio-emotional development (McLoyd, 1998). Verbal ability, given its relations with ToM (e.g., Milligan, Astington, & Dack, 2007) and EK (e.g., Eisenberg, Sadovsky, & Spinrad, 2005), and its relevance to at risk samples (e.g., Hart & Risley, 1995), is an important consideration for this examination. The present study aims to provide clarification regarding the existence of a relation between ToM and EK, particularly whether ToM influences the development of EK accounting for verbal ability in a Head Start sample.

Development of EK and ToM

EK and ToM are separate but related constructs that work together to influence children's understanding of their social environment. EK and ToM are perceived as vital to children's ability to accurately interpret social cues, predict behavior, and command social communication (Baron-Cohen, 2001; Capage & Watson, 2001; Izard, Trentacosta, King, & Mostow, 2004; Wellman & Liu, 2004). These constructs appear to relate to different components of social functioning. EK impacts children's general social competence and problem behaviors and may facilitate empathy (Deneault & Ricard, 2012; Izard et al., 2001; Trentacosta & Fine, 2010). ToM may more specifically impact children's understanding of social scenarios that require inference of others' intention, which may result in a flexible application of social adeptness as shown by its positive correlates with peer acceptance as well as with bullying (Foote & Holmes-Lonergan, 2003; Slaughter, Dennis, & Pritchard, 2002; Sutton, 2003). While EK pertains to children's general understanding of emotion, ToM is the ability to understand others' cognitions (e.g., beliefs, desires) or emotions as distinct from one's own cognitions or emotions. Simply put, ToM is the ability to recognize that others may have different thoughts or feelings than one's self.

Despite these differences on social functioning, EK and ToM both demonstrate important developments across the preschool through kindergarten years. In terms of EK, preschoolers develop the ability to recognize emotions and label them. Starting at the end of preschool and continuing into kindergarten, children identify causes and behavioral consequences of emotional states. This knowledge is situation-based by requiring the child to associate perceived scenarios, like looking at facial expressions or receiving ice-cream, with an emotion (Camras & Allison, 1985; Denham, 1998; Denham & Couchoud, 1990; Morgan, Izard, & King, 2010).

In terms of ToM, around age 4 children acquire false belief understanding, which appears to mark when children can form mental representations of other's internal states (Perner, Leekam, & Wimmer, 1987). For example, people typically would believe that a crayon box holds crayons. In a false belief task, children see that instead of crayons, an unexpected toy is inside the crayon box. Then children are asked what a bystander, who has not seen inside the crayon box, would believe to be inside it. Children without false belief understanding respond that the bystander, despite not seeing inside the crayon box, would believe that the toy is inside the crayon box (Perner et al., 1987; Wellman & Liu, 2004). For accurate responses, children cannot base predictions on their own knowledge or on the truth; hence theoretically, they must form mental representations of the bystander's inaccurate belief. This developmental acquisition is a robust effect (Wellman, Cross, & Watson, 2001).

Beyond these basic skills, developing EK may inherently require knowledge of ToM. Consistent with this idea, mother's increased frequency of using mental state language is associated with higher emotion understanding (Doan & Wang, 2010; McQuaid, Bigelow, McLaughlin, & MacLean, 2008). Additionally, 4- through 7-year-old children use increasingly more references to beliefs and thoughts in their explanation of emotion causes as they gain EK understanding (Hughes & Dunn, 2002). Pons, Harris, and de Rosnay (2004) identified three developmental stages of emotion competence. The second stage was characterized as understanding the "mentalistic nature of emotions" (p. 146) and is attained around age 7. Emotion perspective-taking is yet another task that may require knowledge of emotions and mentally representing other's internal states (Harwood & Farrar, 2006).

Hence, some measures of EK and ToM skills appear to be codependent, which likely makes it difficult to tease apart these constructs' developmental relations to each other. Consequently, there is limited literature on this topic, and findings are inconclusive. Given the impact of these constructs on social development, it is important to understand how they relate at different periods of development.

Relations Between ToM and EK

Despite the limited literature on ToM-EK relations, researchers have proposed many types of relations. While there is some evidence that these constructs develop independently (Cutting & Dunn, 1999), cross-sectional studies also demonstrate correlations between EK and ToM (Harwood & Farrar, 2006; Weimer, Sallquist, & Bolnick, 2012). Moreover, longitudinal investigations reveal contrasting conclusions. One investigation found evidence that EK predicted ToM development but not the reverse (O'Brien et al., 2010), whereas a different investigation found that ToM performance contributed to EK development (Hughes & Dunn, 2002). These studies used different measures and included children of different ages. As other researchers have proposed, it is likely that the relation between EK and ToM may depend on developmental age and skill tested (Weimer et al., 2012). This idea underscores the importance of theoretically motivating how one skill may impact the development of another specific skill.

As children try to explain their social environment, children may apply ToM knowledge (i.e., that others have internal thoughts) to explain external social cues. More specifically, children's ability to mentally represent internal states, as measured by false belief tasks, may facilitate the development of a situation-based understanding of EK, as measured by emotion recognition and identifying behavioral causes and consequences of emotions. Theoretically, mental representation allows for the recognition that people may have different beliefs about the same situation. Expanding this idea, understanding false beliefs may impact children's ability to acknowledge that emotions can vary by person and situation.

Research provides some initial evidence for this hypothesis. Harwood and Farrar (2006) conducted a cross-sectional study that investigated the relation between false belief and affective perspective-taking on 46 children ages 3 through 5 whose parent was either a university student or employee. They found that false belief performance positively related

to children's ability to predict a character's emotion when it differed from their own, but not when the character's and child's emotion was the same. False belief understanding may broaden children's understanding that people experience and respond to situations differently, which promotes EK development.

The literature also supports the idea that false belief performance relates to emotion competence other than emotion perspective-taking. Weimer et al. (2012) used a cross-sectional design and recruited from a predominantly middle- socioeconomic class area to examine the relation between 78 four-through 6-year-olds' false belief understanding and various measures of emotion competence. Controlling for age, false belief performance positively related to recognition and understanding causes of specific emotions, but not with measures of more complex emotion competence. Another study found that 4-year-olds' false belief understanding predicted their ability at age 7 to provide more elaborate causal explanation of sadness and anger (Hughes & Dunn, 2002). False belief understanding may provide children with the opportunity to learn about emotions more broadly; that is, they may learn about emotion cues and associated behaviors from other's differing responses.

The reviewed literature highlights the need for more studies investigating this relation. Longitudinal studies would help to clarify the direction of effects, as many of the reported studies were cross-sectional. Also, this directional clarity is particularly important to identify if ToM impacts situation-based EK that asks children to recognize emotion expressions and behavioral causes and consequences of emotions. The present study aims to further our understanding of false belief understanding on EK development using a longitudinal investigation of at-risk children.

Disadvantaged Children's ToM and EK and the Importance of Verbal Ability

The sample included in the present study is noteworthy for its susceptibility for poor socio-emotional development. Research consistently finds disadvantaged children's EK to lag behind that of their more economically advantaged peers (Bennett, Bendersky, & Lewis, 2003; Izard et al., 2008; McLoyd, 1998). Researchers also have identified ToM as delayed within this population, and as a factor that influences social functioning (Curenton, 2004; Holmes-Lonergan, 2003; Holmes, Black, & Miller, 1996). These common delays underscore the importance to identify if one area of functioning impacts another in order to intervene at a level that can prevent further impairment.

Verbal ability may be one possible explanation of this discrepancy between advantaged and disadvantaged samples' socioemotional functioning. Economically disadvantaged preschoolers frequently perform below average on measures of verbal ability and generally know fewer words than non-disadvantaged peers (Hart & Risley, 1995). Verbal ability also is strongly predictive of EK (Beck, Kumschick, Eid, & Klann-Delius, 2011; Sullivan, Bennett, Carpenter, & Lewis, 2008). Language skills also appear to impact the development of false belief (Astington & Jenkins, 1999; Milligan et al., 2007). Although there is strong evidence that verbal ability is associated with EK and ToM, it is unclear how verbal ability affects their development. It is possible that language skills provide a foundation from which social understanding develops, while leaving room for other factors to play important roles

to progress development. Researchers need to clarify these developmental relations in the context of economic disadvantage in order to understand how best to promote these children's socio-emotional competence.

There exist only a few studies that examine the relation between ToM, EK, and verbal ability within an at risk sample. Weimer & Guajardo (2005) conducted a cross-sectional examination of 60 Head Start and non-Head Start preschoolers' emotion perspective-taking, false belief, and social skills, while controlling for effects of verbal ability. The authors found relations between emotion perspective-taking and false belief performance, beyond effects of age and verbal ability, for the entire sample, but not when examined by group. The relations between constructs did not significantly differ between samples. The study's small sample size ($n = 30$ per group) may have limited power to detect relations within each sample.

In summary, the impact of ToM understanding on EK development is unclear, particularly in the context of an at-risk sample where this knowledge may provide the most utility for preventative interventions. This investigation is motivated by the idea that ToM promotes children's awareness of others' emotions, facilitating their emotion understanding beyond personal experiences. Thus, the present study aims to explain the influence of ToM on EK development above and beyond the role of verbal ability within an economically disadvantaged sample. Of secondary interest, the study aims to explore the role of verbal ability, given its strong, but unclear relations with the primary constructs.

Method

Participants

Participants were obtained from a longitudinal emotion-based preventative intervention study, which compared the effects of an emotion-based intervention to another socio-cognitive program (for a description of the intervention see Izard et al., 2008). Children were recruited from seven inner-city Head Start centers. Eighty-two children completed data collection in preschool. However, one year later in kindergarten, five children had moved, two children were not enrolled in kindergarten, three children had unknown contact information, one parent no longer wanted their child involved, and 11 children missed multiple appointments. Thus, the final sample included 60 children.

The 60 children (33 received the emotion-based intervention) were enrolled in 28 preschool classrooms across the seven Head Start centers; the next year, they were enrolled in 23 different elementary schools. Children's age at the first data collection in the fall of preschool ranged from 3.42 to 5.15-years-old ($M = 4.61$). The sample included 31 boys, and 36 African American children and 24 Hispanic American children. As a Head Start sample, 90% of the participants had an income at or below the poverty level.

Procedures

Demographic information and a measure of children's verbal ability were collected at the beginning of the preschool year. Measures of ToM and EK were collected at the end of the

preschool year, and a second measure of EK was collected at the end of the kindergarten year.

Trained research assistants naive to the study objectives assessed the children to obtain measures of ToM, EK, and verbal ability. Each interview was completed within a single testing session, unless child fatigue (e.g., demonstrated by the child acting out or stating that he no longer wanted to play) or time restraint (e.g., transition to lunch) necessitated a second session. Preschool interviews took place in classrooms, whereas kindergarten interviews occurred in a variety of settings, including classrooms, community centers, or Head Start centers.

Measures

Verbal ability—Children's verbal ability was assessed using the Peabody Picture Vocabulary Test-Third Edition (PPVT-III; L. M. Dunn & Dunn, 1997, $\alpha = .94$) or its Spanish equivalent (Test de Vocabulario en Imágenes Peabody; TVIP; L. M. Dunn, Padilla, Lugo, & Dunn, 1986). This measure assesses receptive vocabulary skills and provides a good estimate of verbal ability. Verbal ability is often related to both EK and ToM (Astington & Jenkins, 1999; Eisenberg, Sadovsky, & Spinrad, 2005), and so it was included as a covariate in all analyses. Previous research has demonstrated adequate validity and reliability with economically disadvantaged, minority samples (Campbell, Bell, & Keith, 2001; Washington & Craig, 1999). Children from Hispanic families were administered both the PPVT and TVIP. If children received a higher score on the TVIP than the PPVT, Spanish versions of all subsequent preschool child measures were used (11 children received Spanish assessments).

Emotion knowledge—We used two different measures of EK to account for developmental differences in children's EK understanding from preschool to kindergarten. The Emotion Matching Task (EMT; Izard, Haskins, Schultz, Trentacosta, & King, 2003) assessed EK in preschool. The four subparts of the EMT measure different aspects of EK: (a) emotion matching: matching a target emotion expression with another face demonstrating the same expression, (b) receptive emotion labeling: identifying an emotion expression associated with an emotion label, (c) expressive emotion labeling: providing an emotion label associated with an emotion expression, and (d) emotion situation knowledge: identifying an emotion expression elicited by a social situation. Subparts a, b, and d presented children with four multiple choice picture options, while part b required children to elicit a verbal response. The EMT presents pictures of ethnically diverse elementary school boys and girls (African American, Caucasian, Hispanic, and bi-racial) displaying expressions of happiness, sadness, fear/surprise, anger, and no expression. The EMT's construct validity was supported in a culturally diverse sample of 3-to 6-year-olds by correlations with other widely-used measures of EK (Morgan et al., 2010). From the original 48-item measure, split-half versions (EMT-A and EMT-B) were created to shorten the length of the measure, resulting in 6-items per subpart. Theoretical and empirical evidence demonstrates that an ordinal alpha based on polychoric correlations results in a more accurate estimate of reliability for ordinal or binary data (Gadermann, Guhn, & Zumbo, 2012). Ordinal alphas for each split version maintained adequate reliability, EMT-A $\alpha = .72$;

EMT-B $\alpha = .74$. Independent-samples t-tests revealed no significant differences between the EMT versions, $t(58) = -.18, p = .86$.

The Assessment of Children's Emotion's Skills (ACES; Schultz, Izard, & Bear, 2004, $\alpha = .68$) was used to assess kindergarten EK. ACES assesses three aspects of developing EK: (a) receptive emotion labeling, (b) emotion situation knowledge, and (c) emotion social behavior identification. The stimuli presented in receptive emotion labeling were similar to that of the EMT and included pictures of ethnically diverse elementary school boys and girls displaying expressions of happiness, sadness, fear/surprise, or anger. The assessment was abbreviated from a 40-item test to a 30-item test in order to limit strains on attention. Items were randomly omitted from each of the three parts, with the caveat that constraints were placed to maintain balance across emotions. The shortened form demonstrated good internal consistency (ordinal $\alpha = .82$).

Theory of mind—Three ToM tasks, Knowledge Access, Contents False Belief, and Explicit False Belief, were selected from Wellman & Liu's (2004) 6-item battery. These tasks were selected because they measure different levels of false belief understanding. They demonstrate excellent developmental sensitivity for 3-to-5 year old children and have resulted in good variability in previous research (Wellman & Liu, 2004). Also, the inclusion of different levels of false belief understanding may be relevant for a sample of low socioeconomic children due to findings that suggest they develop false belief understanding at a slower rate than more advantaged peers (Holmes-Lonergan, 2003; Holmes et al., 1996; Weimer & Guajardo, 2005). Studies that examined false belief understanding in samples of economically disadvantaged children included similar false belief tasks (Holmes et al., 1996). In the Knowledge Access task, children were privy to seeing the contents of a box while another character was not. Children were then asked if the character knew what was in the box. In the Contents False Belief task, children were privy to knowledge that contradicted the beliefs of normal bystanders. They were asked what the other character would believe. In the Explicit False Belief task, children were informed that a character had an incorrect belief. Given the character's error in knowledge, children were asked what the character would do. Each assessment includes a control question that assessed children's memory for vital factual information provided to the child. In order to receive full credit (1-point) for each task, children had to answer both the control and the test questions correctly. A total score, as found in previous studies (e.g., Farrant, Maybery, & Fletcher, 2012; Harwood & Farrar, 2006), was calculated by adding the children's scores from the three stories (ordinal $\alpha = .74$).

Results

Preliminary Analyses

As children were recruited from a larger socio-emotional intervention study, we assessed for differences between children who participated in the target intervention and those in the control condition. (Treatment and control groups received different socio-emotional programs.) Independent sample t-tests revealed that kindergarten EK and ToM did not vary by treatment group, $p > .05$. Additionally, regression analyses revealed that treatment did not

moderate effects of preschool EK or ToM on kindergarten EK. However, analyses revealed a significant treatment difference on preschool EK. Therefore, intervention and control groups were combined in analyses, and treatment group was covaried to account for preschool EK differences.

Independent samples t-tests¹ were conducted to assess sample selection biases that may have occurred from attrition. We compared the final sample of 60 children to the 22 children with preschool data but no kindergarten data. No significant differences emerged for demographic information such as age, sex, and race/ethnicity (between African American and Hispanic). Analyses revealed no group differences for treatment group, verbal ability, preschool EK, or ToM. Thus, these results suggest that the children who completed data collection at both time points did not differ from the children who completed only the preschool data collection. The sample of 60 children with complete data was used in all subsequent analyses.

Independent sample t-tests assessed for sex differences on kindergarten EK. Analyses revealed no differences in kindergarten EK performance by sex, which is consistent with previous findings (Weimer et al., 2012). Sex was not included as a predictor in the final model.

Table 1 presents the means, standard deviations, and ranges for all variables. Consistent with at-risk samples, mean verbal ability was about a standard deviation below the population mean. Table 2 presents the correlations among all variables. Age and verbal ability positively related to kindergarten EK. Of note, ToM also positively related to kindergarten EK.

Closer inspection of children's performance on the ToM battery indicated that 50% did not pass any of the three tasks, and 30% demonstrated false belief knowledge by correctly answering two or three questions of the three-task battery. Using this latter definition of having false belief understanding², children failed more often than predicted by chance, exact binomial p (2-tailed) $< .01$. An independent samples t-test revealed that children who passed 2 or 3 tasks earned a significantly higher verbal ability score (M verbal ability = 89.9) than peers who passed 0 or 1 task (M verbal ability = 82.4), $t(58) = -2.41$, $p < .05$.

Primary Analyses

We performed a single multiple regression analysis to address the main hypothesis that false belief performance would impact the development of EK. In the model (see Table 3), kindergarten EK was predicted from preschool false belief performance, with preschool EK, age, verbal ability, and treatment group serving as covariates. False belief performance demonstrated a positive relation with kindergarten EK, such that a standard deviation increase in false belief performance resulted in a .33 increase in kindergarten EK.

¹Alpha set at .05 for these t-tests and all subsequent t-tests.

²We dichotomized children's performance across the three ToM tasks to estimate attainment of (or lack thereof) false belief understanding. The dichotomized score helps to estimate the likelihood that children performed greater or less than chance. However, the primary analysis uses a summation score because the range in scores (i.e., 0-3) better captures developmental sensitivity to the differences in the tasks.

Furthermore, false belief performance contributed uniquely and significantly to the prediction of kindergarten EK, above the effects of preschool EK. False belief performance uniquely explained 10% of the total variance of kindergarten EK, whereas preschool EK uniquely explained 7% of the total variance of kindergarten EK. The positive relation between verbal ability and kindergarten EK did not hold in the regression model. Together, the model explained 35% of kindergarten EK performance.

To provide further clarity regarding the role of verbal ability and ToM on EK development, we conducted exploratory moderation and mediation analyses. The preliminary finding that children who scored higher on the false belief measures had higher verbal ability scores than children with lower false belief scores served as an impetus to explore the potential moderating effect of verbal ability on the relation between false belief and EK. A hierarchical regression analysis, with age, treatment, and preschool EK in block 1, centered verbal ability and false belief performance in block 2, and the interaction term of verbal ability and false belief performance in block 3, revealed no significant interaction effect, $\beta = -.04$, $t = -.94$, $p > .05$. The inclusion of an interaction term did not explain a significantly greater amount of variance of the total model beyond the proposed model, $R^2 = .01$, $p > .05$.

Theoretically, it is possible that ToM serves as a mediator between verbal ability and developing EK given previous evidence that higher verbal ability predicts higher ToM performance (Astington & Jenkins, 1999). Regression analyses on the present data supported these claims that verbal ability positively predicted ToM, $\beta = .26$, $t = 2.04$, $p < .05$, and preschool EK $\beta = .38$, $t = 3.58$, $p < .01$. Furthermore, a multiple regression revealed that verbal ability assessed at the beginning of preschool, with age and treatment serving as covariates, positively predicted kindergarten EK, $\beta = -.28$, $t = 2.28$, $p < .05$. As noted from the primary analyses, verbal ability was no longer a significant predictor of kindergarten EK with the inclusion of ToM and preschool EK assessed at the end of the preschool year. To explore this post-hoc mediation hypothesis, we tested a multiple mediation model assessing for both the total and indirect effects of ToM (and preschool EK) as contributing to the relation between verbal ability and kindergarten EK. Researchers suggest applying bootstrap methods for small sample sizes, and the following analyses were conducted using the approach specified by Preacher and Hayes (2008). The total indirect effect of verbal ability on kindergarten EK through ToM and preschool EK was significant, with a point estimate of .0735 and 95% Bias Corrected and Accelerated (BCa) bootstrap CI of .0340 to .1355, which leads to the rejection of the null hypothesis that the total indirect effect is zero. Investigation of specific indirect effects reveals whether the pathway through one mediator remains significant controlling for the effect of the second proposed mediator. The specific indirect effect through ToM (verbal ability $\rightarrow$ ToM $\rightarrow$ kindergarten EK) was significant, with a point estimate of .0251 and 95% BCa CI of .0045 to .0608, as was the specific indirect through preschool EK (verbal ability $\rightarrow$ preschool EK $\rightarrow$ kindergarten EK), with a point estimate of .0484 and 95% BCa CI of .0173 to .0934. A contrast comparing the two specific indirect effects revealed no difference, with point estimate of .0232 and 95% BCa CI of $-.0175$ to .0681, suggesting that the pathways cannot be distinguished in terms of magnitude of effect. ToM and preschool EK each appear to be important mediators on the relation between verbal ability and kindergarten EK.

Discussion

The present study investigated the impact of ToM on EK development in Head Start children. We aimed to clarify the role of ToM, particularly false belief understanding, on children's situation-based EK a year later. Results support the hypothesis that ToM would predict individual differences in Head Start children's EK development. Additional analyses suggest that ToM serves as a mediator between verbal ability and EK.

After controlling for preschool EK and verbal ability, children's false belief understanding in preschool positively predicted their situation-based EK in kindergarten. This result supports the idea that EK development is facilitated by the ability to form mental representations (Harwood & Farrar, 2006; Weimer & Guajardo, 2005). It is possible that children with the ability to separate internal states from reality are better at identifying the range of appropriate emotion expressions, situations, and behaviors associated with emotions. More specifically, mental representations, as measured by false belief tasks, may promote children's continued development of recognizing emotion expressions across different faces and identifying the variety of behavioral antecedents and consequence of emotions. Children without this understanding may have a rigid definition of appropriate emotion expressions, behaviors, and situations. False belief understanding may be a crucial milestone for children to begin to generalize their basic understanding of emotions and apply it across broader social contexts.

A strength of the current study is its clear theoretical explanation of why specific ToM skills may impact particular EK skills. Given the range of evidence in the literature regarding the relation between ToM and EK, it is important to understand these findings in the context of the tasks examined. We chose ToM and EK tasks that appeared to minimize skill overlap between these domains. That is, the false belief tasks did not include questions about emotions and the EK questions did not ask children to take the perspective of someone with a conflicting emotional state to their own state. Thus, the findings directly speak to our hypothesis that false belief understanding can help children learn about observational features of emotions (i.e., associating emotions with situations and behaviors) from a broader perspective. This idea that false belief understanding facilitates basic levels of EK is consistent with findings from previous studies targeting similar aspects of ToM and EK (Hughes & Dunn, 2002; Weimer et al., 2012).

Our finding does not necessarily contradict results demonstrating that EK predicts ToM development. Perhaps these constructs have bidirectional relations that are specific to skills and developmental age. Future studies that aim to investigate the relation between ToM and EK need to target particular aspects of these constructs to understand thoroughly their developmental relation.

Another strength of the study is its inclusion of an economically disadvantaged sample. First, findings add support that Head Start children are delayed in their false belief development. According to Wellman et al.'s (2001) meta-analysis, children at around age 3.6 correctly answer false belief questions 50% of the time, and children after that age become increasingly more accurate. The Head Start sample mean age was 4.6, and these

children failed the false belief battery at a greater than chance occurrence. These results are consistent with findings that Head Start children's acquisition of false belief understanding lags behind their more advantaged peers (Weimer & Guajardo, 2005). Also our findings continue to support the importance of verbal ability on ToM development, as children who demonstrated false belief understanding (i.e., correctly answered 2 or 3 tasks of the 3-task battery) obtained a significantly higher verbal ability score than children who did not demonstrate good false belief understanding.

Secondly, the collective findings from this study suggest that Head Start children's delayed timing on false belief acquisition may help to explain their subsequent poor socio-emotional competence relative to their more advantaged peers. Verbal ability did not predict EK after controlling for ToM, nor did it moderate the relation between ToM and EK. To further understand the developmental role of ToM on the relation between verbal ability and developing EK, exploratory mediation analyses were conducted. The results revealed that ToM and preschool EK mediated the relation between verbal ability and kindergarten EK. Theoretically, language allows children to communicate about their and others' feelings (Beck et al., 2011; Eisenberg et al., 2005). Our findings support the idea that ToM could be one mechanism by which children learn to talk about emotions as others' internal states, resulting in greater emotional understanding.

The study contributes to the present literature by suggesting ToM as an additional method to promote EK development in economically disadvantaged preschoolers. The increased likelihood that disadvantaged children display lower levels of EK than their advantaged peers (Bennett et al., 2003) may be explained by disadvantaged children's similarly below average ToM understanding (Cole & Mitchell, 1998). Currently, popular interventions center directly on improving EK skills (e.g., Greenberg, Kusche, Cook, & Quamma, 1995; Izard, 2002; Izard et al., 2004). Programs that promote EK in Head Start children aim to increase children's exposure to emotion language and emotion talk (e.g., Izard et al., 2004). Similarly, ToM is related to talk about mental state language, which Head Start children may receive limited exposure to at home. While current ToM programs are intended for individuals with autism (e.g., Gevers, Clifford, Mager, & Boer, 2006; Ozonoff & Miller, 1995), perhaps programs developed for Head Start can target children's exposure to mental state language. In the present population, targeting ToM would likely offer another avenue to impact EK development preventatively.

Limitations and Future Directions

Although the present study provides important insight on the role of ToM for the development of EK, several limitations should be acknowledged. In terms of methodology, the timing of our data collection may have limited our ability to accurately capture developmental effects. Developmental trajectory may be non-linear and the investigated effects may change over time. Future studies should include multiple assessments in order to assess for nonlinear developmental trajectories. Also, the study included two measures of EK to address developmental effects on test performance, but these measures are limited in the way they examine EK. Aspects of EK that may have taxed ToM like perspective-taking were intentionally avoided, but there may be other situation-based aspects of EK in addition

to emotion expressions, emotion situations, and emotion behaviors to examine. Little literature exists on developmentally appropriate evidence-based measures of EK (especially for kindergarten and older children), thus future research is needed to address this issue. The preschool and kindergarten EK measures included in the present study have similar components, and earlier EK performance predicted later EK performance, which helps support the reliability of these measures. Additional research examining EK development should continue to test measurement characteristics.

Importantly, the study's sample consisted of urban economically disadvantaged Head Start children. Supported by our findings, Head Start children are delayed in their false belief understanding, as 50% of children failed all three false belief tasks. Although we selected false belief measures that previously demonstrated developmental sensitivity (Wellman & Liu, 2004), the data were skewed, obscuring potential variability in children's understanding. Future studies should be mindful of including ToM measures that yield greater variability in performance. In general, these findings may not generalize to other populations, and may be most applicable to Head Start children. Head Start children may benefit the most from ToM intervention programs.

Mediation analyses provided additional evidence for these conclusions; however, their exploratory nature warrants caution for interpretation. The mediation analyses identified ToM as a mediator on the relation between verbal ability and kindergarten EK, but it is of note that preschool EK served as another important mediator that contributed to the total indirect effect between verbal ability and kindergarten EK. Limited power may have resulted in a Type II error for detecting differences in magnitude between these two indirect effects. Most importantly, theory and data supported the decision to explore mediation, but the initial study design was not intended for longitudinal mediation analyses. Multilevel modeling, which requires a large sample size and repeated measures, is a preferred method of analysis to assess developmental growth (MacKinnon & Fairchild, 2009; Selig & Preacher, 2009). Hence, we suggest interpreting these results as strong evidence for future thorough examination of this mediation model.

The literature demonstrates that exposure and use of mental state language impacts ToM and EK development (J. Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991; Harris, de Rosnay, & Pons, 2005; McQuaid et al., 2008). Perhaps false belief performance is a proxy for exposure and use of mental state language. However, false beliefs represent a conceptual change in the way children understand mental states (i.e., that they are representational in nature), which suggests that this ability goes beyond mental state language, exposure, and use. Future studies should include mental state language exposure and use to help address this issue.

The present findings add to our understanding of EK development in disadvantaged populations, and they specifically highlight positive ToM influences. Children from economically disadvantaged homes may gain the most from programs that promote ToM. Yet, the data more generally raise interesting questions about the possible processes that develop and promote EK understanding. This investigation provides initial support for the hypotheses that verbal ability serves as a foundational skill for developing EK, and that this

relation is mediated in part by ToM. Language skills may provide children with abilities, such as semantic understanding, that allow for false belief understanding (Astington & Jenkins, 1999). We propose that understanding false beliefs (i.e., symbolizing the ability to mentally represent internal states) helps children learn about emotions by expanding their perception beyond their own emotional experiences. Subsequently children would improve their ability to recognize emotions and identify associated behaviors across broader contexts. Future studies should continue to test ToM as a mechanism of change to target in preventative interventions.

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Table 1

Means, Standard Deviations, and Ranges of All Variables

	<i>M</i>	<i>SD</i>	Range
Age (years)	4.61	0.42	3.42-5.15
Verbal Ability	84.67	11.54	59.00-105.00
Theory of Mind	0.85	0.97	0.00-3.00
Preschool EK	16.83	3.40	8.00-23.00
Kindergarten EK	19.60	3.56	9.00-26.00

Note. EK = emotion knowledge.

Table 2

Correlations Among All Variables

Variable	1	2	3	4	5	6
1. Age	-	-.05	.28 [*]	-.08	.44 ^{**}	.27 [*]
2. Verbal Ability		-	.03	.26 [*]	.36 ^{**}	.27 [*]
3. Treatment Group			-	-.11	.27 [*]	.14
4. Theory of Mind				-	.13	.38 ^{**}
5. Preschool EK					-	.49 ^{**}
6. Kindergarten EK						-

Note. EK = emotion knowledge.

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

^{*}
 $p < .05$.

Table 3

Multiple Regression Analysis Predicting Kindergarten Emotion Knowledge from Preschool Theory of Mind

Predictors	<i>B</i>	<i>SE</i>	β	Squared Semi-partial <i>r</i>
Intercept	5.32	5.5	---	---
Age	<.01	<.01	.14	.01
Treatment Group	.32	.83	.05	<.01
Verbal Ability	.02	.04	.06	<.01
Preschool EK	.36	.15	.34*	.07
Theory of Mind	1.22	.42	.33**	.10

Note. $R^2 = .354$, EK = emotion knowledge.

**
 $p < .01$.

*
 $p < .05$.