DEVELOPING DECEPTION DETECTION SKILLS: AN INVESTIGATION
OF THEORY OF MIND AND EMOTION KNOWLEDGE
AS PRECURSORS

by

ALEXANDRA FAILOR NANCARROW

ANSLEY T. GILPIN, COMMITTEE CHAIR
ANGELA B. BARBER
JOAN M. BARTH

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ABSTRACT

Examining developmental factors that impact young children’s success in both social and cognitive domains has important implications for advancing our current knowledge concerning social cognitive development. Both emotion knowledge and perspective-taking skills impact how young children develop unique views the world; specifically, these skills are often relied upon for detecting deception in others. The purpose of the study was to examine predictors of children’s deception detection skills to shed light on the development of social cognition. Specifically, preschoolers’ emotion knowledge was examined as a potential moderator of the relation between Theory of Mind (ToM) and deception detection. Results indicated both children’s emotion knowledge and ToM develop over the preschool years and are positively related to the development of deception detection. However, emotion knowledge does not moderate the relation between ToM and deception detection.
DEDICATION

This thesis is dedicated to everyone who helped me along the way, either by participating in the project or providing encouragement and/or advice.
# LIST OF ABBREVIATIONS AND SYMBOLS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ACES</td>
<td>Assessment of Children’s Emotional Skills</td>
</tr>
<tr>
<td>ANOVA</td>
<td>Analysis of Variance</td>
</tr>
<tr>
<td>B</td>
<td>Unstandardized regression coefficient</td>
</tr>
<tr>
<td>ERC</td>
<td>Emotion Regulation Checklist</td>
</tr>
<tr>
<td>$F$</td>
<td>Fisher’s $F$ ratio: A ratio of two variances</td>
</tr>
<tr>
<td>$\Delta F$</td>
<td>$F$ change</td>
</tr>
<tr>
<td>$M$</td>
<td>Mean: the sum of a set of measurements divided by the number of measurements in the set; arithmetic average</td>
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<tr>
<td>$N$</td>
<td>Sample size</td>
</tr>
<tr>
<td>$\eta_p^2$</td>
<td>Partial eta-squared: measure of the strength of a relationship</td>
</tr>
<tr>
<td>$p$</td>
<td>Probability under the null hypothesis of a value as extreme or more extreme than the observed value</td>
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<tr>
<td>PPVM</td>
<td>Preschool Peer Victimization Measure – Teacher Report</td>
</tr>
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<td>PPVT</td>
<td>Peabody Picture Vocabulary Test</td>
</tr>
<tr>
<td>$r$</td>
<td>Pearson correlation coefficient</td>
</tr>
<tr>
<td>$R^2$</td>
<td>Coefficient of determination: proportion of variability accounted for by the statistical model</td>
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<tr>
<td>$\Delta R^2$</td>
<td>$R^2$ change</td>
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<tr>
<td>$SD$</td>
<td>Standard deviation</td>
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<tr>
<td>$SE$</td>
<td>Standard Error</td>
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$t$ \hspace{1cm} \text{Computed value of $t$-test}

ToM \hspace{1cm} \text{Theory of Mind}

< \hspace{1cm} \text{Less than}

= \hspace{1cm} \text{Equal to}
ACKNOWLEDGMENTS

I would like to thank my advisor and committee chair, Ansley Gilpin, for providing me with superb guidance and support throughout this thesis project. I would also like to thank the members of my thesis committee, Angela Barber and Joan Barth, for wonderful research advice and support.

I would also like to thank my lab mates, Brooke Meyer and Rachel Thibodeau, for their support and friendship, as well as the KID Lab undergraduate research assistants who assisted in this study. Additionally, I am grateful for the encouragement and support of my family and friends.

Finally, this study would not have been possible without the children, parents, and teachers who participated; thank you!
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CHAPTER 1
INTRODUCTION

Children have two main methods of learning about the world: by exploring on their own and absorbing information from the people around them. Additionally, in order to ensure that the views of the world children develop are accurate ones, children have to learn to distinguish between individuals they can trust to provide reliable information and those who may be deceiving them. Therefore, children must rely on their developing social cognition skills to detect deception. Investigating the precursory skills that scaffold deception detection is critical both for expanding our knowledge of development in general, as well as for the application of early interventions with young children who exhibit difficulty in developing foundational social cognition skills.

Examining predictors of deception detection, such as perspective taking, emotion knowledge, and emotion regulation, may have implications for furthering our current knowledge on early social cognitive development. A central aspect of social cognition is the flexibility to investigate novel ideas by utilizing an understanding of others’ perspectives and taking note of one’s own cognitive limitations. The ability to understand one’s actions and emotions in order to relate to the thoughts and feelings of others forms the fabric of socialization. Gaining the ability to infer the influence of other’s mental states on behavior and recognizing that one’s own mental state may differ from the mental states of others is referred to as Theory of Mind (ToM; Hughes & Ensor, 2007).
Concerning children’s emotion understanding, emotion knowledge serves as a precursor to social cognition. Children learn to identify and distinguish their own emotions as well as those of others. For example, Garner (1999) suggests that children display good emotion knowledge by simply interpreting the social situation to understand a friend’s emotions. Facial recognition of emotions may be disparate from other emotion skills. For example, emotion knowledge is enhanced even further when children realize that others’ facial expressions may not match their emotion. Then, when children can also regulate their own emotional reaction in a difficult social situation, they demonstrate both the mastery of emotion knowledge as well as emotion regulation. Thus, emotion knowledge developmentally precedes emotion regulation (which is a central aspect of social cognition) and is important for understanding which emotions are better suited for particular situations (Denham & Couchoud, 1990). Emotion regulation may be defined as an individual displaying different emotions across different situations and the ability to automatically or consciously change one’s emotional expression (Gross, 1998). Eisenberg and Fabes (1992) demonstrated that the presence of both a high level of negative emotion and poor emotion regulation was related to poor social competency skills.

Children’s emotion knowledge is also a critical component of social competency skills in interactions with peers and siblings (Denham, McKinley, Couchoud, & Holt, 1990; Garner, Jones, & Miner, 1994; Jones, Abbey, & Cumberland, 1998). Social competence may be defined as the social, emotional, and cognitive skills and behaviors that children need for successful and effective social interactions (Welsh & Bierman, 2001). Emotion knowledge has also been demonstrated as a significant predictor of social competency throughout the lifespan (Jones et al., 1998; Matsumoto, 1993; Underwood, Coie, & Herbsman, 1992; Zeman & Garber, 1996). Eventually, children learn to integrate emotion knowledge with emotion regulation; to do so,
children must be cognizant of both the situation and emotional display to elicit appropriate regulatory behaviors (Garner, 1999). Children must also understand that consequences exist for inappropriate emotional displays (Garner, 1999). Social rules regarding emotional displays involve two socialization functions: (1) a “self-protective” function in which children preserve self-esteem and (2) a “prosocial” function in which children think about how a certain emotion may impact someone else (Garner, 1999, p. 249). Children do not completely understand emotion display rules until they reach middle childhood (Garner, 1999). However, preschoolers begin to understand that individuals’ facial expressions may not match their internal emotions (Banerjee, 1997; Gross & Harris, 1988; Harris, Donnelly, Guz, & Pitt-Watson, 1986; Josephs, 1994). Indeed, acting in a deceptive manner incorporates three facets of knowledge: (1) facial expression knowledge, (2) knowledge of emotion-evoking situations, and (3) the ability to recognize how someone else feels (Garner, 1999).

In addition to the development of emotion knowledge and emotion regulation, development in understanding mental states occurs during the preschool years with children progressing from a fragile understanding of others’ intentions and perspectives to a more robust understanding of the difference between their own current knowledge and emotions versus those of the past. Children then progress to understanding that their own knowledge and emotions can differ from those of others (Wellman & Liu, 2004). Similarly, understanding others’ intentions and recognizing that their knowledge can be different from your own is a cornerstone of understanding deception (Maas, 2008). Children’s success in recognizing first-order false beliefs (understanding others’ false beliefs) arises from primarily judging their own perspective accurately, but success in recognizing second-order false beliefs (understanding what others think about another’s false belief) is primarily due to the accurate judgment of another
individual’s perspective (Maas, 2008). Therefore, gaining the ability to accurately judge others’ intentions is helpful for distinguishing their true beliefs from false ones.

By the age of 3 years, children begin to exhibit a general understanding that lying is performed to deceive others (e.g., Chandler, Fritz, & Hala, 1989; Polak & Harris, 1999). Young children begin to develop the ability to enhance their success in social situations by hiding certain expressions of emotion (Lewis, Stanger, & Sullivan, 1989). For example, hiding disappointment after receiving an undesirable gift requires the ability to correctly assess the situation, anticipate typical responses of one’s self and the person giving the gift, and developing a plan to change one’s visible emotional response (Gyurak, Goodkind, Kramer, Miller, & Levenson, 2012). Emotion regulation is often used in day-to-day life, and involves expression modification of emotions in posture, face, and speech (Gyurak et al., 2012). The improvement of these skills at a young age is beneficial for facilitating social assimilation in the forms of greater social competency skills and greater popularity with peers (Dunn & Brown, 1994; Eisenberg et al., 1997; Fabes et al., 1999; Graziano, Keane, Calkins, 2007). In order to develop these social acceptance skills, 3-year-olds also begin lying to cover their wrongdoings (Lewis et al., 1989; Polak & Harris, 1999).

Understanding lies and deception increases from 3 to 5 years of age, a time when children display increased success on ToM measures of false belief (Carlson, Moses, & Hix, 1998). Chandler and colleagues (1989) noted that measuring children’s understanding of deception may be used as an early indication of their understanding that others hold different beliefs. Anecdotally, developmentalists mark a children’s emergence of ToM as the first time they intentionally lie, and reassure distressed parents that their children are advancing cognitively, not becoming psychopaths. Further, the majority of direct assessments for ToM measure false belief,
or the ability to recognize that other people may hold beliefs that are inconsistent with one’s own view of reality. However, there is a dearth of research that particularly investigates the development of social cognition by examining precursors of the understanding of deception. In order to detect deception, individuals often rely on their world knowledge to spot the errors in others’ lies (Lee, Cameron, Doucette, & Talwar, 2002). For instance, adults would find a child’s claim of a dragon coming to life and breaking a household object to be false due to the fact that Western beliefs dictate that dragons are creations of fantasy (Lee et al., 2002). Therefore, young children begin to use their existing world knowledge to determine whether someone is acting deceptively, by tapping into their developing world knowledge.

Present study and hypothesis. The purpose of the present study was to test emotion knowledge and ToM as predictors of the development of deception detection. In addition to an exploratory analysis of the relation between emotion knowledge and social competency, I predicted the following:

- **Aim 1A.** First, I hypothesized that children’s emotion knowledge and ToM would be related, whereby children with better emotion knowledge would also demonstrate better ToM.

- **Aim 1B.** Additionally, I expected both ToM and emotion knowledge tasks to show development by age.

- **Aim 2.** Second, I hypothesized that children’s ToM would predict their deception detection abilities, such that children with better ToM would exhibit greater deception detection ability.
• **Aim 3.** Third, I hypothesized that children’s emotion knowledge would be related to their deception detection ability, whereby children with better emotion knowledge also demonstrate better deception detection.

• **Aim 4.** Fourth, I hypothesized that emotion knowledge would serve as a moderator of relations between ToM and children’s deception detection, such that children with better emotion knowledge would have a stronger relation between ToM and deception detection (i.e., better social cognitive skills).
CHAPTER 2

METHODOLOGY

Participants

Ninety typically developing children between the ages of 3 and 5 were recruited for this study, including 47 boys and 43 girls. This included 26 three-year-olds \( (M = 43.0 \text{ months}; \text{ range: } 38-49 \text{ months}; 13 \text{ boys and } 13 \text{ girls}) \), 42 four-year-olds \( (M = 52.2 \text{ months}; \text{ range: } 48-61 \text{ months}; 23 \text{ boys, } 19 \text{ girls}) \), and 22 five-year-olds \( (M = 62.8 \text{ months}; \text{ range: } 60-68 \text{ months}; 11 \text{ boys and } 11 \text{ girls}) \). Seventy-six percent of participants were Caucasian, 6% were African American, 6% were Asian, and 2% were other. Sixty-four percent of participants were from families with annual incomes of $90,000 or more. Participants were recruited from local preschools in Tuscaloosa, Alabama. School administrator letters of support were obtained before entering schools. Child verbal assent, parent written consent, and teacher consent were also obtained. All teacher questionnaires were returned (return rate of 100%).

Child Direct Assessment Measures

Theory of Mind. The Theory of Mind (ToM) tasks consisted of a battery of tasks developed by Wellman and Liu (2004). The seven-item ToM scale was designed for the experimenter to administer tasks in order of relative conceptual difficulty. According to Wellman and Liu (2004), the diverse-desires task was administered first (for children to become familiarized with a relatively easy task) and the real-apparent emotion task (the most difficult task) was administered last. For passing a task, participants received a score of 1. Each Wellman and Liu (2004) task is described in more detail below, generally progressing from easier to more
difficult. Participants completed all 7 and will received 1 point for each task they passed. Children were categorized as having a theory of mind if they scored a 4 or higher.

1. Diverse desires task. Children made judgments about themselves and someone else having different desires about the same items. Participants viewed a toy figure of an adult as well as a cookie and a carrot drawn on a piece of paper. The experimenter introduced the task to participants by saying, “Here’s Mr. Jones. It’s snack time, so Mr. Jones wants a snack to eat. Here are two different snacks: a carrot and a cookie.” Then, the experimenter asked the participant the own-desire question, “Which snack would you like best? Would you like a carrot or a cookie best?” If the participant picked the carrot, the experimenter replied, “Well, that’s a good choice, but Mr. Jones really likes cookies. He doesn’t like carrots. What he likes best are cookies.” If the participant picked the cookie, the experimenter replied that Mr. Jones likes carrots better than cookies. Then the experimenter then asked the target question, “So now it’s time to eat. Mr. Jones can only choose one snack, just one. Which snack will Mr. Jones choose? A carrot or a cookie?” Children had to answer the own-desire and the target questions with opposite answers to be scored as correct.

2. Diverse beliefs task. Children made judgments about themselves and someone else having different beliefs about the same item. Participants were presented with a toy girl as well as a garage and tree drawn on a piece of paper. The experimenter said, “Here’s Linda. Linda wants to find her cat. Her cat might be hiding in the bushes or it might be hiding in the garage.” The experimenter then asked the participant an own-belief question, “Where do you think the cat is? In the bushes or in the garage?” If the participant picked bushes, the experimenter said, “Well, that’s a good idea but Linda thinks her cat is in the garage. She thinks her cat is in the garage.” If the participant picked the garage, the experimenter said Linda thinks her cat was in
the bushes. Then the experimenter asked the participant the target question, “So where will Linda look for her cat? In the bushes or in the garage?” Children had to answer both the own-belief question and the target question with opposite answers to be scored as correct.

3. Knowledge access task. The experimenter presented children with a box. Children were asked to judge the knowledge of what is in the box of another person who has not seen inside the box. The experimenter showed children a small box with a drawer that has a small item, such as a plastic toy cat, and said, “Here’s a box. What do you think is inside?” Then the experimenter opened the box, showed the participants the contents, and said, “Let’s see… it’s really a cat inside!” The experimenter then closed it and asked the participant what the box contains. After the participant answered, the experimenter presented a toy girl to the participant while saying, “Polly has never seen inside this drawer. Does Polly know what is in the box? Did Polly see inside this box?” The first question was the target question, and the second question was the memory question. Participants had to answer both question with “no” in order to be scored as correct.

4. Contents false belief task. Children judged someone else’s false belief about what is inside a distinctive container. The experimenter presented children with a box labeled “Band-Aids” and said, “Here’s a Band-Aid box. What do you think is inside the Band-Aid box?” The child was allowed to open the box and discover that it does not have the expected contents (e.g., stickers). The experimenter then said, “Let’s see… it’s really stickers inside!” The box was then closed and the experimenter asked the child again, “Okay, what is in the Band-Aid box?” Then, the experimenter brought out a toy figure of a boy and said, “Peter has never ever seen inside this Band-Aid box. So what does Peter think is in the box? Band-Aids or stickers?” (target question)
and “Did Peter see inside this box?” (memory question). The child had to answer the target question with “Band-Aids” and the memory question with “no” to be scored as correct.

5. **Explicit false belief task.** Children judged how someone would search, given that individual’s false belief. The experimenter showed children a toy figure of a boy and a piece of paper with a closet and a backpack drawn on it. The experimenter said, “Here’s Scott. Scott wants to find his mittens. His mittens might be in his backpack or they might be in the closet. *Really, Scott’s mittens are in his backpack. But Scott thinks his mittens are in the closet.*” The experimenter then asked, “So, where will Scott look for his mittens? In his backpack or in the closet?” (target question) and “Where are Scott’s mittens really? In his backpack or in the closet?” (reality question). Children had to answer the target question with “closet” and the reality question with “backpack” to be scored as correct.

6. **Belief emotion task.** Children judged how a person would feel, given a mistaken belief. The experimenter presented children with a toy figure of a boy and an individual-size Cheerios box containing rocks inside. The experimenter said, “Here is a Cheerios box and here is Teddy. What do you think is inside the Cheerios box? Teddy says, ‘Oh good, because I love Cheerios. Cheerios are my favorite snack. Now I’ll go play.’” The experimenter then placed Teddy out of sight, subsequently showed the child the contents of the Cheerios box, and said, “Let’s see… there are really rocks inside and no Cheerios! There’s nothing but rocks.” The experimenter then closed the Cheerios box and asked the child what was inside it. The experimenter then brought Teddy back and said, “Teddy has never seen inside this box. Teddy’s back - it’s snack time. Let’s give Teddy this box.” The experimenter then asked the child, “So, how does Teddy feel when he gets this box? Happy or sad?” (target question). The experimenter then opened the Cheerios box, let Teddy look inside, and asked the child, “How does Teddy feel
after he looks inside the box? Happy or sad?” (emotion-control question). The child had to answer the target question with “happy” and the emotion-control question with “sad” to be scored as correct.

7. **Real-apparent emotion task.** Children judged that a person could feel one thing but display a different emotion. Children were shown a piece of paper with three faces on it (e.g., happy, neutral, sad), and the experimenter checked that the child recognized these expressions. The experimenter then showed the child a cutout figure of a boy drawn from the back so that the boy’s facial expression could not be viewed. The experimenter then said, “This story is about a boy. I’m going to ask you about how the boy really feels inside and how he looks on his face. He might really feel one way inside but look a different way on his face. Or, he might really feel the same way inside as he looks on his face. I want you to tell me how he really feels inside and how he looks on his face.” Then, the experimenter began the story: “This story is about Matt. Matt’s friends were playing together and telling jokes. One of the older children, Rosie, told a mean joke about Matt and everyone laughed. Everyone thought it was very funny, but not Matt. But, Matt didn’t want the other children to see how he felt about the joke, because they would call him a baby. So Matt tried to *hide how he felt.*” Then the experimenter checked the child’s memory of the story: “What did the other children do when Rosie told a mean joke about Matt?” and “In the story, what would the other children do if they knew how Matt felt?” The experimenter then pointed to the three emotion pictures and asked, “So, how did Matt really feel, when everyone laughed?” Did he feel happy, sad, or okay? (target-feel question) and “How did Matt try to look on his face, when everyone laughed? Did he look happy, sad, or okay?” (target-look question). The child’s answer to the target-feel question had to be more negative
than her answer to the target-look question (i.e., sad for target-feel and happy/okay for target-
look, or okay for target-feel and happy for target-look) to be scored correct.

**Deception detection.** The implausible lie task, adapted from Lee and colleagues (2002),
assessed children’s ability to detect deception by another individual. Specifically, the implausible
lie task investigated whether children believe a lie being told to them when the statement violates
their developing knowledge of reality versus fantasy distinctions. A confederate sat reading a
book quietly with a picture of a dragon on the cover while the experimenter reads another book
with the participant. After reading, the experimenter placed a cup on a table and suggested that
the participant should join her in getting a drink from another room. While they were gone, the
confederate switched the cup with an identical but broken cup. Then the experimenter returned
with the participant and asked the confederate, “What happened to the cup?” The confederate
replied, “Well, it was the dragon from the picture book [pointed to the dragon on the cover of
the book so that the child could see]. He jumped out of the picture book, picked up the cup off
the table, dropped it on the floor, and broke it.” The confederate then left the room. The
experimenter asked the participant a memory control question (“How did [confederate’s name]
say the cup got broken?”), critical question (“Who do you think really broke it?”), and eight
follow-up questions: (1) “Do you think there are dragons for real?”; (2) “Do you think that there
are dragons in books and movies?”; (3) Do you think that real dragons could come to visit me?”;
(4) Do you think that this dragon [show a dragon book] could come out of this book and break
this cup [point to a cup on the table]”; (5) Do you think this dragon could jump out of this book,
and shake my hand, and say, ‘Hi, my name is Dragon’?”; (6) “Can this dragon come out of this
book at all?”; (7) “Can the dragon in this book watch me eating my dinner?”; (8) “So, overall, do
you think dragons are for real or pretend?
**Emotion regulation.** Children’s ER was measured by a behavioral task designed to measure how preschoolers control their emotions when presented with an undesirable gift, such as a twisted slinky (Liebermann, Giesbrecht, & Muller, 2007). In this disappointment procedure, children ranked eight small prizes in order of their appeal. The eight prizes consisted of undesirable items (e.g., a broken slinky) and desirable items (e.g., sticky hand). After ranking the items, the experimenter placed the prizes out of the participant’s view and administered an unrelated task. Next, the experimenter informed the participant that he will be given a gift and presented the participant with a gift bag containing her first choice prize. The participant was allowed to open and examine the prize for 20 seconds, during which the experimenter gathered her papers and maintained regular eye contact and a neutral facial expression. The experimenter used a neutral tone to paraphrase anything the child said during the 20 s. After the 20 s, a second unrelated task was administered. Then the experimenter gave the participant the same gift bag with her last choice prize. The child was allowed to open the gift and examine it for 20 s while the experimenter remained neutral. After the 20 s, the experimenter informed the participant that there had been a mistake and that the participant was given the wrong prize. The experimenter then offered the participant another toy in place of the wrong prize. According to previous coding schemes (Liebermann, Giesbrecht, & Muller, 2007; Saarni, 1984), vocalizations, facial expressions, and gestures were used as signs of positive and negative emotions. ER measures will be obtained by calculating the proportion of positive behaviors after receiving the last choice prize (with the same calculation for the proportion of negative behaviors). Children will be categorized as having successful ER abilities if they display more positive behaviors than negative behaviors when receiving the undesirable gift.
**Emotion knowledge.** Both the behavioral vignettes and the situational vignettes of the Assessment of Children’s Emotional Skills (ACES; Schultz, Izard, & Bear, 2004) assessed children’s emotion knowledge. For each set of vignettes, the experimenter presented children with 15 one- to three-sentence items. Each item depicts behaviors or situations corresponding to emotional arousal. Children responded to each item by labeling the protagonist’s feeling as happy, sad, scared, mad, or no feeling. Three items in each subscale contain ambiguous vignettes, designed to describe non-prototypical emotional behaviors or situations. Children’s emotion knowledge score was determined by the total amount of correct responses in each set of vignettes separately. The raw scores were then standardized based on the

**Receptive vocabulary.** The Peabody Picture Vocabulary Test, Fourth Edition Form B (PPVT-4; Dunn & Dunn, 2007) assessed children’s receptive vocabulary. The PPVT has a 90% reliability rate (Dunn & Dunn, 2007). When administering the PPVT, children view a booklet with each page consisting of four colored pictures. The experimenter states one vocabulary word that corresponds to one picture on each page. Children were asked to point to the picture that correctly corresponded to the vocabulary word. After passing training items (e.g., baby, candy), children were presented with test items. Standard scores were used to assess children’s receptive vocabulary. The PPVT was used, in part, to determine whether children’s receptive vocabulary was good enough to understand the battery’s instructions. Data from children who scored less than the 20th percentile on the PPVT were excluded from analyses ($N = 7$).

**Teacher Questionnaires**

**Emotion Regulation (ER).** Children’s ER was measured by a teacher report of emotions displayed in the classroom, the Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997). The ERC contains 24 items on a 4-point Likert scale, with 1 indicating “never” and 4 indicating
“almost always.” Of particular interest was the emotion regulation subscale ($\alpha = .89$), which assesses adaptive behavior, including empathy, emotional self-awareness, and displaying appropriate emotions, through items such as “responds positively to neutral or friendly overtures by peers.”

Preschool Peer Victimization Measure (PPVM; Crick, Casas & Ku, 1999). Children’s social competency was measured by the PPVM which assesses three subscales of social competency with peers: physical victimization, relational victimization and prosocial behaviors. This measure has 9 items rated on a 5-point Likert scale with 1 indicating “never” and 5 indicating “always true”. Cronbach’s alpha for the three subscales range from .76 to .87.

Procedure

Participants were individually interviewed during one 30-minute session. The PPVT was used as a control variable and preschool-aged children typically find the PPVT to be an arduous task; for these reasons, the PPVT was administered last for each participant. Administration of all other measures occurred in a fixed random order. A fixed random order was used because past research has demonstrated that research involving individual differences should employ fixed rather than counterbalanced designs (Carlson & Moses, 2001). Table 1 describes the order of child measures.

Table 1

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<th>Task</th>
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<td>i. Diverse desires</td>
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<td>ii. Knowledge access</td>
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<td></td>
<td>iii. Belief emotion</td>
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<td></td>
<td>iv. Explicit false belief</td>
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</table>
v. Diverse beliefs
vi. Contents false belief
vii. Real-apparent emotion

2. Implausible Lie Task (deception detection)
3. Assessment of Children’s Emotional Skills (ACES; emotion knowledge task)
4. Emotion Regulation Measure
5. Peabody Picture Vocabulary Test (PPVT-4; receptive vocabulary)

Each participant was interviewed in a private room that was appointed for experimental testing. Before testing, each participant was provided verbal assent, and parents provided written consent. The experimenter assumed dissent if the child verbally dissented, was silent, or behaviorally indicated dissent (e.g., hiding, not answering questions, putting her head down on the table, being shy, and getting up from the table). If the child dissented, the experimenter asked the child one more time on another day if she is willing to participate. If the child dissented again, then the experimenter did not ask the child to participate again. Experimenters accompanied participants to and from their classrooms. Participants and experimenters sat next to each other at a small table. Participants received a sticker for their participation. Two research assistants were trained to code the interviews, and a third research assistant settled any differences. Table 2 describes a coding scheme summary.

Table 2

<table>
<thead>
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<th>Measure</th>
<th>Code</th>
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| Theory of Mind Scale         | 0 = Fail
|                              | 1 = Pass
|                              | Summary Score Range: 0–7                  |
| Implausible Lie Task         | 0 = Incorrect answer                      |
|                              | 1 = Correct Answer                        |
|                              | Summary Score Range: 0–8                  |
Emotion Regulation Measure

Positive emotions:
1. Smile – lip corners pulled up.
2. Positive vocalization about gift, e.g., using light, lilting tone and using words reflecting something positive about the gift.
3. Smiling eye contact with experimenter
4. Identifies with gift, e.g., hugs gift, plays with toy, claims ownership (i.e., “now I have two orange cars.”)
5. Verbalization of usefulness to others.

Negative emotions:
1. Straight-line or pursed mouth.
2. Negative vocalization about the gift, e.g., whiny or insistent tone and using words reflecting something negative about the gift.
3. Shoulder shrug.
4. Distances from gift – e.g., pushes toy away, says “don’t want it,” examines toy but does not play with it.
CHAPTER 3

RESULTS

Control Variables

Research has demonstrated that theory of mind (ToM) develops with age (Wellman & Liu, 2004) and is correlated with language ability (Cutting & Dunn, 1999; Happé, 1995). Therefore, analyses including ToM included age and receptive vocabulary as covariates.

Descriptive Statistics

Means, standard deviations, and possible ranges for the child variables are included in Table 3. PPVT standard scores were higher than expected ($M = 112.91$), but within 1 standard deviation of the mean of 100. A large proportion of the sample was taken from a University-associated preschool, which most likely accounts for the higher average score.

Table 3

*Descriptive Statistics for Child Measures.*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age</th>
<th>$M$</th>
<th>$SD$</th>
<th>Possible Range</th>
<th>Actual Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPVT Standard Score (Receptive Vocabulary)</td>
<td>3-year-olds</td>
<td>113.71</td>
<td>12.68</td>
<td>20–160</td>
<td>89–144</td>
</tr>
<tr>
<td></td>
<td>4-year-olds</td>
<td>112.36</td>
<td>11.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-year-olds</td>
<td>112.94</td>
<td>13.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>112.91</td>
<td>12.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theory of Mind Scale</td>
<td>3-year-olds</td>
<td>2.88</td>
<td>1.20</td>
<td>0–7</td>
<td>0–6</td>
</tr>
<tr>
<td></td>
<td>4-year-olds</td>
<td>2.97</td>
<td>1.27</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-year-olds</td>
<td>4.00</td>
<td>1.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>3.16</td>
<td>1.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACES Social Behaviors</td>
<td>3-year-olds</td>
<td>4.88</td>
<td>2.33</td>
<td>0–15</td>
<td>1–12</td>
</tr>
<tr>
<td></td>
<td>4-year-olds</td>
<td>5.67</td>
<td>2.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-year-olds</td>
<td>7.94</td>
<td>2.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overall</td>
<td>5.73</td>
<td>2.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACES Social Situations</td>
<td>3-year-olds</td>
<td>5.81</td>
<td>2.86</td>
<td>0–15</td>
<td>0–13</td>
</tr>
</tbody>
</table>
Table 4 demonstrates correlations between age in months, receptive vocabulary, deception detection, emotion knowledge, emotion regulation, ToM ability, and PPVM relational victimization. Emotion regulation, as assessed by the Emotion Regulation subscale of the Emotion Regulation Checklist did not correlate with any other variables of interest. For this reason, all further analyses investigate the role of emotion knowledge, as assessed by the ACES Social Behaviors Vignettes, on children’s deception detection abilities.

Table 4

Correlations between Variables of Interest.

<table>
<thead>
<tr>
<th>Variable</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age in Months</td>
<td>.592***</td>
<td>.320**</td>
<td>.573***</td>
<td>.431***</td>
<td>-.004</td>
<td>.011</td>
</tr>
<tr>
<td>2. PPVT Age Equivalent Score (Receptive Vocabulary)</td>
<td>.338**</td>
<td>.438***</td>
<td>.595***</td>
<td>.048</td>
<td>-.118</td>
<td></td>
</tr>
<tr>
<td>3. ToM Scale</td>
<td>.282*</td>
<td>.149</td>
<td>-.100</td>
<td>-.053</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. Implausible Lie Critical Score (Deception Understanding)  
\[ .254^* \quad .019 \quad -.069 \]

5. ACES Social Behaviors (Emotion Knowledge)  
\[ .168 \quad -.240^* \]

6. ERC Emotion Regulation subscale  
\[ -.263^* \]

7. PPVM Relational Victimization

Note. * \( p < .05 \), ** \( p < .01 \), *** \( p < .001 \).

To address whether participants demonstrate age-related changes in the direct measure of ER, univariate ANOVA was performed comparing children’s behaviors and age group.

Children’s positive behaviors when presented with the undesired gift were not related to age, \( F(2, 66) = .53, p = .59 \) in this data set, although a developmental progression was shown in Liebermann and colleagues (2007). Children’s negative behaviors when presented with the undesired gift were not related to age, \( F(2, 66) = .69, p = .51 \), consistently with Liebermann and colleagues (2007).

Table 5 demonstrates children’s performance patterns on the ToM Scale (Wellman & Liu, 2004). The table is arranged in order from the hypothesized easiest task to hypothesized most difficult task. The developmental progression of means on the ToM Scale is in line with previously reported findings (Wellman & Liu, 2004).
Table 5

*Theory of Mind Scale Performance by Age Group.*

<table>
<thead>
<tr>
<th>Task</th>
<th>3-year-olds (n Pass)</th>
<th>4-year-olds (n Pass)</th>
<th>5-year-olds (n Pass)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diverse Desires</td>
<td>19 (82.6%)</td>
<td>34 (81.0%)</td>
<td>20 (95.2%)</td>
</tr>
<tr>
<td>Diverse Beliefs</td>
<td>17 (73.9%)</td>
<td>30 (71.4%)</td>
<td>15 (71.4%)</td>
</tr>
<tr>
<td>Knowledge Access</td>
<td>3 (13.0%)</td>
<td>20 (47.6%)</td>
<td>17 (81.0%)</td>
</tr>
<tr>
<td>Contents False Belief</td>
<td>5 (21.7%)</td>
<td>8 (19.0%)</td>
<td>12 (57.1%)</td>
</tr>
<tr>
<td>Explicit False Belief</td>
<td>6 (26.1%)</td>
<td>9 (21.4%)</td>
<td>6 (28.6%)</td>
</tr>
<tr>
<td>Belief Emotion</td>
<td>7 (30.4%)</td>
<td>13 (31.0%)</td>
<td>10 (47.6%)</td>
</tr>
<tr>
<td>Real-Apparent Emotion</td>
<td>9 (39.1%)</td>
<td>7 (16.7%)</td>
<td>3 (14.3%)</td>
</tr>
</tbody>
</table>

Figure 1 demonstrates children’s performance patterns on the Implausible Lie task (modified from Lee et al., 2002). Univariate ANOVA, controlling for receptive vocabulary (PPVT standard score) was conducted to determine whether children’s deception detection ability demonstrates significant development from age 3 to 5. This analysis revealed a main effect of age, $F(2, 63) = 7.51, p < .01, \eta_p^2 = .204$. Pair-wise comparisons using a Bonferroni adjustment revealed significant differences between 3-year-olds ($M = 1.26$) and 5-year-olds ($M = 1.93$), $p < .01$, and between 4-year-olds ($M = 1.48$) and 5-year-olds ($M = 1.93$), $p < .01$.

In each age group, the percentage of children who blamed the dragon was lower than expected (Lee et al., 2002). This may be due to the nature of the sample, which was largely taken from a University-based preschool.
Primary Aims

Aim 1A. Regression analyses were performed to address whether children’s ToM and emotion knowledge were related. The Assessment of Children’s Emotion Skills (ACES) social behaviors vignettes score assessed children’s emotion knowledge. Contrary to predicted, the regression analysis did not demonstrate a significant relation between ToM and emotion knowledge regardless of whether or not receptive vocabulary (PPVT) was entered as a control variable, $F(2, 73) = 1.82, p = .17$.

Aim 1B. Univariate ANOVA was conducted to determine whether ToM and emotion knowledge demonstrate development by age group (3-, 4-, and 5-year-olds). The data were assessed via histograms to determine which children could be categorized as having a ToM or not. Figure 2 demonstrates that the mode ToM was 3 (out of a possible 7). Children were categorized as having a ToM if they scored a 4 or higher. Twenty-eight children were
categorized as having ToM (scored a 4 or higher), and fifty-one children were categorized as not having ToM (scored a 3 or lower). Figure 3 demonstrates that the mode emotion knowledge score was 6 (out of a possible 15). Children were categorized as demonstrating high emotion knowledge if they scored an 8 or higher (out of a possible 15; Bernoulli probability $p = .01$). Twenty-one children were categorized as having high emotion knowledge (scored an 8 or higher), and fifty-six children were categorized as having low emotion knowledge (scored a 7 or lower).

*Figure 2. Histogram of Theory of Mind (ToM) Scale Performance. Children’s performance on the ToM task was scored from 0 (low ToM) to 7 (high ToM).*
Figure 3. Histogram of Emotion Knowledge Performance. Children’s performance on the emotion knowledge task was scored from 0 (low emotion knowledge) to 15 (high emotion knowledge).

ToM demonstrated development by age group. A univariate ANOVA (Age: 3, 4, 5) was conducted on children’s ToM abilities, controlling for receptive vocabulary (PPVT standard score). This resulted in a significant main effect of age, $F(2, 72) = 3.64, p = .03, \eta^2_p = .210$. Pair-wise comparisons using a Bonferroni adjustment revealed significant differences between 3-year-olds ($M = 2.88$) and 5-year-olds ($M = 4.00$), $p = .02$, and between 4-year-olds ($M = 2.97$) and 5-year-olds ($M = 4.00$), $p = .04$; see Figure 4. A univariate ANOVA (Age: 3, 4, 5) was conducted on children’s emotion knowledge (assessed by the ACES Social Behaviors Vignettes), controlling for receptive vocabulary (assessed by the PPVT standard score). This resulted in a significant main effect of age, $F(2, 72) = 10.29, p < .01, \eta^2_p = .145$. Pair-wise comparisons using a Bonferroni adjustment revealed significant differences between 3-year-olds ($M = 4.88$) and 5-
year-olds ($M = 7.94$), $p < .01$, and between 4-year-olds ($M = 5.67$) and 5-year-olds ($M = 7.94$), $p < .01$; see Figure 5.

Figure 4. ANOVA Results on Theory of Mind Scale and Age. Error bars represent standard error. ** $p < .01$.

Figure 5. ANOVA Results on Emotion Knowledge and Age. Error bars represent standard error. ** $p < .01$. 
Aim 2. A regression analysis addressed whether children’s ToM and deception detection were related. When controlling for receptive vocabulary (PPVT), ToM significantly predicted deception detection, $F(2, 60) = 3.361, p < .05$. $R^2$ indicated that 10.1 percent of the variance in deception detection was predicted by ToM. Children who scored better on the ToM Scale had better deception detection abilities ($B = .25$).

Aim 3. A regression analysis addressed whether emotion knowledge (assessed by the ACES Social Behaviors Vignettes) and deception detection abilities (assessed by the Implausible Lie task) were related. Emotion knowledge significantly predicted deception detection ability, $F(1, 62) = 4.27, p < .05$, $\eta_p^2 = 1.032$. Children high in emotion knowledge predicted deception better ($B = .25$). However, when controlling for receptive vocabulary (PPVT), emotion knowledge did not significantly predict deception detection ability, $F(2, 60) = 2.22, p = .12$.

Aim 4. To examine whether emotion knowledge serves as a moderator of relations between ToM and children’s deception detection a hierarchical linear regression analysis predicted deception detection ability from the following predictors: age, gender, PPVT (block 1), main effects of ToM and emotion knowledge (block 2), the interaction between ToM and emotion knowledge (block 3). Table 6 depicts the final regression results. Older children, males (trending), and those who have better receptive vocabulary (trending) demonstrate better deception detection. However, ToM and emotion knowledge (and their interaction to test for moderation) did not predict deception detection abilities over and above gender, development (age), and receptive vocabulary.
Table 6

Hierarchical Linear Regression Analysis Details.

<table>
<thead>
<tr>
<th>Model</th>
<th>Predictor</th>
<th>B</th>
<th>SE B</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Constant</td>
<td>-1.569</td>
<td>.625</td>
<td>-2.512</td>
<td>.015</td>
</tr>
<tr>
<td></td>
<td>Age in Months</td>
<td>.037</td>
<td>.007</td>
<td>5.354</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>.206</td>
<td>.104</td>
<td>1.973</td>
<td>.053</td>
</tr>
<tr>
<td></td>
<td>PPVT Standard Score</td>
<td>.008</td>
<td>.004</td>
<td>1.780</td>
<td>.080</td>
</tr>
<tr>
<td>2</td>
<td>Constant</td>
<td>-1.741</td>
<td>.715</td>
<td>-2.434</td>
<td>.018</td>
</tr>
<tr>
<td></td>
<td>Age in Months</td>
<td>.038</td>
<td>.008</td>
<td>4.583</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>.208</td>
<td>.106</td>
<td>1.962</td>
<td>.055</td>
</tr>
<tr>
<td></td>
<td>PPVT Standard Score</td>
<td>.009</td>
<td>.005</td>
<td>1.776</td>
<td>.081</td>
</tr>
<tr>
<td></td>
<td>ToM Scale</td>
<td>.007</td>
<td>.043</td>
<td>.154</td>
<td>.878</td>
</tr>
<tr>
<td></td>
<td>Emotion Knowledge (ACES Behaviors)</td>
<td>-.016</td>
<td>.026</td>
<td>-.624</td>
<td>.535</td>
</tr>
<tr>
<td>3</td>
<td>Constant</td>
<td>-1.975</td>
<td>.744</td>
<td>-2.552</td>
<td>.013</td>
</tr>
<tr>
<td></td>
<td>Age in Months</td>
<td>.039</td>
<td>.008</td>
<td>4.618</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>.204</td>
<td>.106</td>
<td>1.921</td>
<td>.060</td>
</tr>
<tr>
<td></td>
<td>PPVT Standard Score</td>
<td>.009</td>
<td>.005</td>
<td>1.663</td>
<td>.102</td>
</tr>
<tr>
<td></td>
<td>ToM Scale</td>
<td>.094</td>
<td>.117</td>
<td>.805</td>
<td>.424</td>
</tr>
<tr>
<td></td>
<td>Emotion Knowledge (ACES Behaviors)</td>
<td>-.028</td>
<td>.061</td>
<td>.147</td>
<td>.642</td>
</tr>
</tbody>
</table>
ToM x Emotion Knowledge | -.014 | .017 | -.806 | .424
--- | --- | --- | --- | ---

*Note.* The dependent variable was deception detection (Implausible Lie Task).

Model 1: $F(3, 59) = 11.942, p < .001, R^2 = .378$.

Model 2: $F(6, 56) = 7.058, p < .001, R^2 = .382, \Delta R^2 = .005, \Delta F(3, 56) = .211, p = .811$.

Model 3: $F(9, 53) = 5.954, p < .001, R^2 = .389, \Delta R^2 = .007, \Delta F(3, 53) = .650, p = .424$.

**Exploratory Analysis**

Children’s emotion knowledge (as assessed by the ACES Social Behaviors Vignettes) negatively correlated with relational victimization (PPVM relational subscale), $r(74) = -.24, p = .037$. Thus, greater emotion knowledge was associated with less peer relational victimization.

The other two subscales of the PPVM (physical victimization and prosocial behaviors) were not related to emotion knowledge.
CHAPTER 4
DISCUSSION

Examining developmental factors that impact young children’s success in both cognitive and social domains has important implications for advancing our knowledge concerning social cognition. Research in social cognition has recently featured advances in studying ToM and emotion knowledge. However, emotion knowledge has not been examined as a moderator of the developmental progression of ToM and deception detection. Understanding deception is important for several facets of development, including relationships with peers, determining which adults to trust, and generally learning about the world. However, deficits in this type of understanding are witnessed in individuals with general social cognition deficits, such as people with autism spectrum disorder (ASD). The findings from this study further our understanding of the factors that impact the development of social cognition. Additionally these findings may help to inform therapies that scaffold these emerging skills.

The central aim of this study was to examine the development and relations among emerging skills central to social cognition: theory of mind, emotion knowledge, and deception detection. Tasks were analyzed to examine whether participants demonstrated development by age group. Children’s ToM and emotion knowledge both demonstrated development by age group (3-, 4-, and 5-year-olds). Additionally, children’s deception detection also demonstrated age-related change from 3 to 5 years, with only 5-year-olds showing a clear understanding of deception. With regard to the relations among the emerging skills, the data demonstrated that children’s emotion knowledge or emotion regulation skills were not related to their emerging
theory of mind (ToM) skills as I anticipated. However, emotion knowledge did significantly predict children’s deception detection abilities, such that more emotion knowledge predicted greater deception detection ability. Additionally, ToM predicted development in deception detection. Yet, emotion knowledge did not serve as a moderator to strengthen the relations between ToM and deception detection, as was predicted. Thus, it appears that emotion knowledge and ToM independently predict children’s ability to detect deception.

Learning how to correctly label one’s own emotions and the emotions of others (i.e., emotion knowledge) aids children in successfully assessing different social situations. Therefore, emotion knowledge is critical for various features of social competence, including the ability to detect deception. In addition to emotion knowledge in general, deception also incorporates knowledge of facial expressions and emotional situations as well as the ability to recognize the feelings of others (Garner, 1981). Thus, future research should also incorporate the role of facial recognition in deception detection.

The Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997) and the Undesired Gift Task both demonstrated almost no variance, which was not anticipated. The latter, in particular, should have demonstrated a developmental trajectory, but in these data it did not. Nonetheless, even with these task performance issues, it is possible that emotion knowledge does not moderate (strengthen) development between ToM and deception detection. Perhaps examining precursive variables, such as children’s understanding of intentions, will provide better insight into the development of deception detection. The development of the understanding of intentionality precedes the development of ToM (Lillard, 1998), as intentionality is one aspect of ToM understanding. Thus, it is possible that young children are relying on their understanding of intentionality to detect deception, such that they evaluate
whether the deceiver intends to deceive or has simply unintentionally provided misinformation. Although intention understanding is a component of ToM, it is not directly assessed in Wellman and Liu’s (2004) theory of mind battery. In the same vein, Garner (1994) suggests that acting in a deceptive manner requires three precursive components: (1) facial expression knowledge, (2) knowledge of emotion-evoking situations, and (3) the ability to recognize how someone else feels. Thus future research should examine how these precursors to deception detection are related to components of social cognition understanding, such as ToM and emotion knowledge.

Examining the nature of the sample might provide some insight regarding the results of this study. Sixty-four percent of participants were members of families generating annual incomes of greater than 90,000 dollars. Previous research has demonstrated that discrepancies in language development and social-economic status (SES) are present even in infancy (Fernald, Marchman, & Weisleder, 2012). By the time children reach the age of 24 months, there is a six-month gap in language processing skills between children from low-income families and children from high-income families (Fernald et al., 2012). Therefore, due to participants’ SES in this study, future research should include participants with a wider range of SES. Children with better language skills tend to perform more successfully than children with poor language skills on tasks of ToM and emotion knowledge vignettes. Even though age, regardless of language, may serve as a proxy for developing world knowledge, the age ranges of the present sample are centered around 4-year-olds. Thus, future studies should include a wider age range of participants.

Additionally, future research should incorporate measures of emotion knowledge that contain more emotive components to assess both the cognitive and emotional aspects of emotion knowledge. This will ensure that children are assessed with a more robust measure of emotion...
knowledge. For example, Channell and Barth (2013) assessed children’s ability to identify emotions from a series of 14 vignettes acted out by a faceless puppet.

The emotion regulation task used in this study simply examined children’s ability to hide disappointment after receiving a disappointing gift. However, future research should also include an emotion regulation task that examines whether children can hide a different emotion. As in everyday events, the social contexts of any given situation determine which emotions are appropriate to display. Thus, examinations of emotion regulation should include differing situations in order to assess children’s ability to regulate their emotions in varying contexts. For example, in the Secret Keeping task designed by Carlson and Wang (2007), an experimenter pretends to be a talking fish using a high pitched voice and asks participants to keep her identity a secret. Children’s performance on the emotion knowledge tasks and the emotion regulation is linked to the varying situations at hand; the emotions expressed in the emotion knowledge tasks and the emotion regulation tasks depend upon the types of social situations proposed in each measure.

In addition, future research should include deception measures and emotion regulation measures that more closely mirror situations that occur in everyday life. Emotive expressions are common in both deceptive acts and situations involving the use of emotion regulation. Therefore, experimenters should act in a more emotive manner when assessing children’s ability to detect deception and regulate their own emotions.

Related to the aim this study, research has investigated deception detection in high functioning children with autism spectrum disorders (ASD). Children with ASD have a range of social cognition deficits such that understanding others’ intentions and perspectives is challenging. Past research has found that children with ASD understand less about deception
than typically-developing children, which is corroborated by performance on ToM false-belief
tasks (Oswald & Ollendick, 1989). Additionally, children with ASD perform worse than their
typically-developing peers when asked to tell a lie (Sodian & Frith, 1992), which relates to their
performance on a false-belief task. Baron-Cohen (1992) extended this research to suggest that
children with ASD have trouble keeping information secret from others but perform just as well
as typically-developing children in hiding objects from others. Dennis, Lockyer, and Lazenby
(2000) demonstrated that children with ASD exhibit difficulty in emotion knowledge (i.e.,
assigning emotions to characters in a story and knowing that facial expressions may not match an
individual’s true feelings). Children with ASD also tend to exhibit little use of symbolic or
pretend features in their play (Kasari, Chang, & Patterson, 2013). Thus, more research is needed
to identify mechanisms of the development of social cognitions for the advancement of therapy.

Various intervention therapies exist that focus on emotion knowledge and emotion
regulation at home and at school: the Promoting Alternative Thinking Strategies (PATHS)
Preschool Social and Emotional Learning curriculum (Domitrovich et al., 2005), Tools of the
Mind (Bodrova & Leong, 1996), the Early Start Denver Model (Rogers & Dawson, 2010),
Project ImPACT (Ingersoll & Dvortcsak, 2009), SCERTS (Prizant, Wetherby, Rubin, & Laurent,
2006), JASPER, (Kasari et al., 2010), Early Social Interaction (Wetherby & Woods, 2006), and
Floortime (Wieder & Greenspan, 2003). For example, Power PATHS parents and teachers are
taught to label emotions with their children and to practice projecting four times as many
positive emotions than negative emotions. Indeed, past research has demonstrated associations
between preschoolers’ emotion knowledge and social competency (Garner & Waajid, 2012) as
well as school readiness (Garner & Waajid, 2008; O’Brien et al., 2011). In kindergarten,
children’s greater emotion knowledge has been linked to greater sustained attention to academic tasks as well as later academic achievement (Izard et al., 2001; Trentacosta & Izard, 2007).

This study was limited by correlational data; therefore, future studies should focus on intervention to examine whether enriching experiences to help understand others’ perspectives aids children in detecting deception. This would be especially applicable to children with developmental delays in the domain of social cognition. When children increase their ability to determine whether others are acting deceptively, they should feel more at ease with the world. Longitudinal designs will also provide the ability to investigate the predictive factors of children’s developing emotion knowledge and theory of mind skills on social competency outcomes, such as emotion regulation and deception detection.
REFERENCES


Oswald, D. P., & Ollendick, T. (1989). Role taking and social competence in autism and mental


Appendix A

IRB Project #: 15-OR-177

UNIVERSITY OF ALABAMA
INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS
REQUEST FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS

I. Identifying Information

Principal Investigator: Amsley Talis Gipm, Ph.D.
Names: Amsley Talis Gipm, Ph.D. Alexandra Nancarrow (PY), graduate student
Second Investigator: Psychology
Department: Psychology
College: Arts and Sciences
University: University of Alabama
Address: Box 870348, Tuscaloosa, AL 35487
Telephone: 205-348-9903
Fax: 205-348-8468
E-mail: agipm@ua.edu

Third Investigator: Psychology (PY)
College: Arts and Sciences
University: University of Alabama
Address: Box 870348, Tuscaloosa, AL 35487
Telephone: 214-538-9797
Fax: 205-348-8468
E-mail: sfnancarrow@crimson.ua.edu

Title of Research Project: Theory of Mind, Emotion Regulation, and Fantasy Orientation

Date Submitted: 3/13/2015
Funding Source: Psychology Department: Research overhead, Applying for RGC

Type of Proposal: ☑ New ☐ Revision ☐ Renewal ☐ Completed ☐ Exempt
Please attach a renewal application
Please enter a continuing review of studies form
Please enter the original IRB # at the top of the page

UA faculty or staff member signature: ____________________________

II. NOTIFICATION OF IRB ACTION (to be completed by IRB):
Type of Review: ________ Full board ☑ Expedited

IRB Action:
☑ Approved this proposal complies with University and federal regulations for the protection of human subjects.

Approval is effective until the following date: 5/25/16
Items approved:
☒ Research protocol (dated 5/26/16)
☐ Informed consent (dated 5/26/16)
☐ Recruitment materials
☐ Other:

Approval Signature: ____________________________ Date: 5/26/2015

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Appendix B

UNIVERSITY OF ALABAMA
INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS
REQUEST FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS

I. Identifying information

<table>
<thead>
<tr>
<th>Principal Investigator</th>
<th>Second Investigator</th>
<th>Third Investigator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Names:</td>
<td>Ansley Tullos Gilpin, Ph.D.</td>
<td>Alexandra Nancarrow (PY), graduate student</td>
</tr>
<tr>
<td>Department:</td>
<td>Psychology</td>
<td>Psychology (PY)</td>
</tr>
<tr>
<td>College:</td>
<td>Arts and Sciences</td>
<td>Arts and Sciences</td>
</tr>
<tr>
<td>University:</td>
<td>University of Alabama</td>
<td>University of Alabama</td>
</tr>
<tr>
<td>Address:</td>
<td>Box 870348, Tuscaloosa, AL 35487</td>
<td>Box 870348, Tuscaloosa, AL 35487</td>
</tr>
<tr>
<td>Telephone:</td>
<td>205-348-9903</td>
<td>214-538-9797</td>
</tr>
<tr>
<td>FAX:</td>
<td>205-348-8648</td>
<td>205-348-8648</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:agilpin@ua.edu">agilpin@ua.edu</a></td>
<td><a href="mailto:afnancarrow@crimson.ua.edu">afnancarrow@crimson.ua.edu</a></td>
</tr>
</tbody>
</table>

Title of Research Project: Theory of Mind, Emotion Regulation, and Fantasy Orientation

Date Submitted: ________________________
Funding Source: Psychology Department Research Overhead, Applying for RGC

Type of Proposal: New \( \square \) Revision \( \square \) Renewal \( \square \) Completed \( \square \) Exempt
Please attach a renewal application
Please attach a continuing review of studies form
Please enter the original IRB # at the top of the page

UA faculty or staff member signature: ____________________________

II. NOTIFICATION OF IRB ACTION (to be completed by IRB):

Type of Review: _______ Full board _______ Expedited

IRB Action:

- Rejected
- Tabled Pending Revisions Date: ___________
- Approved Pending Revisions Date: ___________
- Approved-this proposal complies with University and federal regulations for the protection of human subjects.

Approval is effective until the following date: 5/25/16

Items approved: __Research protocol__ (dated ___________
__Informed consent__ (dated ___________
__Recruitment materials__ (dated ___________

Approval signature ___________________________ Date: 6/17/2015

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