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Assessment of distress in young children: A comparison of autistic disorder, developmental delay, and typical development

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ABSTRACT

Distress emotions in very young children are manifest in vocal, facial, and bodily cues. Moreover, children with different developmental conditions (i.e. autistic disorder, AD; developmental delay, DD; typically developing, TD) appear to manifest their distress emotions via different channels. To decompose channel of emotional distress display by group, we conducted a study in which video clips of crying of 18 children 18 months of age belonging to three groups (AD, DD, TD) were modified to isolate vocal, facial, or bodily cues, and 42 female adults were asked to judge the distress and typicality (expected normality) of the different stimuli. We find variation in adult judgements of distress and typicality by child group (AD, DD, TD) and by isolated cues (vocal, facial, or body). Although there is some overlap between responses to episodes of crying of children with AD and those with DD, the different cues of crying of children with AD tend to be considered more atypical and distressed than those of the other two groups (DD and TD). Early assessment of different cues of the expression of distress, and more generally of emotional expressivity in a child, may provide useful information for pediatricians and practitioners who are in contact with young children and must make clinical screening decisions. The findings also alert parents of children with AD to important aspects of their cries.

Expressing distress represents one of first communication of human children to convey their needs and affect their environment (Gingras, Mitchell, & Grattan, 2005; Irwin, 2003). In turn, caregiver responsiveness to children's distress plays an important role in the development of the child's personality, temperament, cognition, and language. Thus, expression of distress constitutes a biosocial phenomenon that reflects the status of the nervous system and indirectly mediates child development through parental intervention (Lester, 1984; Lester, Boukydis, & Garcia Coll, 1995; LaGasse, Neal, & Lester, 2005).

The vast majority of the studies of expressions of distress in very young children have focused on cry and its morphology. In general, an episode of crying elicits physiological reactions in adults, such as increases in heart rate (Huffman et al., 1998) and endocrine responses (Fleming, Corter, Stallings, & Steiner, 2005). Such physiological reactions activate those listening to cries to take measures to eliminate their cause (Bowlby, 1969; Gustafson, Wood, & Green, 2000; LaGasse et al., 2005). Studies of morphological characteristics of children's cry, such as its frequency and duration, have shown how these characteristics moderate adult responses (Gustafson & Green, 1989; Ziefman, 2003). For example, high-frequency cries are perceived as more aversive and distressed than low-frequency cries. A particular type of cry, characterized by low frequency, and typical

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of children with developmental delay (specifically Down syndrome), is perceived as less urgent than high-frequency cries (encountered in oxygen-deprived infants suffering brain damage; Frodi & Senchak, 1990).

Distress in very young children is expressed through different channels (i.e., vocal, facial, bodily cues). Information about children's state of distress is available not only through voice, but through facial and bodily cues as well. Irwin (2003) found that perceiver ratings of comfort and agitation differed for high- and low-distress cries on the basis of facial and vocal cues, but not bodily cues. In general, to respond appropriately to the level of distress a child expresses in everyday situations caregivers normally attend to the sound (in particular the intensity and pitch), evaluate the facial expression and the body movements of the child, and take the general circumstance into account (such as the hour of the day, time since the previous meal, and so forth). In the current study, we aim to investigate adult judgments of distress conveyed by different cues (vocal, facial, or bodily) in children with different developmental conditions (i.e., autistic disorder, AD; developmental delay, DD; typically developing, TD).

Expressions of distress vary with children's psychopathological status. For example, the fundamental frequency (f0) of cry is especially sensitive to neurological insult with both higher levels overall and greater variability. autistic disorder affects emotional expression, communication, and social skills to varying degrees. Furthermore, considering the connection between crying and the functioning of the brainstem and limbic system (both areas are compromised in AD children; Amaral, Schumann, & Nordahl, 2008), it seems reasonable to expect anomalies in the expression of distress of AD children (Bieberich & Morgan, 1998). The analysis of acoustic features of expression of distress has revealed a number of differences among children with AD and matched TD controls. In particular, episodes of cry in children with AD are shorter in duration, show less waveform modulation, and consist of greater dysphonation (Esposito & Venuti, 2008). Children who suffer a developmental delay (DD) often vary in the development of their communication skills and emotional expression, tending to rely on unconventional and idiosyncratic nonverbal behaviors (e.g., Meadan, Halle, Ostrosky, & DeStefano, 2008).

Because emotional expression, especially for distress, among children with AD or DD and TD children may show different profiles, it may be important to analyze their early manifestation. Indeed, differences in the expression of distress may influence parenting. A number of studies have investigated how parents perceive crying in children with AD and DD compared to TD children (Esposito & Venuti, 2008, 2009, 2010a, 2010b). Esposito and Venuti (2008) interviewed parents of TD children and those of children with AD. Qualitative analysis revealed that parents of AD children more often mentioned negative patterns of feelings with respect to crying episodes (e.g., AD cries were considered unexpected for parents who could not identify causal factors). The authors also designed a "Listen-and-Response" experiment to test whether the atypical structure of crying episodes characteristic of children with AD biases adult perceptions. Twelve episodes of crying of children of two ages (13 and 20 months), garnered from home videos of children with AD and from matching control-group TD children, were randomly presented to participants who were asked to estimate the age of the child who was crying, give reasons why the child was crying, and describe how they felt while hearing the cries. Adults reported feeling more negative mental states (i.e., anxiety) when listening to AD cries. In contrast, tender mental states were reported when listening to crying episodes of typically developing and intellectually challenged children.

Studies of cry in children with developmental conditions have mainly focused on acoustic components. Some studies have investigated the role of non acoustical components (e.g., facial expression, motor behaviors, etc.) in typically developing children (e.g., Irwin, 2003) but there are no studies in the current literature that have specifically investigated non acoustical components of distress in children with AD or DD. This circumstance is unfortunate because in atypical development, especially in AD, children tend to display less facial expressivity and specific motor dysfunctions (i.e., stereotypies). We hypothesize that these anomalies may influence the way adults perceive distress in these children.

In sum, distress emotions in very young children can manifest in vocal, facial, and bodily cues (Irwin, 2003). Moreover, children with different developmental conditions (AD, DD, TD) may manifest distress emotions via different channels (Bieberich & Morgan, 1998). Although previous work has focused on different cues that influence the perception of distress emotions in young children (e.g., Irwin, 2003) and different developmental conditions (e.g., Bieberich & Morgan, 1998; Iverson & Wozniak, 2007), no previous study has analyzed the specific effects of different cues of distress in different developmental conditions. To decompose channel of emotional distress display by group, we conducted a study in which we asked adults to judge the distress and typicality of isolated voices, faces, and body movements of crying AD, DD, and TD toddlers. In this way, this study promises to test the hypothesis that typically and atypically developing children express distress through different cues and to quantify which cues were most prominently associated with which atypical condition. Guided by the existing literature, we expected that: (i) vocal features of atypical crying will be perceived as more distressed and atypical; (ii) because of their poor facial expressivity, the faces of children with AD during episodes of crying will elicit lower levels of distress and more atypicality compared to children with DD or TD; and (iii) because of the presence of motor stereotypies, motor cues in episodes of crying in children with AD will elicit higher levels of perceived distress and more atypicality compared to children with DD or TD.

1. Method

1.1. Participants

Forty-two female nullipara ($M = 30.67$ years; $SD = 8.91$) participated in the study. Because the study aimed to investigate adult judgments of distress in children with different developmental conditions, to exclude any bias or expertise in listening to cries of typical or atypical children only adult non mothers were selected. Participants were recruited from an urban area