



Changes in empathy-related cry responding as a function of time: A time course study of adult's responses to infant crying



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ABSTRACT

Describing temporal relations between perceptual and emotional elements underlying responses to infant crying is important to our understanding of sensitive parenting. Prior research on adults' responses to infant crying has mostly relied on *playback* and *snapshot* approaches to obtaining recall of responses following exposure to relatively short cry stimuli. This study documented continuous temporal relations in the perception of the infant's distress and affect-related processes in response to a 4-min-long bout of crying. Three visual-analog slider scales were used to collect 90 participants' real-time responses on perceived aversiveness of the cry, empathic concern for the infant, and personal distress elicited by the cry, respectively. The results highlighted a moderating role of empathic concern at certain second in the relation between personal distress and empathic concern at the following second. In addition, personal distress moderated the relation between concurrent perceived aversiveness and empathic concern. The findings carry potentially important implications for cognitive and emotional regulation in adaptive parenting.

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Cries of infants may differ in eliciting causes (e.g., hunger, thirst, pain, fatigue, temperature change, separation, etc.); they all sound aversive in the perceiver's ears (Frodi, Lamb, Leavitt, & Donovan, 1978; Lamb, 1978). The obnoxious qualities of cries compel caregivers to attend to the cries and try to alleviate infants' distress by nursing and comforting (Bell & Ainsworth, 1972; Boukydis, 1985; Murray, 1979, 1985). Sensitive responding to infant crying reflects one form of empathic process when a person discerns another in plight, though empathic responding need by no means be the only possible consequence (Frodi, 1985; Lounsbury & Bates, 1982; Murray, 1979; Wiesenfeld, Whitman, & Malatesta, 1984; Zahn-Waxler, Radke-Yarrow, & King, 1979). Proximately, infants' needs are gratified; and, in most cases, crying is terminated (Del Vecchio, Walter, & O'Leary, 2009). Ultimately, infant survival and parental reproductive fitness are enhanced (Meaney, 2001; Zeifman, 2001; Seifritz et al., 2003).

While the provoked arousal may elicit adaptive caregiving and parental proximity, excessive amount of infant crying could have a very different result by heightening distress arousal that sometimes perturbs caregivers (Boukydis, 1985; Frodi, 1985; Murray, 1985). In fact, inconsolable and high-pitched crying have been identified as triggers of infant maltreatment, including neglect, abuse, and even infanticide (Dix, 1991; Feshbach, 1987; Frodi, 1981; Leerkes, Crockenberg, & Burrous, 2004; Soltis, 2004; van IJzendoorn & Hubbard, 2000). The fact that empathy sometimes fails (Frodi, 1985) and becomes overshadowed by caregivers' distress arousal warrants our attention to the distress aspect of infant cry responding.

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Adults' sensitive and appropriate responses to infants' distress have been shown to foster a child's emotional well-being and attachment security (Ainsworth, Blehar, Waters, & Wall, 1978; Bell & Ainsworth, 1972; Bowlby, 1969; Brazelton, Koslowski, & Main, 1974; Egeland & Faber, 1984; Völker, Keller, Lohaus, Cappenberg, & Chasiotis, 1999). Surprisingly, however, among the accounts for adults' responses to infant crying, the role of empathy has not been addressed sufficiently. Even though research has documented the association between empathy and sensitive responding to infant crying (e.g., Lounsbury & Bates, 1982; Milner, Halsey, & Fultz, 1995; Wiesenfeld et al., 1984; Zeifman, 2003), empathy, however, has generally been evaluated as a global personality trait (e.g., Carkhuff, 1969; Davis, 1983b; Nezlek, Feist, Wilson, & Plesko, 2001; Perez-Albeniz & de Paul, 2003; Williams, 1990). Moreover, information is scarce on how the perception of infant crying relates to empathic cry responding. Further, the relations between cry-elicited empathic processes and cry perception have not been described as a function of time.

The purpose of this study was to describe the temporal relations between perception of infant's distress and evoked affect-related processes in response to infant crying. Traditionally, research on infant cry responding has largely relied on "snapshot" approaches to obtain retrospective responses after a period of exposure to stimuli. Also, cry samples used in much of cry research have been of short durations (10 sec or less than 1 min). In contrast, this study examined continuous temporal changes in the perception of infants' distress and affect-related processes in response to a relatively long (4 min) spontaneous crying (crying without being induced by unpleasant stimuli). Unraveling the temporal relations between perceptual and affective aspects of cry responding may add to our understanding of processes underlying caregiving and may potentially promote parenting effectiveness.

1. Infant crying sound as a graded signal

The current predominant view of crying as a graded signal considers crying as a complex and eventful state, which conveys meanings through its varied acoustic and visual features over time (Gustafson, Wood, & Green, 2000; Wilson, 1975; Zeifman, 2001). Cry sound alone, contrary to our common lore, rarely communicates isomorphic and categorical information to the caregivers about specific causes (Müller, Hollein, & Murry, 1974). Rather, crying sound is considered to be a signal regulated by the autonomic neural functioning and reflecting varying levels of infant arousal, (Green, Gustafson, Irwin, Kalinowski, & Wood, 1995; Gustafson et al., 2000; Murray, 1979; Lester & Zeskind, 1982; Zeskind, Sale, Maio, Huntington, & Weiseman, 1985; Wolff, 1987). The sound for a pain cry, for example, may convey greater distress and urgency during the initial portion of high infant arousal. Once the arousal subsides, the acoustic features of a pain cry may appear very similar to those of a cry elicited by a less arousing stimulus, such as hunger (Wolff, 1967; Zeskind & Lester, 1978). Research indicates that adults are sensitive to distress arousal in cries and their caregiving behaviors may vary differentially by varied levels of perceived infant arousal (Axia & Bonichini, 2005; Donate-Bartfield & Passman, 1985; Gustafson, Cleland, & Harris, 1988; Jahromi, Putnam, & Stifter, 2004; Porter, Miller, & Marshall, 1986; Zeskind, Klein, & Marshall, 1992). Even within a cry bout, caregivers' perception of urgency and aversiveness conveyed in crying and their levels of alertness in response are likely to change dynamically over time as infant arousal varies (Wood, 2009; Zeskind et al., 1985).

The view of crying as a dynamic graded signal challenges our conventional thinking of empathic processes in response to infant crying. Given that cry responses putatively mirror temporal variability in the perceived levels of infant arousal, our conceptualization of empathic responding to infant crying requires a dynamic delineation across time. Indeed, the traditional "snapshot" methods of recording responses to infant crying, either at the end of a stimulus presentation, or at certain intervals over the course of a cry bout (e.g., every 10 s), can only provide limited information about cry responding. To our knowledge, there has not been any cry research that examines the temporal gradations of the perceptual and emotional responses at a continuous and microanalytic level.

2. Perceived aversiveness—a construct reflecting the perceived qualities of infant cries

Adults' sensitivity to and their perception of infants' distress conveyed in crying is crucial to interpreting and understanding infants' needs (Axia & Bonichini, 2005; Donate-Bartfield & Passman, 1985; Gustafson & Harris, 1990; Jahromi et al., 2004; Porter et al., 1986; Zeskind et al., 1992). Assessment of adults' cry perception often involves using descriptors for adults to describe qualities of crying. Some examples of the descriptors include *urgent*, *arousing*, *aversive*, *grating*, *piercing*, *discomforting*, *distressing*, and *sick* (Zeskind et al., 1985; Zeskind & Lester, 1978). Taking these multiple descriptors together, researchers (e.g., Gustafson & Green, 1989; Zeskind & Lester, 1978) have suggested a single-factor solution for cry perception rating items—a dimension which reflects the unpleasantness, or *aversiveness*, of the cry. Therefore, *perceived aversiveness* is a construct used to reflect listener's perception of infant distress through the qualities of infant cries. Note that *perceived aversiveness* does not refer to the aversion that the perceiver experiences; rather, it refers to how aversive the cry sounds are perceived to be.

Adults' perception of aversiveness in infant crying has been correlated with acoustic parameters (such as pitch, duration, amplitude, formants, dysphonation, or temporal irregularity) as well as visual information, including facial expressions, gestures, and bodily posture made during crying (see reviews in Barr, Hopkins, & Green, 2000; Gustafson & Green, 1991; LaGasse, Neal, & Lester, 2005; Lin & Green, 2007). Cry sounds reflecting greater levels of infant arousal often are perceived to be more urgent, distressing, and aversive and generally have higher fundamental frequency (f_0), greater variability of f_0 , shorter intervals between cry bouts, greater dysphonation, longer duration, and greater amplitude (Gustafson & Green, 1989;

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