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# How is this child feeling? Preschool-aged children's ability to recognize emotion in faces and body poses

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## Abstract

The study examined children's recognition of emotion from faces and body poses, as well as gender differences in these recognition abilities. Preschool-aged children ($N = 55$) and their parents and teachers participated in the study. Preschool-aged children completed a web-based measure of emotion recognition skills, which included five tasks (three with faces and two with bodies). Parents and teachers reported on children's aggressive behaviors and social skills. Children's emotion accuracy on two of the three facial tasks and one of the body tasks was related to teacher reports of social skills. Some of these relations were moderated by child gender. In particular, the relationships between emotion recognition accuracy and reports of children's behavior were stronger for boys than girls. Identifying preschool-aged children's strengths and weaknesses in identification of emotion from faces and body poses may be helpful in guiding interventions with children who have problems with social and behavioral functioning that may be due, in part, to emotional knowledge deficits. Further developmental implications of these findings are discussed.

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Emotional understanding skills are essential to the development of healthy social behavior in early childhood. These skills are related to important developmental outcomes such as school readiness, enhanced language, literacy, and mathematics skills in preschool (Campbell, 2002; Denham, 2006; Raver, 2002; Raver, Garner, & Smith-Donald, 2006). One of the underlying skills critical to the development of social and emotional competence is emotion recognition (Denham, 1986; Halberstadt, Denham, & Dunsmore, 2001; McClure, Pope, Hoberman, Pine & Leibenluft, 2003). Emotion recognition begins to develop in the preschool years and tends to predict social behavior and adjustment among preschool-aged children (Denham, McKinley, Couchoud & Holt, 1990; Izard et al., 2001; Philippot & Feldman, 1990; Schulz, Izard, & Ackerman, 2000). Likewise, this skill continues to be important in predicting likeability among peers and social competence through late childhood and adolescence (Izard, et al., 2001; Miller, Gouley, Seifer, Zakriski, Eguia, & Vergnani, 2005; Mostow, Izard, Fine, & Trentacosta, 2002). Although emotion recognition skills are related to an array of outcomes, these relations tend to vary by gender. For example, the relationship between emotion knowledge and social competence appears to be stronger for girls than boys (Leppänen & Hietanen, 2001). In a meta-analysis of sex differences in facial emotion processing, McClure (2000) suggested that the possession of emotion decoding skills may be more important for girls than boys due to the structure of girls' peer groups. Therefore, examining gender differences in the relationships among preschool children's abilities and various social outcomes was a primary goal of the current study.

The majority of studies examining preschool-aged children's recognition and understanding of emotion have explored these skills using stimuli depicting facial expressions of others depicted in cartoons, puppets, or photographs of adults or children (e.g., Denham, et al., 2002; Greenberg, Kusche, Cook, & Quamma, 1995; Pons, Lawson, Harris, & deRosnay, 2003; Schultz, Izard, & Bear, 2004). However, children's ability to recognize emotion in others is not limited to faces; children may also identify emotion from body postures. Recognition of emotion expression through body poses is of recent interest to researchers (e.g., Coulson, 2004; de Gelder, 2006; Pitterman & Nowicki, 2004; Winters, 2005; Schindler, Van Gool, & de Gelder, 2008). Although most of this research has been conducted with adults, it is likely that children also possess the ability to recognize emotion through body poses. This ability may also play a role in children's social-emotional and academic competence, similar to children's facial emotion recognition skills. Therefore, the goals of this study were to examine: 1) preschool-aged children's emotion recognition abilities of faces and bodies and how this skill relates to children's social-emotional competence and 2) how these relationships might vary as function of child gender.

## Children's Facial Recognition of Emotions

Emotion recognition is central to the Affective Social Competence Model (ASC, Halberstadt et al., 2001), a theoretical framework that focuses on children's development of emotional skills. In particular, this model describes the development of emotional understanding, communication and experience within relationships. It proposes that children develop emotional skills in three broad domains: *sending*, "efficacious communication of one's own affect;" *receiving*, "successful interpretation and response to others' affective communications;" and *experiencing*, "awareness, acceptance, and management of one's own affect" (Halberstadt et al., 2001). In particular, the essential first step in the *receiving* skill, according to the ASC model, is the appraisal of another's emotion. Specifically, by preschool age, most children should develop the skill to accurately label how another person is feeling by encoding cues from the face without much confusion. This contributes to children's abilities to correctly interpret an emotion message, as well as communicate emotion messages back to peers, parents, or teachers. This first step in the *receiving* skill is also important because receiving affective messages from others gives direct feedback about one's own conduct as well as the other person's objectives. Children who misinterpret or overlook messages from others are less able to adjust their own sending or expression accordingly, often resulting in being less successful in establishing and maintaining peer relationships. In contrast, children who accurately receive emotion messages from peers during play or challenging situations are more likely to have successful and effective interactions with peers (Dunsmore, Noguchi, Garner, Casey, & Bhullar, 2008; Denham, McKinley, Couchoud, & Holt, 1990; Hubbard & Dearing, 2004; Schultz et al. 2004).

Children's development of emotion recognition skills begins early in life. Some children as young as two demonstrate the ability to accurately identify facial expressions of various emotions including happy, sad, angry, and scared (Denham, 1986; Wellman, Harris, Banerjee, & Sinclaire, 1995). Most evidence points toward the developmental expectations for children ages four to five to be able to accurately and reliably identify facial expressions of the six basic emotions of happy, sad, anger, fear, surprise and disgust using a range of

stimuli (Bosacki & Moore, 2004; Camras et al., 1988; Denham & Couchoud, 1990; MacDonald, Kirkpatrick, & Sullivan, 1996; Maxim & Nowicki, 2003; Russell & Widen, 2002; Schultz, Izard, & Ackerman, 2000; Widen & Russell, 2008). Preschool-aged children's ability to recognize these six emotions in faces of same-aged peers in relation to social skills and aggressive behavior is of interest in the current study.

Individual differences in emotion knowledge and recognition skills play a significant role in current and later prosocial behavior (Izard, Schultz, Fine, Youngstrom, & Ackerman, 2000; Maxim & Nowicki, 2003; Miller et al., 2005; Serra, Loth, van Geert, Hurkens, & Minderaa, 2002). For example, children's facial emotion recognition skills at age five predicted their social skills four years later (Izard et al., 2001). Additionally, children who were more skilled at decoding emotional faces than other same-aged children were rated as more liked by their peers (Nowicki & Duke, 1992). In contrast, children with poor emotion recognition skills are at risk for being victimized or rejected by peers (Barth & Bastiani, 1997; Miller et al., 2005; Schultz, Izard, & Ackerman, 2000). These children are also at risk for aggression. For example, children who exhibited low emotion knowledge in preschool displayed increased levels of aggression in early elementary school (Denham et al., 2002). Overall, it appears that young children with emotion recognition skill deficits are at increased risk for a number of negative outcomes such as academic failure, aggression, delinquency, and poor peer relationships (e.g., Arsenio, Cooperman, & Lover, 2000; Coy, Speliz, DeKlyen, & Jones, 2001; Dodge, 1993)

Some support exists for gender differences in emotion recognition and understanding skills in early childhood. For example, some studies have found that girls are better at emotion recognition and emotion understanding than boys while in other studies, small or no gender differences have been reported (Babu & Rath, 2007; Bosacki, 2007; Hughes and Dunn, 2002; Martin & Green, 2005; Maxim & Nowicki, 2003; McClure, 2000; Montirosso, Peverelli, Frigerio, Crespi, & Borgatti, 2009; Schultz, Izard, & Ackerman, 2000). For example, girls were found to be better than boys at decoding and explaining emotions, both at 3 and 6 years; however, both boys and girls improved between the 3 and 6 year timeframe (Brown & Dunn, 1996). An examination of preschool children's recognition of emotion in animated facial expressions found that girls were better at recognizing anger and disgust than boys, but no differences emerged for other basic emotions (Montriosso et al., 2009). In addition, it is possible that different patterns of relations may exist among emotion knowledge skills and social competence for boys and girls (e.g., Cunningham, Kliewer, & Garner, 2009; Dunsmore, et al., 2008; Leppänen & Hietanen, 2001; Martin & Green, 2005). For example, the ability to accurately decode emotional messages from others was related to peer acceptance for girls and forming friendships for boys (Dunsmore, et al., 2008). Given this empirical work, we expected children's gender to play a role in the relationship between children's emotion recognition skills and their social-emotional behaviors.

## Recognition of Emotion in Body Postures

Although a considerable amount of research has examined emotion recognition through facial expressions, little has been done on the ability to recognize emotions via body poses and positioning. Body postures provide important sources of information about emotional

status and interpretation of body poses is a key developmental skill (e.g., Pitterman & Nowicki, 2004). These nonverbal cues can supplement the interpretation of ambiguous facial expressions and may potentially supplant facial cue interpretation when facial cues cannot be accessed. For example, an individual's face may be obscured in some way, so the receiver would need to access, encode, and interpret other cues to understand how the person is feeling. Body cues may then provide important information about the individual's emotional status. In addition, some individuals may try to mask how they are truly feeling by modulating their facial expressions, an ability that increases with age (e.g., smiling when actually feeling angry or disappointed; Gnepp & Hess, 1986; Jones, Abbey, & Cumberland, 1998; Shipman, Zeman, & Stegall, 2001). Therefore, the ability to accurately interpret body postures may provide important nonverbal cues as to how a person is truly feeling.

Both faces and bodies share some important physical properties and convey similar social and emotion information, which may indicate that the encoding of body postures is similar to the encoding of faces (e.g., Reed, Stone, Bozova & Tanaka, 2003; Reed, Stone, Grubb, & McGoldrick, 2006; Stekelenburg & de Gelder, 2004; Van den Stock, Righart & de Gelder, 2007). For example, when someone expresses anger, muscles tense in both the face as well as body. In particular, one's eyebrows and mouth may tense while the shoulders and arms also become tense. Individuals likely encode cues from the face and body simultaneously, using cues from the face to inform the interpretation of the body cues and vice versa. For example, individuals tend to be better at identifying an angry face when it is paired with an angry body expression instead of a happy body expression (e.g., Van den Stock, et al., 2007). Hence, a growing body of research suggests that body postures can be reliably interpreted and provide complementary sources of information in addition to facial cues (Banziger, Grandjean, & Scherer, 2009).

Not only are do faces and bodies convey similar information about emotions, there is some evidence to suggest that adults can accurately identify emotions based solely upon exposure to body postures. For example, Montepare and colleagues (1999) found that adults were able to accurately identify emotion body expression from three-second video clips (Montepare, Koff, Zaitchik & Albert, 1999). In more recent studies with photos of individuals posing a particular emotion with their bodies (faces obscured), adults were able to label the six basic emotions (i.e., happy, sad, anger, fear, surprise, and disgust) with some emotions more challenging to accurately identify than others (e.g., fear), which is consistent with facial emotion recognition studies (Coulson, 2004; Van den Stock, et al., 2007). Additionally, the Multimodal Emotion Recognition Test (MERT; Banziger, et al., 2009), which assesses emotion recognition with adults from the body, in addition to face and voice, has demonstrated construct validity with other adult facial emotion recognition tasks providing evidence that body postures can be meaningful measures of emotion recognition.

Based on past research, it appears that adults can recognize emotions from body postures with moderate levels of accuracy. The question remains whether or not children possess the ability to accurately recognize emotions from body poses. Some research does exist that has begun to explore this empirical question and suggests that the ability to recognize emotions from body poses improves from 5 to 8 years of age and this ability likely continues to increase as children develop (e.g. Boone & Cunningham, 1998; Pitterman & Nowicki,

2004). Overall, there appears to be support for children's ability to recognize emotions through body poses; however, this skill has not been examined in preschool-aged children and forms one of the main goals of the present study.

It can be expected that children who do not possess the ability to accurately recognize emotion in body postures would also be at risk for negative outcomes with peers or other relationships. In a study of young adults, Pitterman & Nowicki (2004), using the DANVA2-POS (Diagnostic Analyses of Nonverbal Accuracy-2 Posture Test), found that an inability to recognize emotion through body postures was related to reports of increased loneliness, social anxiety, and lower self-esteem, for males particularly. In a study with young boys aged 8–16 years, Muńoz (2009) found an association between emotion recognition abilities and reports of callousness and unemotionality. Specifically, boys who displayed a poor ability to label both facial and body expressions of fear had the highest levels of callous-unemotional traits. Similar to studies with facial emotion recognition, it is possible that children who fail to accurately interpret an emotion (e.g., anger) from another's body postures might react impulsively or aggressively. In the current study, it was expected that children's recognition of emotion through body poses would be related to reports of children's aggressive behavior, as well as their social skills.

Gender differences have not been previously explored in research on the body emotion recognition. Given the fact that facial emotion recognition skills have been found to vary by gender, the present study extends this question to whether preschool children's recognition of body poses varies as a function of gender.

## Measurement Issues

Some inconsistent findings have been reported regarding children's emotion knowledge skills in relation to behavioral outcomes. For example, some studies have found relationships in which emotion knowledge skills predicted aggression or disruptive behavior (e.g., Denham et al., 2002; Schultz et al., 2004) and some have not (e.g., Miller et al., 2006). Other studies have reported relationships between emotion knowledge and social skills or adaptation (e.g., Izard et al., 2001; Schultz et al., 2001) and others have not (e.g., Strand, Cerna, & Downs, 2008).

These discrepant findings may be a result of the wide variety of stimuli and methods used to assess emotional knowledge skills. For example, some studies of young children have assessed emotional knowledge using free recall or labeling tasks (e.g., Widen & Russell, 2003; 2008), whereas others have used recognition tasks (e.g., Bowers, Blonder, & Heilman, 1999, Denham, 1986; Denham et al., 2002; Mayer, Salovey, & Caruso, 2000, Nowicki & Duke, 1994; Pons et al., 2003; Schultz et al., 2004). Some studies have used photographs to display facial expressions (e.g., Camras, Grow, & Ribordy, 1983; Schultz et al., 2004; Mayer, Salovey, & Caruso, 2000; Nowicki & Duke, 1994; Widen & Russell, 2003; 2008), whereas others have used felt puppets (e.g., Denham, 1986) or illustrations (e.g., Greenberg et al., 1995; Mayer et al., 2000; Pons et al., 2003). Several studies reported using photographs of older children or adults in their photographic stimuli (Mayer, et al., 2000; Nowicki & Duke, 1994; Schultz, et al., 2004; Widen & Russell, 2008); while only one study was located that reported using same-age peer models (Camras et al., 1983). In addition,

most studies provide little to no information about the sex, race, or ethnicity of the models in the photographic stimuli, so the cultural relevance of the measures cannot be determined. Finally, a variety of methods have been employed for selecting stimuli including objective coding of facial expressions (e.g., FACS; Camras, et al., 1983) and the percentage of agreement or consensus among adult judges (e.g., Schultz et al., 2004).

Therefore, as part of the current study, a new measure (CARE; Children and Adolescents' Recognition of Emotion) was created in order to examine individual differences in preschool-aged children's ability to identify emotions using scientifically-selected, high quality photographic stimuli of a mixed racial sample of preschool-aged boys and girls. The scientific method used for selecting photographs in CARE involved stringent criteria in which faces were objectively coded using the Facial Action Coding System (FACS) developed by Ekman and Friesen (1976) to ensure that the facial expressions accurately represented a prototypical facial expression of emotion. Given that one crucial developmental context for children involves social skills with same-aged peers, the CARE measure uses same-age peer models. Also, the demographic characteristics of the models were carefully selected to include equal numbers of both boys and girls, as well as black, white, Asian, and Hispanic youth.

The method of administration was also carefully developed for the CARE measure. Web-based administration and use of the audio-computer-assisted self-interviewing (audio-CASI) format were designed to 1) help keep preschoolers engaged in the task; 2) enable reliable, consistent delivery of stimuli across interviewers; and 3) provide inexpensive, immediate, and accurate access to children's responses in an electronic database. Thus, the web-based format allowed for reductions in both interviewer and data entry errors.

Finally, given that few studies examine children's understanding of emotion in bodies, CARE provided the means to directly assess children's ability to identify and label emotions from body postures. Therefore, CARE was utilized in the current study to examine preschool-aged children's knowledge of emotion in the faces and bodies of their same-aged peers in relation to their social skills and aggressive behaviors.

## Current Study

There were two goals in the present study. The first goal was to assess the relations between preschool-aged children's emotion knowledge and children's behavioral and social competence using a newly created, web-based measure of facial and body emotion recognition skills. Facial and body pose emotion recognition skills were hypothesized to be positively related to children's social skills and negatively related to children's aggression. The second goal was to examine whether the child's sex moderated the relationship between emotion knowledge skills and behavioral and social competence. Given the mixed findings on the relations between facial emotion recognition skills and gender during the preschool period, we chose to examine gender differences but are not proposing a strong directional hypothesis.

## Method

### Participants

A total of 55 children ages 3 through 6 (*M*age = 4.5 years; *SD* = 0.63, see Table 1), participated in the study (27 White, Non-Hispanic; 4 White, Hispanic; 12 African-American, 5 Asian American, and 7 multiracial). Moreover, 31 were male and 24 were female. Fifty-four parents (*M*age = 37.43; *SD* = 5.55; five fathers and 49 mothers) and 13 teachers completed questionnaires on their child's or student's behavior. The majority of parents had a college degree and an average annual household income of $67,500. Participants were recruited from child care centers serving children 6 weeks to 5 years of age across two counties in a southeastern state. The seven participating preschool centers were recruited by phone and in-person conversations with the directors of the preschools.

### Measures

**Demographic information—**Parents of participating children completed a brief parent demographic questionnaire consisting of 11 items which included: parents' age, sex, race, ethnicity, education, and income, as well as their participating child's date of birth, age, sex, race, and ethnicity.

**The Child and Adolescent Recognition of Emotions (CARE)—**CARE is a web-based, self-administered measure that directly assesses developmentally appropriate and culturally sensitive skills in children's emotion recognition. CARE includes five tasks: three tasks for facial emotion recognition (Face Recall, Face Word, and Four Faces) and two tasks for body posture emotion recognition (Body Recall and Body Word). Across the five tasks in CARE, children were presented with FACS-coded (Ekman & Friesen, 1976) photographic stimuli of preschool-aged, culturally diverse children depicting facial and body expressions of happy, sad, mad, scared, surprise, and disgust as well as neutral expressions. The photographic stimuli, created for the purposes of this study, included head and body shots of preschool-aged boys and girls from four racial and ethnic groups: African American, Asian American, European American, and Hispanic American. Photographs of 53 models ages 4 to 6 years old (28 girls and 25 boys) were taken for use in this measure.

A trained, FACS-certified research assistant (RA) was present during each photo shoot in order to coach the child models to display prototypical examples of each emotional expression. Two strategies were utilized to achieve a single facial emotional expression according to FACS. The procedure used to coach the preschool child models was to read a vignette out loud that was designed to evoke a specific feeling (e.g., disgust). Photographs of the child model's face were taken during and after each vignette. Second, if a child model did not produce the desired facial expression, the RA would display an emotion on her face and ask the child model to imitate her facial expression. The child was given a mirror to use to help practice the facial expression until it looked like it would be acceptable using FACS coding of the corresponding photograph. Once the expression was achieved, a series of photographs for that emotion were taken.

Photographs were selected for inclusion in the CARE measure using a series of steps. First, all of the photographs were visually inspected and triaged by the RA. Second, the triaged group of photographs were reviewed by the authors and further reduced. Third, the certified FACS coder conducted coding of the photographs to provide the evidence that the final selection of faces were prototypical exemplars of the six basic emotions. Inter-rater reliability was established by having a second FACS-trained coder score a random set (20%) of the photographs. Inter-rater agreement for the photographs was 87%.

In addition to emotion facial expressions, each child model was asked to display emotions using body poses. The research team developed a set of stereotypical body poses for each of the six emotions (happy, sad, mad, surprised, disgusted and scared) as well as a neutral pose based on stimuli used in studies with adults, as well as stereotypical movements and body poses used in animation and cartoons. Child models were asked to mimic these body poses during the photo sessions. The body poses included in the final set of stimuli were: a child standing up straight, squared at the camera, with arms at side (neutral), a child jumping in the air with arms raised above the head (happy), a child raising the shoulders, bending elbows 90 degrees, and extending hands and fingers (surprised), a child with arms crossed, one foot forward with body turning away from camera (mad), a child kneeling on the ground, with shoulders slumped, head bent, and hands over the face (sad), a child with hands and arms outstretched in front of face with palms facing the camera and body pulling backwards (scared); a child holding stomach and bending forward slightly (disgust). The set of body pose photographs were selected similar to above, by visual inspection and roundtable discussions. The final selection of facial and body photographs used in CARE was counterbalanced across gender, ethnicity, and emotion.

**Face Recall:** Children were presented with eight photographic stimuli of preschool-aged, culturally diverse children depicting facial expressions of the six basic emotions, as well as two neutral expressions. The eight faces were randomly presented. Children were asked to respond to the open-ended prompt, “How is this child feeling?” and generate an emotion label. Analyses were conducted using the Kuder-Richardson Formula 20 to determine the internal consistency reliability for this task. Analyses identified two items with poor reliability (i.e., two neutral facial expressions) and, therefore, these two items were dropped from the task. The final scale included six items (KR20 = .41). An emotion accuracy score based on these six items was obtained consisting of the sum total of correctly labeled emotions such that scores could range from a low of 0 (no emotions correctly labeled) to a high of 6 (all emotions correctly labeled).

**Face Word:** Children were presented with four blocks of seven individual faces each for a total of 28 photographic stimuli of similarly aged, culturally diverse children depicting the six basic emotions as well as neutral expressions. Children were shown one photograph at a time and given a choice of selecting one of two emotion labels or the option to skip the question. The number of emotion label responses was selected based on developmental expectations of most preschool-aged children being able to choose between two word options.

The presentation of photographs was initially created based upon a random order; however, that procedure resulted, by chance, in a few instances in which two or more emotion faces appeared back-to-back (e.g., three mad faces in a row). Therefore, the order of photographs was slightly reorganized to correct for this type of occurrence such that no two consecutive screens contained faces with the same prototypic feeling expression.

Children clicked on a large colored button to make their decision following a prompt. The directions were said out loud to the participants, who could not read, by a narrator whose voice was pre-recorded into an audiotaped file. The directions for this task were as follows: “Is this child happy or sad? If (he or she) is happy, click on the yellow button. If (he or she) is sad, click on the blue button.”

Internal consistency analyses revealed four items with poor reliability (i.e., one happy expression, two mad expressions, and one scared expression) and therefore, these four items were dropped from the task. The final scale included 24 items (KR20 = .75). An emotion accuracy score based on these 24 items was obtained consisting of the sum total of correctly labeled emotions such that scores could range from a low of 0 to a high of 24.

**Four Faces:** Children were presented with four photographic faces on the computer screen and asked to select a face that best represented an emotion label. Within in each block of four faces on a screen, the order of the photographs was randomized. In other words, the photograph in the far left-hand side of the screen alternated across screens in emotion, gender, and race; thus, for example, no two consecutive screens had a happy face in the far left-hand side of the screen. Children responded to the prompt “Click on the child who is feeling ____ (e.g., mad)”. This measure included 21 items (screens) with four pictures per screen of preschool-aged, culturally diverse children whose faces depicted one of the six basic emotions or a neutral expression. Internal consistency analyses identified one item to be dropped due to poor reliability (i.e., a mad facial expression) and therefore, the final scale included 20 items (KR20 = .70). An emotion accuracy score based on these 20 items was obtained consisting of the sum total of correctly labeled emotions such that scores could range from a low of 0 to a high of 20.

**Body Recall:** Children were presented with seven photographic stimuli of preschool-aged, culturally diverse children depicting body poses expressing happy, sad, mad, scared, disgust and surprise, or neutral. The body postures associated with each emotion are described above. The faces in the pictures were blurred so that children would focus on the body pose as the emotion cue. The emotions expressed by the body postures were presented randomly in this task. Children were asked to respond out loud to the open-ended prompt, “How is this child feeling?” Preliminary analyses of internal consistency identified one item with poor reliability (i.e., surprised body expression) and therefore, the final scale included six items (KR20 = .50). An emotion accuracy score based on these six items was obtained consisting of the sum total of correctly labeled emotions such that scores could range from a low of 0 to a high of 6.

**Body Word:** Children were presented with eight photographic stimuli of preschool-aged children depicting body poses expressing one of the six basic emotions or a neutral pose.

The faces in the pictures were blurred out so that children would focus on the body posture as the emotion cue. The eight body poses were presented in a randomly determined order in this task. Similar to the Face Word task, children were shown one photograph at a time and asked to click on one of two colored buttons corresponding to a feeling word. Audiotaped instructions could be automatically heard by the child participants to assist them in making their decision. For example, children were asked: “Is this child surprised or mad? If (he or she) is surprised, click on the purple button. If (he or she) is mad, click on the red button.” Preliminary analyses of internal consistency identified one item with poor reliability (i.e., surprised body expression) and therefore, the final scale included seven items (KR20 = .51). An emotion accuracy score based on these seven items was obtained consisting of the sum total of correctly labeled emotions such that scores could range from a low of 0 to a high of 7.

As mentioned above, children’s faces were obscured in both body tasks and this is similar to other measures used in studies of body posture emotion recognition (e.g., Kleinsmith, Ravindra, De Silva, & Bianchi-Berthouze, 2006; Pitterman & Nowicki, 2004). We found it likely that if both face and body expressions were included in the photograph, we would not be able to determine which information or cues children used to decide upon a label for each model’s emotion expression. Given the difficulties associated with drawing conclusions regarding the basis for children’s knowledge of facial and body cues when both are available, the faces were blurred so that we could examine children’s recognition of emotion based solely upon body postures.

**Affect Knowledge Test (AKT; Denham, 1986)—**The AKT assesses preschoolers’ emotional knowledge and is individually administered and requires the use of felt puppets depicting four detachable facial expressions of happy, sad, mad, and scared. In this measure, children are required to identify the emotions verbally by naming the four facial expressions in response to the question, “What is the face feeling?”, as well as non-verbally by pointing to each expression in response to the question, “Where is the _____ face?”. The measure consists of a total of eight items.

**Assessment of Children’s Emotions Scales (ACES; Schultz, Izard, Ackerman, & Youngstrom, 2001)—**The ACES assesses children’s emotion expression knowledge using photographs of elementary school-aged children posing facial expressions of emotion. The original version of this measure used 26 photographs but for the purposes of this study, 12 photographs will be used, similar to the methodology utilized in Domitrovich, Cortes, and Greenberg (2007). Children viewed two expressions for each of the four basic emotions (happy, sad, mad, and scared), as well as four expressionless faces. After presenting the image to the child, the interviewer asked, “Does s/he feel happy, sad, mad, scared or no feeling?”.

**Social Skills Rating System-Preschool Form (SSRS for teachers; Gresham & Elliot, 1990)—**Preschool teachers provided a rating of the frequency of a child’s socially competent and adaptive behaviors using a Likert scale ranging from 0 (Never) to 2 (Very Often). Sample items include: ‘Makes friends easily, helps you without being asked, accepts peers’ ideas for group activities.’ There is also a brief rating of problematic behaviors (e.g.,

'Has temper tantrums, appears lonely, disobeys rules'). The SSRS has established high internal consistency and test-retest reliability, as well as validity, correlating with other established teacher and parent measures of children's social and problem behaviors (Gresham & Elliot, 1990).

**Children's Behavior Checklist (CBCL/1½-5 for parents; Achenbach & Rescorla, 2000)—**The CBCL/1½-5 was designed to be completed by parents of a child between the age ranges of 1 ½ to 5 years old. The CBCL/1½-5 includes 99 items to be responded to by circling 0 (not true), 1 (somewhat or sometimes true), or 2 (very true or often true). Parent checklists report the syndrome scale of Aggression, as well as other scales that are not relevant to the present study. The CBCL scales have demonstrated strong reliability, as well as validity with other child problem scales (Achenbach & Rescorla, 2001).

**IOWA Conners Rating Scale (ICPRS for parents, Pelham, Milich, Murphy, & Murphy, 1989)—**Parents reported on symptoms of aggression in their children using a 4-point Likert scale (Not at all to Very much). The questionnaire consists of a total of 10 items. Sample items include 'Quarrelsome', 'Temper outbursts', and 'Defiant'. The IOWA Scales have demonstrated reliability from previous studies and have been used as screening measures for Attention Deficit/Hyperactivity Disorder and Oppositional Defiant Disorder (Pelham et al., 1989; Waschbusch & Willoughby, 2008).

Parent reports on the CBCL and ICPRS Aggression scales were significantly correlated with one another ($r = .59$, $p < .001$). Thus, an Aggression composite score was created by standardizing and averaging the parent reports of aggression on the CBCL and ICPRS rating scales.

## Procedure

Child participants were scheduled for individual appointments (upon receiving consent from parents and teachers) which took place in a quiet, private area at the child's child care center. Prior to beginning the interview, the adult interviewer read the child assent form and discussed the child's familiarity with the use of a computer. Once it was determined that the child was familiar with the use of a computer, the staff member launched the CARE web application. A short demographic section was completed by the interviewer for each child, which included questions about the child's age, sex, ethnicity, and race. The interviewer was available to assist the child, if needed, throughout the duration of the completion of the CARE web-based assessment tool. Children were first greeted with a welcome screen to CARE and then instructions on how to complete each measure. The interviewer managed the mouse and keyboard for both the Face Recall and Body Recall tasks as these tasks required typing verbatim responses into the web application program. The child participants used the mouse independently for the remaining three tasks. The order of the CARE tasks was the same for all children (i.e., Face Recall, Face Word, Four Faces, Body Recall, and Body Word) with the Face Recall task presented first, in order to examine children's knowledge of emotions without being primed by any emotion words first. The mean length of time to complete all five tasks in CARE was approximately 20–25 minutes (average

length of time to complete each task: Face Recall = 3–4 minutes, Face Word = 7–8 minutes, Four Faces = 4 minutes, Body Recall = 3–4 minutes, Body Word took 3 minutes). Following the completion of the set of CARE measures, children completed the AKT and ACES (presented in random order). After the completion of the interview, the children received an educational gift and certificate of completion. Each interview lasted approximately one hour.

Parents (mother or father) or guardians of each child were asked to provide an assessment of the child's aggressive/disruptive behavior. Teachers reported on each child's social skills. Parents and teachers received compensation for their participation.

## Results

### Preliminary Analyses

The means and standard deviations of children's emotion accuracy scores on each of the five CARE tasks and their social skills and aggression scores are presented in Table 2. In order to determine if boys and girls significantly differed with respect to their emotion recognition accuracy scores on each of the five CARE tasks, five separate t-tests were conducted. Results from this set of analyses revealed that no significant differences between emotion accuracy of boys and girls on any of the five CARE tasks (see Table 2).

Zero-order correlations among the five CARE tasks, child age, and the outcome variables were conducted. Child age was correlated with four of the five CARE tasks (correlations ranged from .24 to .46, $p < .05$). Therefore, we conducted partial correlations in order to examine the associations among the CARE subscales and the other outcomes variables while controlling for child age (see Table 3). Interscale correlations between CARE tasks ranged from a low of .07 between Face Recall and Body Word to a high of .64 between Four Faces and Face Word with a mean correlation of .31 suggesting that, on average, the CARE tasks were moderately correlated with one another. In other words, the more skilled children were in one emotion recognition task, the more skilled they were in other emotion recognition tasks.

Not only were the CARE tasks correlated with one another, but they were also correlated with other emotion recognition measures. Specifically, emotion accuracy scores on the Face Recall and Body Recall tasks were significantly positively correlated with children's affective labeling on the AKT and with children's emotion accuracy on the ACES. The Face Word task was positively correlated with the ACES but not with the AKT. Also, the Four Faces task was significantly positively correlated with children's emotion accuracy on the ACES, but not correlated with the AKT. The Body Word task was not significantly correlated with either ACES or AKT. Further, individual CARE tasks were not significantly correlated with children's social skills or aggression, with the exception of a marginally significant negative relationship ($p = .06$) between Body Word skills and aggression. No significant relationships emerged among the ACES and AKT measures and children's social skills and aggression.

## Relationships between Children's Emotion Accuracy and Reports of Their Social Skills and Aggressive Behavior

Regression analyses were used to test for direct relationships between children's emotion recognition accuracy for faces and bodies and children's aggression (as rated by parents) and social skills (as rated by teachers). Regression analyses also tested for different relationships between emotion recognition accuracy scores on the CARE and aggression and social skills for boys and girls. Each of the five emotion accuracy scores was centered and an interaction term was created with each task's emotion accuracy score and child gender, resulting in five interaction terms. Separate hierarchical regression analyses were conducted for each of the five CARE tasks and for each of these tasks, two models were tested: emotion accuracy predicting aggression and emotion accuracy predicting social skills. For each model, the main effects of emotion accuracy for each task and child gender were entered in Step 1 and the interaction term was entered in Step 2. When interactions occurred, follow-up simple slope tests were conducted to explore the nature of the significant interactions (Aiken & West, 1991; Preacher, Curran, & Bauer, 2006).

## Prediction of Children's Social Skills

**Faces—**The overall model predicting children's social skills was not significant for the Face Recall task, $F(3, 51) = .78$, $p = .51$. In addition, the Gender X Emotion Accuracy interaction term was not significant (see Table 4).

The overall model predicting social skills for the Face Word Task was significant, $F(3, 51) = 3.37$, $p = .02$. A significant Gender X Emotion Accuracy interaction emerged in Step 2 (see Table 4). Follow-up simple slope analyses revealed that the positive relationship between emotion accuracy and social skills was significant for boys ($\beta = .48$, $p = .02$) but not for girls ($\beta = -.31$, $p = .08$) (see Figure 1).

The overall model predicting social skills for the Four Faces task was significant, $F(3, 51) = 3.11$, $p = .03$. A significant Gender X Emotion Accuracy interaction emerged in Step 2 (see Table 4). Follow-up simple slope analyses revealed that the relationship between emotion accuracy and social skills was significant for boys ($\beta = .37$, $p = .02$) but not for girls ($\beta = -.40$, $p = .13$) (see Figure 2).

In sum, children's emotion accuracy on the Face Recall task was not significantly related to their social skills; however, children's emotion accuracy scores on the Face Word task and Four Faces task were both positively related to teacher reports of children's social skills and these relationships were moderated by gender.

**Body—**The overall model predicting social skills for the Body Recall task was significant, $F(3, 51) = 3.04$, $p = .04$. A significant Gender X Emotion Accuracy interaction emerged in Step 2 (see Table 5). Follow-up simple slope analyses revealed that the positive relationship between children's emotion accuracy and social skills was significant only for boys ($\beta = .53$, $p = .01$) but not for girls ($\beta = -.20$, $p = .32$) (see Figure 3).

The overall model predicting children's social skills was not significant for the Body Word task, $F(3, 51) = 0.89$, p = .45. In addition, the Gender X Emotion Accuracy interaction was not significant (see Table 5).

In sum, children's emotion accuracy on the Body Recall task was positively related to teacher reports of children's social skills, and this relationship was moderated by gender. Children's emotion accuracy on the Body Word task did not significantly predict their social skills.

### Prediction of Children's Aggressive Behavior

**Faces—**The overall models predicting children's aggression were not significant for the Face Recall task, $F(3, 51) = .55$, $p = .65$, the Face Word task, $F(3, 51) = .50$ $p = .69$ or the Four Faces task, $F(3, 51) = .17$, $p = .92$ (see Table 4). In addition, the Gender X Emotion Accuracy interactions were not significant for any of the face tasks. In sum, children's emotion accuracy scores on the three facial emotion tasks were not significantly related to parent reports of children's aggression.

**Body—**The overall model predicting children's aggression for the Body Recall task was not significant, $F(3, 51) = 1.10$, $p = .36$. No significant Gender X Emotion Accuracy interaction was found. The overall model predicting children's aggression was not significant for the Body Word task, $F(3, 51) = 1.27$, $p = .29$. A main effect for children's emotion accuracy was approaching significance in Step 1 ($p = .06$) but was no longer significant with the addition of the interaction term in Step 2 (see Table 5). No significant Gender X Emotion Accuracy interaction was found. In sum, children's emotion accuracy scores on the two body pose tasks were not significantly related to parent reports of children's aggression.

## Discussion

The main goal of the current study was to explore preschool-aged children's recognition of emotions in faces and bodies using a newly created measure of emotion knowledge. Children appeared to be able to label emotion expressions in both the faces and bodies of same-aged peers. Although past research has identified links between preschool-aged children's facial emotion recognition and their social-emotional behaviors, the current study is one of the first to explore preschool-aged children's recognition of emotions from body poses and its relation to children's social-emotional competence.

Accurate encoding of the facial and body cues of peers is an important component of children's social and emotional problem solving skills (Crick & Dodge, 1994; Dunsmore et al., 2008; Halberstadt et al., 2001). In fact, according to the ASC model (Halberstadt et al., 2001), this encoding skill is critical to accurately receiving emotional messages from others and participating in efficacious communication with both peers and adults. Children's emotion recognition ability is predictive of their prosocial abilities and aggressive tendencies (e.g., Arsenio et al., 2000; Barth & Bastiani, 1997; Denham et al., 2002; Denham & Couchoud, 1990; Maxim & Nowicki, 2003; Miller et al., 2005; Schultz et al., 2000) and similar relationships were found in the current study for preschool-aged children's abilities. In particular, children's, specifically boys', emotion accuracy on two out of the three facial

emotion tasks (Face Word and Four Faces) was positively related to their social skills, as reported by their teachers. Developing a skill set that includes the ability to recognize how another is feeling may better equip boys to establish high quality friendships.

Examining how the relations among facial and body emotion accuracy and child behavior vary by gender was an aim of the current study. First, there were no sex differences on mean levels of performance on any of the five subtests, which is consistent with previous studies examining gender differences in emotion knowledge (Dunsmore et al., 2008; Martin & Green, 2005). Second, findings revealed that the relationship between facial emotion recognition skills and teacher-rated social skills was moderated by gender. One previous study reported that the relationship between emotion recognition and social skills would be stronger for girls than for boys (Leppänen & Hietanen, 2001); however, we found the reverse relationship. In fact, the better boys' facial emotion recognitions skills, replicated across three subtests, the better their social skills, and the relationship between facial emotion recognition skills and social skills was not significant for girls. The associations among emotion recognition and social outcomes appeared to differ among the boys and girls. Different patterns of relationships have also emerged with significant improvements in boys' behaviors but not girls' behaviors as a function of emotion socialization (Cunningham et al., 2009; Martin & Green, 2005). In addition, there were very few girls in the sample who were highly rated on aggression or social problems. The truncated range on the social and behavioral measures may have attenuated the relationships between emotional knowledge and adjustment in girls. This finding suggests that a direction for future research might be to explore more complex emotion recognition skills, as well as reexamine these hypotheses with a larger, older, and more diverse samples of girls.

The current study extends findings about preschool-aged children's recognition of emotion beyond faces to the recognition of emotion in body poses. Encoding of nonverbal cues in a social situation can include gathering information from both an individual's face, as well as body posture (e.g., Boone & Cunningham, 1998; Coulson, 2004; Pitterman & Nowicki, 2004; Van den Stock, et al., 2007). Identifying that a person is feeling angry based on their arms folded across their chest or feeling sad based on their slumped shoulders can assist with deciding what to do or say next in a situation. This is particularly important for children to be successful in establishing and maintaining peer relationships. In fact, in the current study, children's, specifically boys', emotion accuracy on the Body Recall task was positively associated with social skills. Boys who could accurately identify emotions from body poses were rated as more socially skilled by their teachers. No significant findings were found for emotion accuracy for body postures and aggression. Given that the findings were based on a new method to examine children's abilities in recognition of emotion from body poses and a small sample, it is possible that a future study with a larger sample of children that utilizes a measure with body pose stimuli may establish unique connections between children's body emotion recognition and their aggressive behaviors. Capturing children's encoding of facial and body cues from others will provide valuable information about the emotional competencies of aggressive and non-aggressive children, as well as information about where these patterns begin to emerge. Nonetheless, the current findings underscore the importance of understanding children's abilities to interpret emotional information.

Surprisingly, no relationships were found between children's recognition of facial emotions and aggression, contrary to previous findings (e.g., Denham et al., 2002; Denham & Couchoud, 1990; Garner, Dunsmore & Southam-Gerrow, 2008; Schultz et al., 2004). One possible reason is that although there was variability in the current sample with respect to aggression, the range was truncated with only two children rated in the clinical range on the nationally normed CBCL measure. Future studies with a larger sample of children might detect a relationship between aggressive behavior and emotional knowledge on the CARE measure.

Interestingly, the Face Recall task did not yield any significant findings. It was anticipated that by age four or five, children would be able to accurately identify the six basic emotions (Camras et al., 1988; MacDonald et al., 1996; Russell & Widen, 2002; Schultz et al., 2000); however, none of the children accurately recalled all six emotions in all faces on the Face Recall task. In fact, only a small percentage of children accurately identified five out of the six emotions, with disgust being the most difficult to recognize. Given the developmental challenges in successfully completing this task, it is not surprising that individual differences were not detected. This recall task was more difficult for many children in the sample as compared to the recognition tasks. Recall is a more challenging memory task than recognition, in general. Specifically, recall of emotion labels by preschool children may be universally challenging because they possess broad emotion categories based on valence (e.g., positive versus negative) and therefore may experience difficulty distinguishing among various types of negative emotion such as anger, sadness or disgust (Brechet, Baldy, & Picard, 2009; Widen & Russell, 2003; Widen & Russell, 2008). As children age (with considerable improvements seen at age eight), their categories become more differentiated, allowing them to more accurately label emotions in free recall tasks (Brechet, et al., 2009; Widen & Russell, 2003; 2008). A potential future study might be to investigate if any age differences exist in children's emotion accuracy on the recall and recognition tasks in the CARE measure across the preschool and early elementary years.

An important contribution of this study was the creation of the web-based CARE assessment tool with the innovative and unique feature of including same-aged peers posing with FACS-coded, prototypical emotional expressions on their faces. The use of the FACS coding to carefully select stimuli for the CARE measure was a strength because the stimuli were standardized across the assessment tool, i.e., every happy face in all five CARE tasks shared the same exact muscle features (e.g., action units 6 and 12). This allowed us to include facial expressions of prototypic, genuine emotions as well as obtain more accurate appraisals of children's emotion knowledge abilities using standard stimuli. The web-based format for data collection also allowed for reductions in both interviewer (stimuli presented same way each time) and data entry errors, as well as immediate downloads and scoring of data.

There are some limitations of the current study. First, the sample size was small, which warrants caution in interpreting and generalizing the findings. To fully understand preschool children's emotion recognition skills as assessed using the CARE measure, the next step will be to replicate this study with a larger, diverse sample of boys and girls using outcome measures from multiple informants. The significant findings that did emerge from this study

suggest that further investigations of the developmental implications of gender differences in emotion recognition skills utilizing the CARE assessment are needed.

Second, some of the CARE scales had relatively low reliability. In particular, the Face Recall task had the lowest reliability of the five tasks assessed in the CARE and perhaps adding more high quality items would increase the scale's reliability and, in turn, improve its validity. In fact, two tasks (i.e., Face Word and Four Faces) had the highest internal consistencies of the set of five tasks which may have contributed to their stronger findings in relation to social skills. Third, the order of presentation of the five CARE tasks was not counterbalanced to avoid providing participants with an emotion vocabulary prior to the initial emotion recall task. This could partly explain why the Body Recall task had slightly better reliability and validity than the Face Recall task. Future studies could examine different sequences of tasks (e.g., presenting the two body tasks first or the face and body recall tasks first) to determine if order of presentation influences emotion knowledge.

Examining the emotion knowledge skills of additional populations is also a direction for future research, particularly given that the sample for the current study was limited to only preschool-aged children. For example, including children of early and late elementary age would also provide valuable information about children's abilities to recall and recognize more complex emotions (e.g., pride), as well as mixed emotions (e.g., anger-sad). As a child develops through adolescence, their emotion recognition skills continue to progress and they develop the ability to differentiate among more complex emotions (Bosacki & Moore, 2004; Izard, 1971). Children aged 9 and 11 can distinguish shame from other emotions such as guilt providing evidence that older children should recognize and understand more complex, self-conscious emotions in addition to basic, primary emotions, such as anger or happiness (Olthof, Schouten, Kuiper, Stegge, & Jennekens-Schinkel, 2000).

Research is also needed to investigate children's ability to identify emotion when facial and body expressions of emotion are incongruent to determine which cues children use to detect and label an emotion. Studies with adults suggest that when face and body convey conflicting emotional information, judgments of the facial expression are influenced by the accompanying body language (Meeren, van Heijnsbergen & de Gelder, 2005; Van den Stock, Righart, & de Gelder, 2007). Similar studies with children and adolescents would provide additional insight into the development of emotion recognition skills across multiple modes of communication.

Finally, another important direction for future research is to examine facial and body emotion knowledge using the CARE assessment as a function of individual differences. For example, investigating children who are aggressive may be of interest. Research on hostile attribution bias has provided evidence that children with aggressive tendencies are more likely to misattribute cues in a situation than children without those aggressive tendencies (e.g., Dodge & Tomlin, 1987; Fine, Trentacosta, Izard, Mostow, & Campbell, 2004; Schultz et al., 2004). This research is typically conducted using facial expressions, but it is of interest whether or not aggressive children's attribution bias would generalize to body cues. Another suggested population of interest for future research may include children with autism spectrum disorders. Children with autism spectrum disorders have deficits in decoding

emotion in other's facial expressions (e.g. Golan, Baron-Cohen & Golan, 2008; Kuusikko et al, 2009), but there is minimal research on body poses. Given that faces and bodies share similar physical and social properties, it is possible that children with autism or Asperger syndrome may also experience difficulty with decoding emotion from body poses, in addition to facial expressions.

Developing the skills to be socially and emotionally competent is an important part of children's healthy social-emotional development (Halberstadt et al., 2001; Hubbard & Dearing, 2004). Broadening our understanding of children's abilities can lead to the development of assessment tools and preventive interventions that will work to identify strengths and weaknesses in emotion recognition in various populations of youth. Additional future research with assessments such as CARE may provide more information about children who have problems with peer relationships or behavior that may be due, in part, to emotional knowledge deficits. This knowledge could be of benefit to early education programs, daycare facilities, as well as child development researchers. Overall, research investigating children's recognition of emotion in faces and body poses and how this relates to their social-emotional competence in preschool and in later years, may inform both theory and prevention practices.

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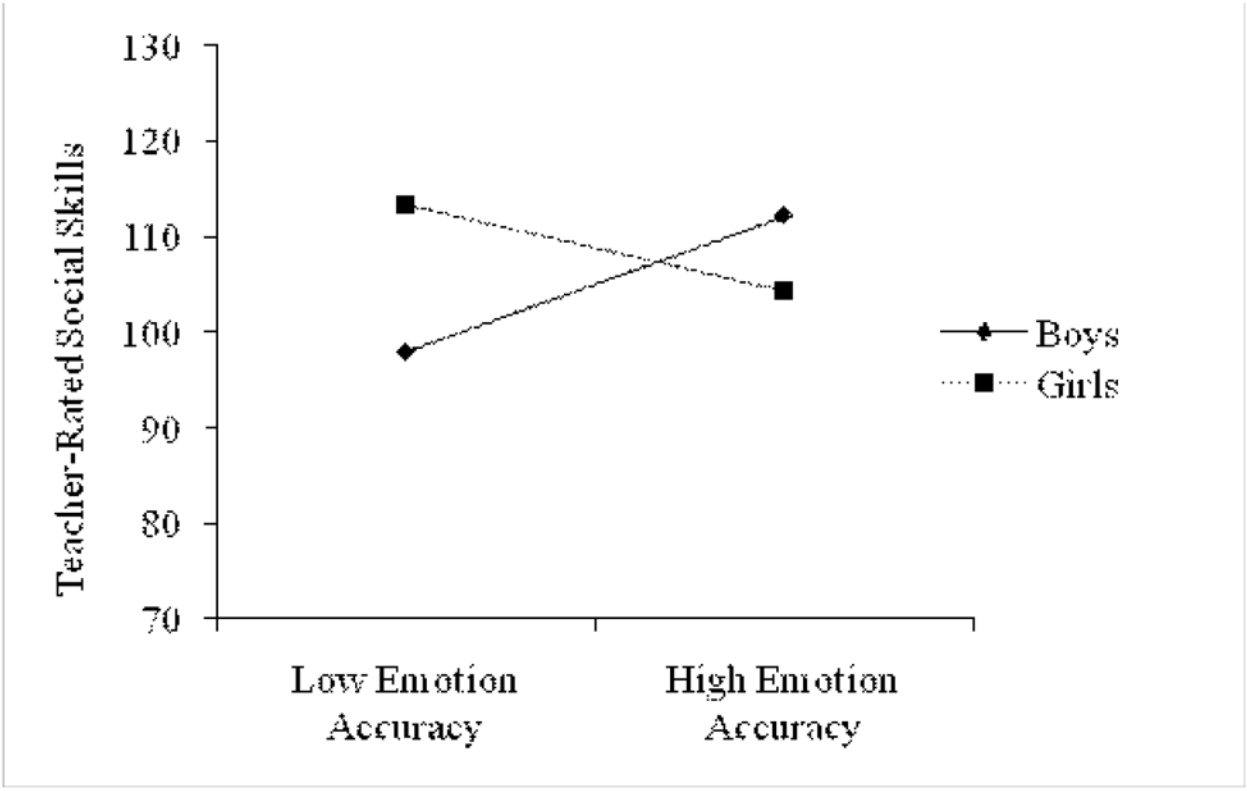


**Figure 1.**
Child gender as a moderator between children's emotion accuracy score on the Face Word task and their teacher-rated social skills.

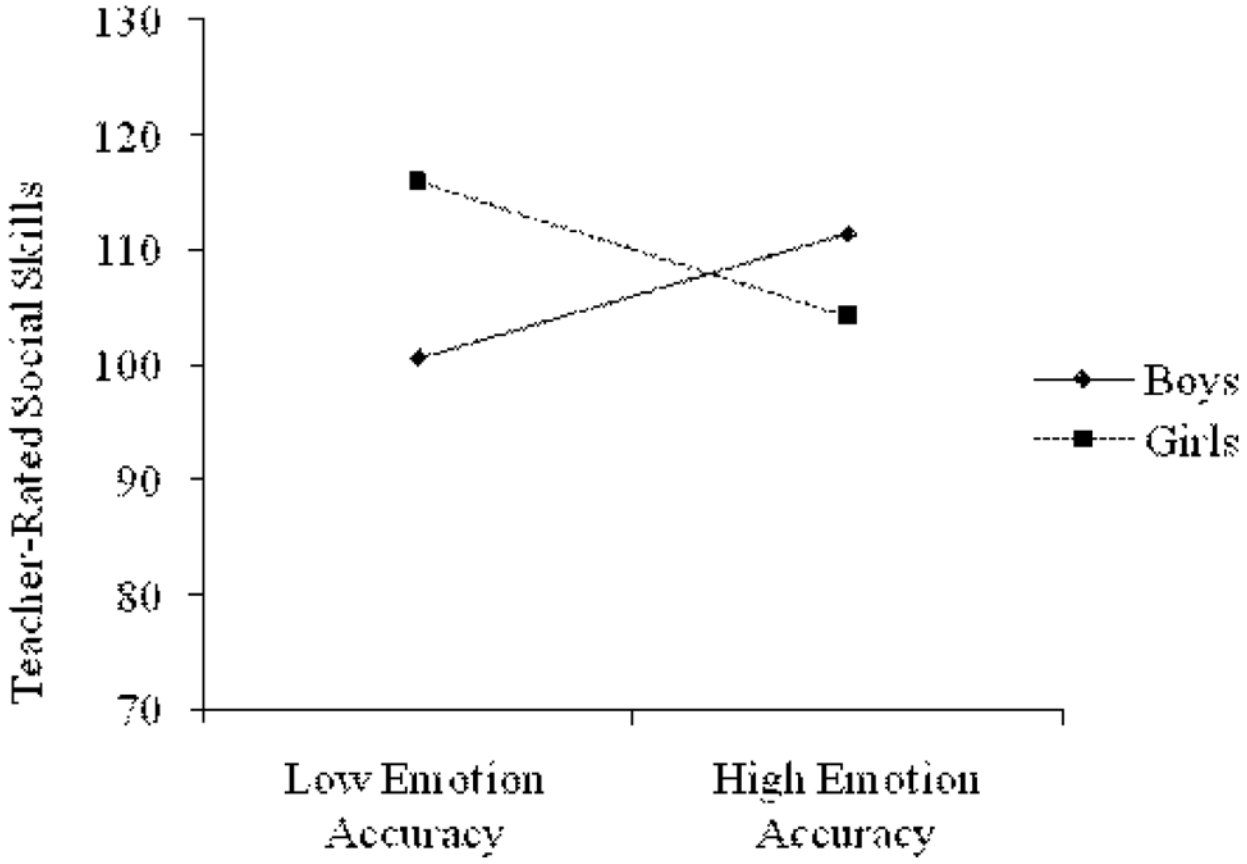


**Figure 2.**
Child gender as a moderator between children's emotion accuracy score on the Four Faces task and their teacher-rated social skills.

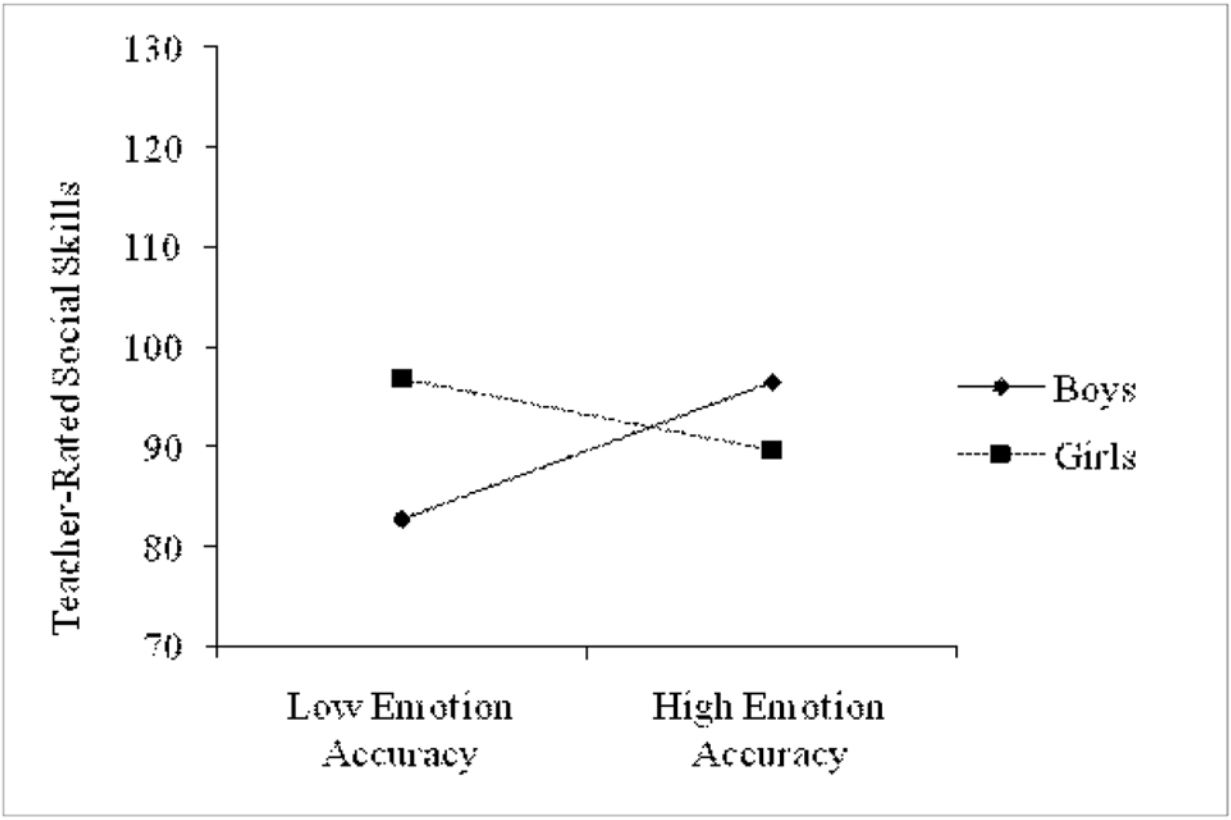


**Figure 3.**
Child gender as a moderator between children's emotion accuracy score on the Body Recall task and their teacher-rated social skills.

**Table 1**

Summary of Child Participants by Gender and Age

| | Age (in years) | | | | |
|---|---|---|---|---|---|
| **Gender** | **3.5** | **4** | **5** | **6** | **Total** |
| Boy | 1 | 13 | 16 | 1 | 31 |
| Girl | 0 | 15 | 8 | 1 | 24 |
| Total | 1 | 28 | 24 | 2 | 55 |

*Early Educ Dev*. Author manuscript; available in PMC 2016 April 05.

**Table 2**

Means and Standard Deviations of Children's Emotion Accuracy on CARE, ACES, and AKT, and Social Skills and Aggression

| | Girls | | Boys | | | |
|---|---|---|---|---|---|---|
| | ***M*** | ***SD*** | ***M*** | ***SD*** | ***t*** | ***p*** |
| CARE | | | | | | |
| Face Recall | 3.04 | 1.06 | 3.17 | 1.15 | .65 | .51 |
| Face Word | 21.92 | 3.84 | 22.17 | 2.84 | .34 | .74 |
| Four Faces | 16.68 | 2.11 | 15.80 | 3.12 | −1.17 | .25 |
| Body Recall | 2.16 | 1.34 | 2.33 | 1.38 | .16 | .87 |
| Body Word | 5.12 | 1.42 | 5.60 | 1.48 | .97 | .34 |
| Emotion Knowledge | | | | | | |
| AKT | 7.23 | .72 | 7.16 | .95 | −.30 | .76 |
| ACES | 4.54 | 2.10 | 4.52 | 2.06 | −.04 | .96 |
| Behavioral Measures | | | | | | |
| Social Skills | 109.00 | 15.72 | 105.18 | 13.67 | −1.02 | .31 |
| Aggression | .04 | .64 | −.03 | 1.07 | −.30 | .77 |

*Note.* Range includes 0 to 6 for Face Recall Total, 0 to 24 for Face Word Total, 0 to 20 for Four Faces Total, 0 to 6 for Body Recall Total and 0 to 7 for Body Word Total, 0 to 8 for AKT, 0 to 8 for ACES, 70 to 130 for Teacher-Rated Social Skills, Z scores range from −1.04 to 3.02 for Parent-Rated Aggression. CARE = Children and Adolescents' Recognition of Emotion; ACES = Assessment of Children's Emotions Scales; AKT = Affect Knowledge Test.

**Table 3**

Partial Correlations (Controlling for Child Age) for Children's Emotion Accuracy, Social Skills, and Aggression

| Measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Face Recall | -- | | | | | | | | |
| 2. Face Word | .37* | -- | | | | | | | |
| 3. Four Faces | .30* | .64** | -- | | | | | | |
| 4. Body Recall | .15 | .37* | .50* | -- | | | | | |
| 5. Body Word | .07 | .28* | .38* | .38* | -- | | | | |
| 6. Social Skills | −.07 | −.04 | .13 | .09 | −.07 | -- | | | |
| 7. Aggression | −.13 | −.14 | −.07 | −.22 | −.27t | −.00 | -- | | |
| 8. AKT | .33* | .15 | .14 | .31* | .10 | .07 | −.13 | -- | |
| 9. ACES | .31* | .64** | .47** | .28* | .21 | .00 | −.11 | .23 | -- |

*Note*. AKT = Affect Knowledge Test; ACES = Assessment of Children's Emotions Scales.

t p<.10,

* p<.05,

** p<.01

**Table 4**

Child Gender and Emotion Accuracy on Facial CARE Tasks as Predictors of Children's Social Skills and Aggression

| | Face Recall | | | | Face Word | | | | Four Faces | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Social Skills | | Aggression | | Social Skills | | Aggression | | Social Skills | | Aggression | |
| **Predictors** | ***B*** | ***SE*** | ***B*** | ***SE*** | ***B*** | ***SE*** | ***B*** | ***SE*** | ***B*** | ***SE*** | ***B*** | ***SE*** |
| Step 1 | | | | | | | | | | | | |
| Gender | 4.20 | 4.12 | .05 | .25 | 4.25 | 4.13 | .06 | .25 | 3.56 | 4.10 | .08 | .25 |
| Emotion Accuracy | −.53 | 1.93 | −.11 | .11 | .05 | .62 | −.03 | .03 | .93 | .75 | −.03 | .05 |
| $R^2$ | .02 | | .02 | | .02 | | .02 | | .05 | | .01 | |
| Step 2 | | | | | | | | | | | | |
| Gender | 3.86 | 4.12 | .06 | .25 | 3.79 | 3.83 | .06 | .24 | 4.12 | 3.89 | .08 | .25 |
| Emotion Accuracy | 1.38 | 2.61 | −.18 | .14 | 2.14* | .91 | −.07 | .06 | 1.98* | .83 | −.03 | .07 |
| Emotion AccuracyXGender | −4.26 | 3.89 | .19 | .23 | −3.51* | 1.17 | .05 | .08 | −4.14* | 1.63 | −.00 | .11 |
| $R^2$ | .04 | | .03 | | .17* | | .03 | | .16* | | .01 | |

*Note*. CARE = Children and Adolescents' Recognition of Emotion.

$^{t}$p<.10,

$^{*}$p<.05,

$^{**}$p<.01

**Table 5**

Child Gender and Emotion Accuracy on Body CARE Tasks as Predictors of Children's Social Skills and Aggression

| | Body Recall | | | | Body Word | | | |
|---|---|---|---|---|---|---|---|---|
| | Social Skills | | Aggression | | Social Skills | | Aggression | |
| **Predictors** | ***B*** | ***SE*** | ***B*** | ***SE*** | ***B*** | ***SE*** | ***B*** | ***SE*** |
| Step 1 | | | | | | | | |
| Gender | 4.20 | 4.07 | .05 | .24 | 4.18 | 4.16 | .01 | .24 |
| Emotion Accuracy | 1.80 | 1.63 | −.14 | .09 | −.13 | 1.43 | −.16$^{t}$ | .08 |
| $R^2$ | .04 | | .05 | | .02 | | .07 | |
| Step 2 | | | | | | | | |
| Gender | 3.23 | 3.87 | .05 | .24 | 3.71 | 4.15 | .01 | .24 |
| Emotion Accuracy | 5.77$^{*}$ | 2.19 | −.21$^{t}$ | .12 | 1.36 | 1.84 | −.18 | .11 |
| Emotion AccuracyXGender | −7.94$^{*}$ | 3.10 | .16 | .18 | −3.63 | 2.88 | .04 | .17 |
| $R^2$ | .16$^{*}$ | | .06 | | .05 | | .07 | |

*Note.* CARE = Children and Adolescents' Recognition of Emotion.

$^{t}$p<.10,

$^{*}$p<.05,

$^{**}$p<.01