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Short communication

Primary caregiver emotional expressiveness relates to toddler emotion understanding

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ABSTRACT

The present study examined the impact of emotional expressiveness in toddlers' environments on their emotion understanding. Primary caregivers of 35 toddlers completed two surveys regarding the family's emotional expressiveness and the primary caregiver's expressivity. Toddlers participated in the Affective Knowledge Test to measure emotion understanding. Toddler emotion understanding related to primary caregiver expressivity, but not family expressiveness. Further, toddler emotion understanding related to primary caregiver Impulse Strength, but not Negative or Positive Emotionality. This suggests that primary caregivers with more impulsive emotional response tendencies may help their children to identify associations between emotional events and reactions.

The social world is complicated, and learning about it begins early (Tomasello, 2010). One key aspect of early social development is emotion understanding, which refers to knowledge about emotion categories in the self and others (Castro, Cheng, Halberstadt, & Grühn, 2015). Emotion understanding involves identifying and labeling emotional expressions, and inferring emotional reactions in response to particular events. This is important because early emotion understanding contributes to a host of concurrent and later skills, including social competence (2003, Denham et al., 2002; Eggum et al., 2011; Izard et al., 2001; Lane, Wellman, Olson, LaBounty, & Kerr, 2010) and academic success (Izard et al., 2001; Torres, Domitrovich, & Bierman, 2015). Children's emotion understanding development is largely stable from age 3 to 11 (Brown & Dunn, 1996; Eggum et al., 2011; Pons & Harris, 2005), suggesting that emotion understanding may undergo important developmental changes before age 3. Infants perceive, differentially respond to, and reference others' specific emotions (Ruba & Repacholi, 2019; Vaish, Grossmann, & Woodward, 2008), and toddlers can answer questions about others' emotions (Denham, 1986), but there are substantial individual differences in early emotion understanding (Dunn, Bretherton, & Munn, 1987). This is likely influenced by the emotional information present in the child's environment. Young children spend most of their time with family members, and families have highly variable emotional environments, which may explain some of the individual differences in emotion understanding. Thus, in the present study, we addressed whether emotion understanding in 2.5-year-olds related to the emotional expressiveness in their families.

Prior research has demonstrated that children's social environment can shape emotion understanding. For example, discussions about emotions from family members predict levels of children's later emotion understanding (Dunn, Brown, & Beardsall, 1991; Taumoepeau & Ruffman, 2006), and emotion understanding relates to secure attachment (de Rosnay & Harris, 2002; Ontai & Thompson, 2002; Steele, Steele, Croft, & Fonagy, 1999), parents' emotion-related beliefs (Castro, Halberstadt, Lozada, & Craig, 2015),

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higher socioeconomic status, and cooperation with siblings (Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991).

Theoretical work suggests that parental expression of emotion is key to socializing children's emotional competence (a broader term often used to describe the combination of emotion understanding, habitual emotional responses, and emotion regulation; Eisenberg, Cumberland, & Spinrad, 1998), and several studies have found evidence supporting this claim. For example, children whose mothers had more displays of anger had lower emotion understanding (Denham, Zoller, & Couchoud, 1994). Additionally, children from low-marital satisfaction families have lower emotion understanding, and children from low-marital conflict families are more likely to attribute positive emotions to vignette characters than children from high-marital conflict families (Nixon & Watson, 2001). Further, lower levels of emotion understanding have been observed among children from socio-emotionally deprived environments (Fries & Pollak, 2004; Pears & Fisher, 2005). Among adults, retrospective accounts of childhood family emotional expressiveness positively related to current perceptions of emotional intensity (Halberstadt, Dennis, & Hess, 2011).

Family expressiveness may also play a role in emotional development in infancy. For example, "positive" mothers have infants who more strongly differentiate fearful and happy expressions (de Haan, Belsky, Reid, Volein, & Johnson, 2004), and higher levels of family expressiveness relate to greater happy "emotion matching" across face and voice (Ogren, Burling, & Johnson, 2018). Conversely, infants of clinically depressed mothers, who typically are less expressive than non-depressed mothers, do not discriminate emotions as well as their peers (Bornstein, Arterberry, Mash, & Manian, 2011). Further, infant familiarity with individuals and parental involvement relate to infant sensitivity to these individuals' expressions (Montague & Walker-Andrews, 2002), and infants prefer to look at fearful faces only when expressed by their own race (Safar, Kusec, & Moulson, 2017). These studies suggest that infant experiences in the early home environment may impact the development of emotion understanding. The present study extends these results by focusing on specific sources of expressiveness and types of expressivity in toddlerhood.

Previous studies examined either family (e.g., Halberstadt et al., 2011; Halberstadt & Eaton, 2002; Ogren et al., 2018) or maternal expressiveness (e.g., Bornstein et al., 2011; Denham et al., 1994; Ereky-Stevens, 2008) in relation to individuals' emotion understanding. Yet to our knowledge, the impacts of these two sources of emotional expressiveness have not been examined together. Disentangling the role of the full family versus the primary caregiver (with whom the toddler may spend the most time) is important to best understand which sources of information and modeling may be most influential early in life. Additionally, it is important to understand what types of expressivity may be driving these relations because emotional expressivity can come in multiple forms (e.g., habitual positive or negative emotional displays, strength of emotional response tendencies).

Recent research suggests that as early as infancy, emotion perception may predict individual differences in later emotion understanding (Ogren & Johnson, 2020). In the present study, however, we targeted an age at which emotion understanding is emerging and variable, 2.5 years (Denham & Couchoud, 1990; Ensor, Spencer, & Hughes, 2011), and we hypothesized that both family expressiveness and primary caregiver expressiveness would uniquely contribute to emotion understanding in this sample.

Thirty-five toddlers (18 female, M_{age} = 30.02 months, SD_{age} = 0.31 months, range = 29.21-30.75 months) participated in the present study as part of a larger longitudinal study (Ogren & Johnson, 2020). Two additional toddlers were excluded due to inattention. This sample size was adequate to detect meaningful, significant relations between toddler's emotion understanding and infant emotion perception at earlier time points (Ogren & Johnson, 2020). Participants were recruited from birth records provided by the county. Thirty-three participants had at least one college-graduate parent. The ethnic and racial breakdown of participants was: White (N = 18), Multiracial (N = 9), Asian (N = 4), Latino (N = 2), African-American (N = 1), Pacific Islander (N = 1). Parents received $30 in cash and a small gift (e.g., A T-shirt or sippy cup) for participating. Parents of all participants provided written informed consent prior to data collection in accordance with the University of California, Los Angeles Institutional Review Board (ID #15-01555), and the ethical approval provided by this committee conformed to APA standards. Parents (33 mothers, 2 fathers) completed a demographic questionnaire, the FEQ (Halberstadt, 1986), and the BEQ (Gross & John, 1997).

The FEQ asked how frequently (Likert scale, 1–9) individuals in the family express themselves in different situations. For example, the survey asked parents how frequently someone in the family would "exclaim over a beautiful day" when they are around family members. The survey contained 40 questions, and possible scores ranged from 40 to 360. Each question in the FEQ represented either positive or negative expressiveness (Burrowes & Halberstadt, 1987). The positive and negative subscales each had possible scores ranging from 20 to 180. The FEQ is distinct from measures of self-expressiveness or shyness, reveals significant similarity among family members, and has high test-retest reliability (Halberstadt, 1986).

The BEQ was used to measure the expressivity of the primary caregiver. The parent who brought the participant to the lab was assumed to be the primary caregiver, and they were asked to fill out the survey about themselves. The BEQ asked the parent to indicate how strongly they agreed or disagreed with various statements (Likert scale, 1–7, 1="strongly disagree," 4="neutral," 7="strongly agree") such as "It is difficult for me to hide my fear". Some items were reverse coded such that a higher value represented greater expressivity. The questionnaire contained 16 questions, separated into three subscales: Negative Expressivity (N = 6), Positive Expressivity (N = 4), and Impulse Strength (N = 6). Impulse strength questions asked about response tendencies (e.g., "My body reacts very strongly to emotional situations"). Subscale scores were calculated as the average of each participant's responses within that category, and a total score was calculated as the average of the three subscale scores. Thus, possible values for each of the subscale scores and the total score ranged from 1 to 7. The BEQ is a valid, stable, and reliable measure of an individual's emotional expressivity (Gross & John, 1997).

Toddler participants took part in Denham's Affective Knowledge Test (AKT; Denham, 1986), a common measure of emotion understanding among preschool-aged children, to assess their expressive, receptive, and stereotypical situation knowledge for the emotions "angry," "happy," "sad," and "afraid." These emotion words are commonly produced by 2-year-olds (Wellman, Harris, Banerjee, & Sinclair, 1995), and the AKT has previously been used with 2-year-olds (Denham & Couchoud, 1990; Ensor et al., 2011).

Participants were presented with four felt faces each depicting anger, happiness, sadness, or fear. The task began with the

experimenter asking the toddler to verbally identify the emotion of each face. Then, the experimenter shuffled the order of the faces and completed the receptive portion of the task. After the toddler responded by pointing to a face for each provided emotion label, the experimenter provided them with the correct labels for each face, accompanied by the appropriate facial and vocal emotional tones. Then, the experimenter tested for understanding of stereotypical emotional situations by portraying eight brief scenarios in which a puppet felt one of the four emotions. Each puppet responded to the scenario in a stereotypical manner. The experimenter produced the facial and vocal emotional cues to accompany the behavior of the protagonist puppet. After each situation, the toddler was asked to identify which of the four faces matched the emotion of the puppet.

For each of the 16 questions in the AKT (4 expressive, 4 receptive, 8 stereotypical situations), the toddler could receive a score ranging from 0 to 2: 2 for the correct answer, 1 for an incorrect answer of the correct valence, and 0 for an answer of the incorrect valence, non-emotion (e.g., "like a dragon"), or no response. Summing across all components of the AKT, a "Total AKT" score was calculated for each participant, with possible scores ranging from 0 to 32.

For AKT scores, higher values indicate higher levels of emotion understanding. We observed considerable variability in AKT performance among participants, with scores for each AKT component and total score as follows: Expressive $M = 3.09$, $SD = 2.50$, *Range* = 0-7; Receptive $M = 4.57$, $SD = 2.56$, *Range* = 0-8; Situational $M = 7.03$, $SD = 2.44$, *Range* = 0-11; Total $M = 14.69$, $SD = 5.09$, *Range* = 2-24. We observed no significant sex differences in any of the AKT components (all t's<2.00, all p's$>.05$) and participant age did not correlate with any of the AKT components (all r's$<.22$, all p's$>.05$). Additionally, no significant participant sex differences were observed for the FEQ or BEQ (t's<0.40, all p's$>.05$), and participant age did not relate to FEQ or BEQ scores (r's$<.25$, p's$>.05$). Thus, biological sex and age were not included as factors in any subsequent analyses.

To assess the unique contributions of family expressiveness and primary caregiver expressiveness to participant emotion understanding, we performed a multiple linear regression with AKT total score as the outcome variable and total scores for the emotional expressiveness questionnaire measures (FEQ and BEQ) as predictors. Total scores were used to assess how the overall degree of expressivity in the toddler's environment may model emotion information. We inspected the data for outliers (more than 3 standard deviations from the mean for the AKT, BEQ, FEQ), but no scores reached this criterion, and thus all scores were retained for analyses. There were no missing data; all 35 participants provided data for each outcome and predictor variable.

Results of the multiple linear regression revealed no significant relation between the FEQ and AKT performance ($\beta = .08$, $p = .506$) when accounting for BEQ. However, the BEQ score uniquely related to toddler overall AKT performance ($\beta = .35$, $p = .041$) when accounting for FEQ. Toddlers with more expressive primary caregivers had higher levels of emotion understanding, over and above the effect of family expressiveness.

Given the positive relation between toddler AKT performance and parent BEQ score, we performed follow-up analyses to identify how the three BEQ subscale scores contributed to toddler emotion understanding in isolation, independent of family expressiveness. We did not have specific hypotheses for these post-hoc analyses. We ran three separate correlations, and we corrected for multiple comparisons using a Bonferroni correction, yielding a new alpha level of .017. Our results showed no significant relation between toddler AKT score and primary caregiver positive expressivity ($r = .25$, $p = .142$; Fig. 1) or negative expressivity ($r = .24$, $p = .171$; Fig. 2), but there was a significant positive relation between toddler AKT score and primary caregiver impulse strength ($r = .42$, $p = .012$; Fig. 3). Toddlers with more emotionally impulsive primary caregivers had higher levels of emotion understanding.

In summary, our results revealed that primary caregiver expressiveness, but not family expressiveness, uniquely related to the emotion understanding of 2.5-year-olds. Follow-up analysis indicated that the primary caregiver's impulse strength related to toddler emotion understanding.

The finding that primary caregiver emotional expressiveness positively related to toddler emotion understanding, when accounting for family expressiveness, appears to conflict with predictions from the socialization hypothesis (Lanzetta & Kleck, 1970), according to which individuals who are better able to understand emotions are those raised in environments that encourage them to limit emotional

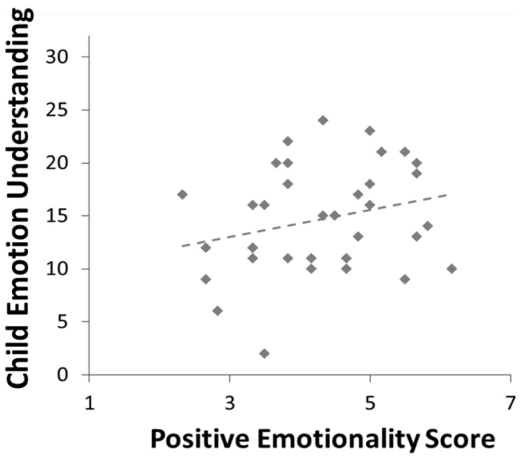

Fig. 1. Scatterplot depicting the relation between level of primary caregiver positive emotionality and child emotion understanding score.

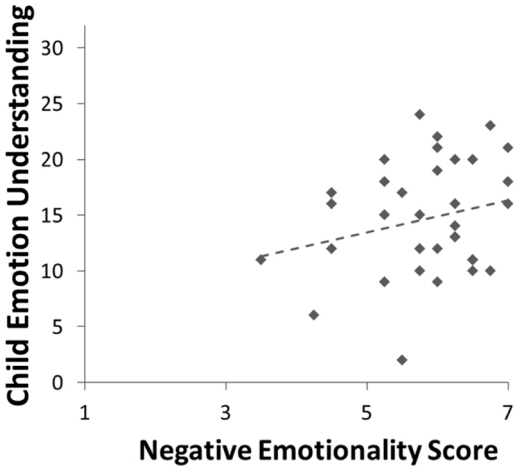

Fig. 2. Scatterplot depicting the relation between level of primary caregiver negative emotionality and child emotion understanding score.

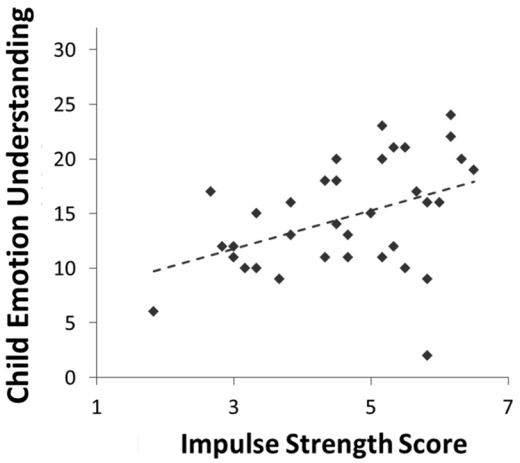

Fig. 3. Scatterplot depicting the relation between level of primary caregiver impulse strength and child emotion understanding score.

displays. Our findings suggest the opposite among 2.5-year-olds, indicating that more expressivity in the child's environment is beneficial for building an early emotion understanding foundation. Additionally, on the surface it appears to conflict with findings from Denham et al. (1994) which suggested that when mothers display more anger, their children have lower emotion understanding. Our study, in contrast, assessed expressivity across a range of emotions. It is possible that parents who frequently displayed anger were less likely to display a wide range of other emotions. Our results indicate that a highly expressive primary caregiver across a variety of emotions may be helpful for providing concrete examples of emotional displays from which toddlers can learn.

Although parent expressivity may drive children's early emotion understanding, (e.g., Bornstein et al., 2011), it is also possible that primary caregivers are more expressive around toddlers who have higher levels of emotion understanding, perhaps because they believe they will be better able to interpret these emotional reactions. A limitation of the present design is that the causal direction of these relations cannot be determined. Future longitudinal research may be particularly beneficial for addressing causality with regards to these relations.

Post-hoc analyses revealed that the BEQ impulse strength subscale, but not positive expressivity or negative expressivity, related to toddler emotion understanding. Impulse strength measures an individual's response tendency, whereas positive and negative expressivity measure habitual expressions in behavior (Gross & John, 1997). Thus, it appears to be that more impulsive response tendency in a primary caregiver is associated with toddler's developing understanding of emotions rather than their habitual expressive responses. This may be because primary caregivers who have emotionally impulsive reactions to events help their toddlers to identify the events, facial expressions, and emotional vocalizations that are likely to co-occur, thereby fostering an early-developing understanding of emotions. Modeling of emotion has been proposed as crucial for helping children learn about emotions by observation (Eisenberg et al., 1998), and it is possible that emotionally impulsive parents may provide more informative modeling of emotion information. It is also worth noting that negative primary caregiver emotional expressiveness did not relate to poorer toddler emotion understanding. Thus, some negative expressiveness from the primary caregiver may be important for the development of emotion

understanding. Our participants were all from non-clinical populations. Within the variability that we may expect during typical development, having a more emotionally impulsive and occasionally negative primary caregiver may be beneficial. However, in other populations, such as abusive homes, overly emotionally impulsive reactions may not be helpful. Therefore, it is important for future research to address how primary caregiver impulse strength and toddler emotion understanding relate among a more diverse population, including socioeconomic diversity.

Contrary to our hypothesis, we found no relation between toddler's emotion understanding and family expressiveness when accounting for primary caregiver expressiveness. This finding was surprising given that prior work has found a relation between family expressiveness and infant emotion matching (Ogren et al., 2018). It is possible that parents may be less accurate at reporting expressiveness for the full family than for themselves as an individual, although high correlations among responses of family members in the initial survey validation (Halberstadt, 1986) suggest that this is unlikely. Notably, however, the relation between toddler emotion understanding and primary caregiver expressiveness was driven by impulse strength, and our measure of family expressiveness did not include an impulse strength subscale (Halberstadt, 1986). It is possible, therefore, that the impulse strength of the family may relate to toddler's developing emotion understanding. It is also possible that the expressiveness of the full family is important in infancy to provide many examples of emotional expressions, but as children grow older they seek more input from the primary caregiver regarding the causes and consequences of emotion. This developmental change may account for the seemingly contradictory findings between the present results and those of Ogren et al. (2018). Future research is needed to test these two possibilities.

The present study holds important implications for identifying mechanisms behind early emotion understanding development. Our results suggest that observing emotional displays from the primary caregiver may facilitate an early understanding of emotions, likely by helping toddlers to draw connections between emotional displays and the surrounding circumstances. Ultimately, this result may hold implications for interventions. For example, teaching primary caregivers of toddlers to be more emotionally expressive may help facilitate toddlers' emotion understanding. A meta-analysis revealed that early emotion understanding interventions appear promising and effective (Sprung, Münch, Harris, Ebesutani, & Hofmann, 2015). For example, preschool classroom interventions intended to increase the use of emotional terms increased children's emotion understanding over the course of only two months (Grazzani & Ornaghi, 2011; Grazzani, Ornaghi, Agliati, & Brazzelli, 2016). Thus, it may be possible to implement similar interventions with parents of toddlers, but targeting the use of emotional expressions rather than emotional terms.

To conclude, the present study contributes to our knowledge of developing emotion understanding by disentangling the role of family expressiveness and primary caregiver expressiveness. Specifically, we identified a significant positive relation between primary caregivers' emotional expressivity and 2.5-year-olds' emotion understanding over and above the effect of family expressiveness. Ultimately, these findings provide important insight to the sources and types of emotional expressiveness which may be most related to the development of emotion understanding in toddlers.

CRediT authorship contribution statement

Marissa Ogren: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Writing - original draft, Visualization, Project administration, Funding acquisition. **Scott P. Johnson:** Methodology, Resources, Writing - review & editing, Supervision, Project administration, Funding acquisition.

Declaration of Competing Interest

The authors report no declarations of interest.

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