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Empathy and distress: Two distinct but related emotions in response to infant crying

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ABSTRACT

This study examined a largely overlooked, yet potentially important, association between empathy and distress in cry responding. The cry stimulus included a 1-min-long video clip of a 4-week-old, crying, male infant. Participants reported their dispositional empathy and distress, perceived aversiveness of the cry stimulus, response emotions, and intention to intervene with the crying infant. Empathy and distress covaried positively both in disposition and in cry responding. Response empathy and distress were related to their corresponding dispositional emotions, but response empathy was also related to dispositional distress. Perceived aversiveness interacted with response distress in predicting response empathy. Both response empathy and distress appeared to be important determinants of intention to intervene. Overall, empathy and distress in response to infant crying appeared more closely related than previously thought. Implications concerning the regulation of emotions in cry responding are discussed.

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1. Introduction

Infant crying signals an infant's distress and provokes arousal in caregivers (Boukydis, 1985; Murray, 1979, 1985; Vecchio, Walter, & O'Leary, 2009). Caregivers are alerted to attend to the cries and, most likely, act to help alleviate the infant's distress by nursing and caring. Adults' responses to infant crying generally reflect one form of empathic responding when one discerns another in distress. The immediate result is to gratify the infant's needs; thus, in most cases, terminating or lessening the cries. The ultimate effect is to enhance infant survival and parental reproductive fitness (Bowlby, 1969; Meaney, 2001; Zeifman, 2001).

While parents' comforting of youngsters' cries is probably genetically programmed (Bell & Ainsworth, 1972; Bowlby, 1969; Cassidy, 1999), not all cries motivate adaptive treatments that foster infants' thriving. Caregivers' responses may range from prompt and sensitive support to neglect and even abuse (Dix, 1991; Feshbach, 1987; Frodi, 1981; Leerkes, Crockenberg, & Burrous, 2004; van Ijzendoorn & Hubbard, 2000). The fact that empathy sometimes fails (Frodi, 1985) and becomes overshadowed by parents' distress emotions suggests a need to direct our attention to empathy related processes that potentially mediate differential responses to infant crying.

Adults' sensitive and supportive responses to infants' distress have been shown to foster a child's emotional well-being, attachment security, and long-term capacity of affect regulation (Ainsworth, Blehar, Waters, & Walls, 1978; Bell & Ainsworth, 1972; Bornstein & Tamis-LeMonda, 1989; Bowlby, 1969; Cassidy, 1994). Surprisingly, however, the accounts for adults' responses to infant crying have yet to sufficiently address the role of empathy in the process of cry responding. When

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empathy has been considered, it has generally been evaluated as a global dispositional construct, with its context-specificity overlooked. Notably, an empathy-related process that involves vicarious negative emotions, namely, *personal distress*, has rarely been examined along with empathy in the context of infant crying. Moreover, how the perception of the infant's distress elicits empathic processes, which, in turn, presumably influence subsequent caregiving intention, has not been explicitly examined.

The purpose of this study was to describe both empathy and distress as important underpinnings of cry responding. Three principal questions were addressed: (1) How do empathy and distress differ from each other in response to infant crying, and, importantly, how do the two emotions relate to each other? (2) How does the perception of aversiveness of infant crying relate to the elicited emotions of empathy and distress and subsequent caregiving motivation? (3) How do dispositional empathy and distress relate to the response emotions of empathy and distress in the context of infant crying? We began by reviewing the constructs of empathy and distress and how the two processes were relevant to adults' responses to infant crying.

1.1. Empathy in cry responding

Empathy has been defined as the psychological process that allows one to understand and resonate with another's experiences (Hoffman, 2000). The construct of empathy has been conceptualized as consisting of cognitive and emotional components (de Waal, 2008; Smith, 2006). *Cognitive empathy* entails socio-cognitive perspective-taking, in which the empathizer takes the role and portrays in mind the views and experiences of the observed. *Emotional empathy* implicates vicarious affect processes, in which the empathizer internally experiences feelings on behalf of the observed person. This emotional aspect of empathy has been referred to as *empathic concern* (Davis, 1980) and has been the focus of empathy research in developmental and social psychology (Batson, Fultz, & Schoenrade, 1987; Eisenberg & Miller, 1987). It should be emphasized that it is this aspect of empathy that this study refers to as 'empathy,' and that 'empathy' is used interchangeably with 'empathic concern' in this paper.

In the context of infant crying, empathic response emotions elicited by infant crying involve vicariously experiencing the infant's distress and may include feelings of concern, sympathy, tenderness, compassion, softheartedness, worry, sadness, etc. (Leerkes & Crockenberg, 2006; Wiesenfeld, Whitman, & Malatesta, 1984). Importantly, emotions of empathic concern in cry responding are organized around the welfare of the infant and, thus, are at the heart of altruistic reasons for supporting the infant's needs. These child-centered emotions enhance the odds of a caregiver's sensitive intervention on the infant's behalf (Dix, 1992) and may contribute to regulating a potential aroused aggressor's hostility toward the infant (Feshbach & Feshbach, 1982; Perez-Albeniz & de Paul, 2003). For this reason, empathic emotions have been identified as essential components of parental sensitivity and supportive parenting (Dix, Gershoff, Meunier, & Miller, 2004; Leerkes, 2010).

1.2. Distress in cry responding

For empathy to occur, clear information about the *self* is vital to an intersubjective induction process to model the states of others (Lamm, Batson, & Decety, 2007). When there is an unclear distinction in the representations of *self* and *other*, the evoked affective experiences, though they may resonate with the other's state, do not necessarily implicate clear concerns for the well-being of the other. This lack of a well-defined *self-other* distinction in the process of responding to others' distress may presumably characterize the process of *personal distress* (Decety & Meyer, 2008; Preston & de Waal, 2002)—another type of vicarious emotional responding, which generally involves negative emotions of alarm and disquiet (Batson et al., 1987; Coke, Batson, & McDavis, 1978; Davis, 1983a). Instead of being altruistic, the motivation evoked by personal distress often focuses on relieving one's own unpleasant arousal (de Paul & Guibert, 2008; Decety & Meyer, 2008; Eisenberg & Fabes, 1998). Though seemingly prosocial actions may still possibly follow, the underlying motivation is egoistic, reflecting insensitivity and indifference to the needs of others.

Infants' distress arousal is often reflected in the unpleasant quality or aversiveness of the cries (Zeskind & Lester, 1978). Adults' aversive ratings of cries have been correlated with acoustic parameters (such as pitch, duration, amplitude, formants, dysphonation, and 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. However, although research thus far has adequately addressed the agreement between cry perception and cry acoustics and/or contextual factors, the relation between cry perception and caregivers' emotional reactions and subsequent caregiving behaviors remains largely unexplored (Gustafson & Harris, 1990; LaGasse et al., 2005).

Although the perception of infant's distress is expected to elicit empathic responses, the aversive nature of the crying has been described as a source of heightened physiological arousal and negative emotions (Boukydis, 1985; Frodi, 1985; Lazarus & Folkman, 1984; Tyson & Sobschak, 1994). Along with elevated autonomic arousal in, e.g., blood pressure, heart rate, skin conductance (Boukydis & Burgess, 1982; Murray, 1985), possible distress emotions provoked by the perception of infant crying may include feelings of alarm, aversion, frustration, worry, anxiety, anger, helplessness, fear, guilt, shame, etc. (Frodi & Senchak, 1990; Zeskind & Lester, 1978). Distress emotions are often unpleasant and taxing, and, therefore, tend

to instigate action goals that remove the aversiveness of parents' negative reactions (Donate-Bartfield & Passman, 1985; Gottman, 1997). Rather than being child-centered, the motivations guided by distress emotions tend to be tied to caregiver's own self-interest (Dix et al., 2004). When caregivers prioritize their own welfares, they are less likely to be keen and sensitive to the infant's cues and immediate needs (Crockenberg & Leerkes, 2003; Dix, 1991), and, hence, are more likely to espouse aims that benefit themselves at the expense of the infant's well-being. Particularly in cases of inconsolable infant crying, and when personal distress may become overpowering, avoidance or aggression may very well arise as a means of arousal reduction (Cassidy, 1994; Frodi & Lamb, 1980; Murray, 1979).

1.3. *The relation between empathy and distress*

While it may be theoretically and empirically informative to draw the qualitative distinctions between the processes of empathy and distress, appreciation of possible connections between the two processes may be particularly essential to a better understanding of empathic responding to infant crying. So far, we still know very little about how the two emotions relate to each other in the context of infant crying besides the traditionally drawn contrast between the two emotional processes in the literature.

Clearly, both empathy and distress can be elicited by vicariously experiencing the infant's distress; they, however, seem to counter each other with respect to their motivational consequences and espoused parenting goals. Emphasis on such a contrast, on the other hand, as Zahn-Waxler and Radke-Yarrow caution (1990), may lead to overly simplified dichotomous thinking about the two emotions and obscure their potentially important relations. In fact, there are reasons to expect that the two emotions are not necessarily inversely related (Batson et al., 1987; Zahn-Waxler & Radke-Yarrow, 1990). First, they both involve emotional arousal in response to another's distress; hence, they may reflect a person's general affect propensity and response patterns in a similar way. Indeed, positive correlations between empathy and distress have been reported (e.g., Batson et al., 1987; Davis, 1983a; Fabes, Eisenberg, & Miller, 1990). Moreover, an alternative, stemming from a developmental perspective, has postulated that empathy originates during toddlerhood on the basis of personal distress (Hoffman, 1975, 2000; Zahn-Waxler & Radke-Yarrow, 1990). Specifically, infants' early reflexive crying in reaction to other infants' crying (Martin & Clark, 1982; Sagi & Hoffman, 1976) has been regarded as a primitive antecedent of empathic arousal, in which distress is experienced with no differentiation between self and other. During toddlerhood, with cognitive advancement in self awareness, children gain a better understanding of the self/other distinction and become capable of processing others' experiences with clear ownership of affect. In this way, children's distress arousal becomes increasingly modulated into a more mature form of empathy. Following this proposition, if the course of cry responding is something of a microcosm of development, it is plausible that the elicited distress arousal may precede in time, and subsequently become regulated into emotions of empathic concern, centered around the well-being of the infant.

1.4. *The present study*

In this study, we extended prior cry research's dichotomous descriptions of empathy and distress and examined the two processes simultaneously for their possible connections. In addition, we examined how the perception of crying would bring about empathy and distress, which, in turn, could potentially motivate caregiving intention. Furthermore, to address context-specificity, we examined the links between empathy and distress in disposition and the two emotions in the context of infant crying.

Five hypotheses were formulated. First, because empathy and distress both may reflect a person's general patterns of emotional responding, we expected to find positive associations between empathy and distress in a person's disposition as well as in cry responding. Second, because prior research has indicated that empathic dispositions incline a person to experience situational empathy (e.g., Eisenberg et al., 1989), we expected to find that dispositional empathy would predict response empathy; and, similarly, dispositional distress would predict response distress. Third, because empathy may possibly derive from a less differentiated state of negative arousal, it was expected that a person's general proneness toward distress would also predict empathy in cry responding. Fourth, because the unpleasant quality of crying would provoke psychological unease, it was expected that perceived aversiveness of the cry would predict response distress. And because elicited distress may possibly predict response empathy, it was expected that perceived aversiveness of crying would also predict empathy through provoked distress. Finally, based on reports on trait empathy's influence on prosocial actions through the mechanism of situational empathy (e.g., Eisenberg et al., 1989; Vitaglione & Barnett, 2003), it was expected that trait empathy would have a mediated effect on caregiving intention via state empathy. Likewise, though potentially motivated by egoistic goals, a propensity toward distress would also predict caregiving intention, with response distress potentially playing a role in mediation.

2. Method

2.1. *Participants*

Participants included 235 college students (64 males, and 171 females, mean age = 20.7 years, age range = 17–46 years) recruited from Introductory Psychology classes. Participation was voluntary, but participants were rewarded with credits for

the requirements of their courses. Because there have been reported similarities in parents' and non-parents' perceptions of unfamiliar infants' cries (Green, Jones, & Gustafson, 1987), this study included both parents ($N=19$) and non-parents ($N=215$). For participants who were parents, the number of children ranged from 0 to 5 (mean = 2), and the age of their children ranged from 0 to 17 (mage age = 2.8). None of the participants reported hearing or vision problems.

2.2. Materials

2.2.1. Demographic form

Information regarding participants' age, gender, marital status, and being parents or non-parents was solicited. Parents were also asked to provide the number of children they had and the age and gender of their children.

2.2.2. Interpersonal Reactivity Index

The 28-item Interpersonal Reactivity Index (IRI) (Davis, 1980) was used to assess participants' dispositional emotions. The IRI examines four separate dimensions of empathy, including Empathic Concern, Personal Distress, Perspective Taking, and Fantasy, each with 7 items. For the purpose of this study, only scores on the subscales of Empathic Concern and Personal Distress were used. The Empathic Concern subscale (IRI-EC) assesses the tendency to feel compassion or sympathy for others, particularly those who are less fortunate (e.g., "I often have tender, concerned feelings for people less fortunate than me."). The Personal Distress subscale (IRI-PD) assesses the propensity for an individual to experience self-oriented distress in challenging situations (e.g., "I sometimes feel helpless when I am in the middle of a very emotional situation."). Participants indicated how well each statement described themselves by a 5 point Likert scale (1 = *does not describe me well* to 5 = *describes me very well*). Scores for each of the subscales were computed by summing the scores on the 7 items. Cronbach's alphas for the items of IRI-EC and IRI-PD were .74 and .79, respectively, which closely corresponded with the reliabilities reported by Davis (1980).

2.2.3. Cry stimulus

The cry stimulus consisted of a 1-min-long video clip of a 4-week-old, crying, Caucasian male infant. The age was chosen because of the abundant information on adults' responses to 4-week-olds' crying (Zeifman, 2003). The infant was full term and healthy at the time of recording. The video clip was made during a home visit scheduled for approximately 20 min before the infant's normal feeding time. Recording began when the infant awakened spontaneously from his nap and began fussing. The parent changed the diaper, but then postponed the usual feeding for approximately 5 min while recording took place. A Sennheiser ME80 microphone was positioned approximately 15 cm above the infant's mouth, and a video camcorder was placed on a tripod approximately 1.5 m from the infant to capture a clear view of the infant's face and the whole body. The infant was placed in a supine position and remained in this position until approximately 1 min of sustained crying was recorded. The total recording time was about 4.5 min. Approximately 1 min of non-stop crying was marked and edited into the video clip. Analysis of the pilot data indicated that the length of the cry bout was adequate to elicit both distress and empathy in participants' response. The video image was preceded with text indicating the following information:

"You are about to view a 1-minute-long video clip of a 4-week-old male baby, who just awakened from his nap. Recording began when the baby started fussing. The parent changed the diaper but put the baby back into his crib without feeding him. The usual feeding was postponed for about 5 minutes while recording took place. The parent picked up the baby and fed him right after the recording. The baby stopped crying after the parent picked him up. After viewing this video, you will be asked to fill out a questionnaire regarding your responses to the crying of the infant."

2.2.4. Response questionnaire

The response questionnaire included 7-point Likert type rating scales tapping participants' (1) Perceived Aversiveness (PerA) of the cry stimulus, (2) Response Empathic Concern (R-EC), (3) Response Personal Distress (R-PD), and (5) Caregiving Intention (CI). Participants indicated how well each statement described themselves by assigning a number to each statement ranging from 1 (*does not describe me well*) to 7 (*describes me very well*).

The PerA item, "*I found the crying aversive and unpleasant.*" was adapted from the typical cry rating items introduced by Zeskind and Lester (1978). According to their reports, there was a unidimensional factor underlying the cry rating items they used, i.e., the unpleasant quality or aversiveness of the cries. The 3 R-EC items, "*I felt concerned for the baby*", "*I did not experience sympathetic emotions toward the baby*" (reverse score item), and "*I felt sad on behalf of the baby*" were constructed using wording similar to that of the IRI-EC subscale items to reflect emotions of empathic concern for the infant. Similarly, the 3 R-PD items, "*The longer I listened to the crying the more I felt helpless and frustrated*", "*I felt bothered when hearing the baby cry*", and "*I was feeling in control even though the baby was crying*" (reverse score item) were used to tap the evoked personal distress in cry responding. Scores on R-EC and R-PD were computed by combining the 3 items for each of the variables. Finally, following Zeifman's (2004) approach to assessing participants' intention for caregiving, the CI item, "*I felt like picking up the baby*" was used to reflect the participant's intent to intervene with the crying. Cronbach's alphas for the items of R-EC, and R-PD were .83 and .67, respectively.

Table 1Mean (*M*), standard deviations (*SD*), and correlations for the variables in the present study (*N*=235).

	PerA	IRI-EC	IRI-PD	R-EC	R-PD	CI
PerA	1					
IRI-EC	-.07	1				
IRI-PD	.06	.16*	1			
R-EC	.23***	.19**	.20**	1		
R-PD	.51***	.08	.24***	.39***	1	
CI	.08	.26***	.14*	.37***	.29***	1
<i>M</i>	4.8	28.5	18.6	12.9	13.9	6.2
<i>SD</i>	1.8	3.9	4.9	2.6	4.7	1.4

Note: PerA, Perceived Aversiveness; IRI, the Interpersonal Reactivity Index; IRI-EC, IRI-Empathic Concern; IRI-PD, IRI-Personal Distress; R-EC, Response Empathic Concern; R-PD, Response Personal Distress; CI, Caregiving Intention.

* $p < .05$.
 ** $p < .005$.
 *** $p < .0005$.

2.3. Procedure

Participants' responses were collected in a classroom setting. Besides providing demographic information, participants filled out the IRI for dispositional empathic concern and personal distress. The cry stimulus was presented using a slide projector and audio speakers. The response questionnaire was administered right after participants viewed the cry stimulus.

3. Results

Preliminary analyses revealed that age did not correlate with any of the other variables and that parents and non-parents did not differ in any of the variables. Therefore, the factors of age and parenthood were disregarded in subsequent analyses. Though not a primary interest in this study, gender differences were found in several variables. Women reported higher scores on (1) Dispositional Empathic Concern (IRI-EC), $t(233) = 2.70$, $p < .01$, and Dispositional Personal Distress (IRI-PD), $t(233) = 3.18$, $p < .005$, (2) Response Empathic Concern (R-EC), $t(233) = 5.56$, $p < .005$, and (3) Caregiving Intention (CI), $t(233) = 6.06$, $p < .005$. However, examinations of possible interactions with gender in all our analyses indicated that none of the gender interaction terms were significant. Since gender did not moderate any of the results found, all analyses reported here were conducted without including gender as a variable.

3.1. Empathy and distress in disposition and in cry responding

Table 1 presents the descriptive statistics and the correlation matrix of the variables in this study. As predicted, IRI-EC positively correlated with IRI-PD, $r = .16$, $p < .05$; and R-EC positively correlated with R-PD, $r = .39$, $p < .0005$. Thus, the first hypothesis was supported in that empathy and distress were positively associated in disposition and in cry responding.

3.2. Relations between dispositional measures and response measures

The results indicated that IRI-EC positively predicted R-EC, $r = .19$, $p < .005$; and IRI-PD positively predicted R-PD, $r = .24$, $p < .0005$. Thus, the second hypothesis was supported in that dispositional emotions positively predicted their corresponding response emotions. Interestingly, besides its corresponding emotion in cry responding, IRI-PD also predicted R-EC, $r = .20$, $p < .005$, indicating a relation between distress and empathy spanning across disposition and cry responding. Thus, the third hypothesis was supported in that a general propensity toward self-focused distress predicted the elicited emotion of empathic concern in the context of infant crying.

3.3. Perceived Aversiveness and Response Emotions

As predicted, Perceived Aversiveness (PerA), correlated significantly with the two response emotions, R-EC and R-PD, $r = .23$, $p < .0005$, and $r = .51$, $p < .0005$, respectively, suggesting that the more aversive the cry stimulus was perceived to be, the higher the levels of both empathic concern and personal distress in cry responding. Regression analysis was conducted to examine if the prediction of response empathic concern from perceived aversiveness could be explained by response personal distress. After statistically equating for R-PD, the relation between PerA and R-EC was reduced to nonsignificance, $R^2 = .15$, $F(2, 231) = 20.68$, $p < .0001$, suggesting a mediating role of R-PD in the relation between PerA and R-EC. Thus, the fourth hypothesis was supported in that perceived aversiveness positively predicted both response empathy and distress and that perceived aversiveness of crying predicted response empathic concern through provoked distress.

Further analysis was conducted to test if the prediction of response empathic concern from perceived aversiveness differed at different levels of response distress. Response Empathic Concern (R-EC) was regressed on both PerA and R-PD as

Table 2
Results for multiple regression analyses.

Criterion	Predictors	Coefficient estimate	t ratio	R ²
R-EC	Intercept	-.071	-1.07	.17
	PerA	.071	1.01	
	R-PD	.374	5.37***	
	(PerA) × (R-PD)	.145	2.48*	
CI	IRI-EC	.199	3.24**	.20
	IRI-PD	.012	.20	
	R-EC	.256	3.86***	
	R-PD	.180	2.73*	
R-EC	IRI-EC	.160	2.44*	.06
	IRI-PD	.174	2.66*	
R-PD	IRI-EC	.045	.69	.05
	IRI-PD	.222	3.37***	

Note: All variables were standardized. PerA and R-PD were first standardized, and then the cross-product was computed. CI, Caregiving Intention; IRI, the Interpersonal Reactivity Index; IRI-EC, IRI-Empathic Concern; IRI-PD, IRI-Personal Distress; R-EC, Response Empathic Concern; R-PD, Response Personal Distress; PerA, Perceived Aversiveness.

* $p < .05$.
 ** $p < .005$.
 *** $p < .0005$.

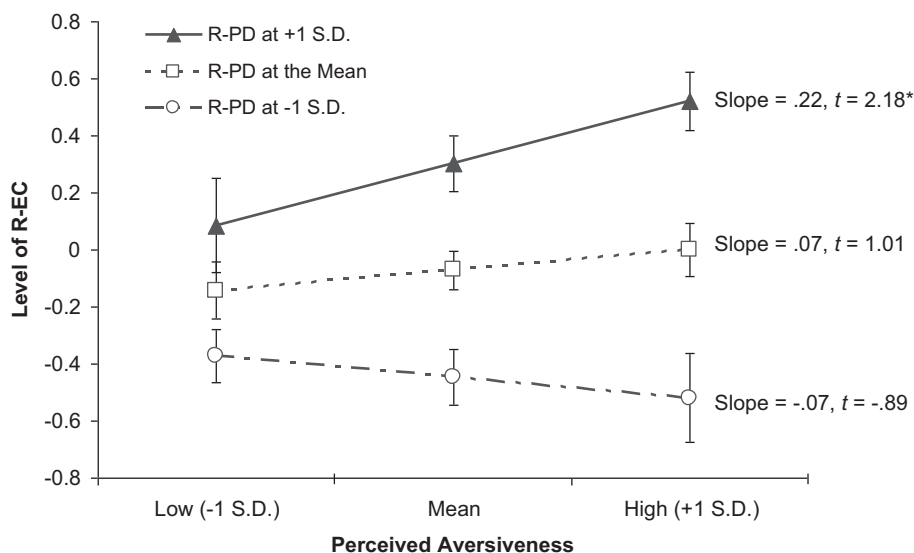


Fig. 1. Interaction between Perceived Aversiveness (PerA) and Response Personal Distress (R-PD) predicting Response Empathic Concern (R-EC). Regression lines indicate the predictions of R-EC from PerA at 3 levels of R-PD (1 SD below the mean, mean, and 1 SD above the mean). All variables were standardized. Slopes of the regression lines were tested against the slope of zero. * $p < .05$.

well as their two-way cross-product, $PerA \times R-PD$. The results indicated a significant interaction between PerA and R-PD in relation to R-EC, $t(230) = 2.48, p < .05$ (Table 2). Fig. 1 summarizes this interaction, showing the predictions of R-EC from low (1 SD below the mean), mean, and high (1 SD above the mean) PerA scores at each of the three levels of R-PD (1 SD below the mean, mean, and 1 SD above the mean). Subsequent simple slope tests indicated that, among the 3 regression lines, only the slope for high R-PD was significantly different from zero, $t(230) = 2.18, p < .05$. Hence, the relation between perceived aversiveness and response empathy varied by differences in response distress. Specifically, and surprisingly, perceived aversiveness only positively predicted response empathy among individuals who reported high evoked distress arousal in response to infant crying.

3.4. Prediction of caregiving intention

Caregiving intention was positively predicted by both dispositional empathy and dispositional distress, $r = .26, p < .0005$, and $r = .14, p < .05$, respectively, and by both response empathy and response distress, $r = .37, p < .0005$, and $r = .30, p < .0005$, respectively. Further analyses were carried out to examine the relations among the predictor variables (IRI-EC, IRI-PD, R-EC, and R-PD) and Caregiving Intention (CI) (Table 2). An initial path analysis model using only linear regressions was constructed and estimated. As shown in Fig. 2, controlling all the other variables, both response emotions, R-EC and R-PD, had direct and positive effects of .26 and .18, respectively, on caregiving intention. Rather than showing the predicted mediated effect on

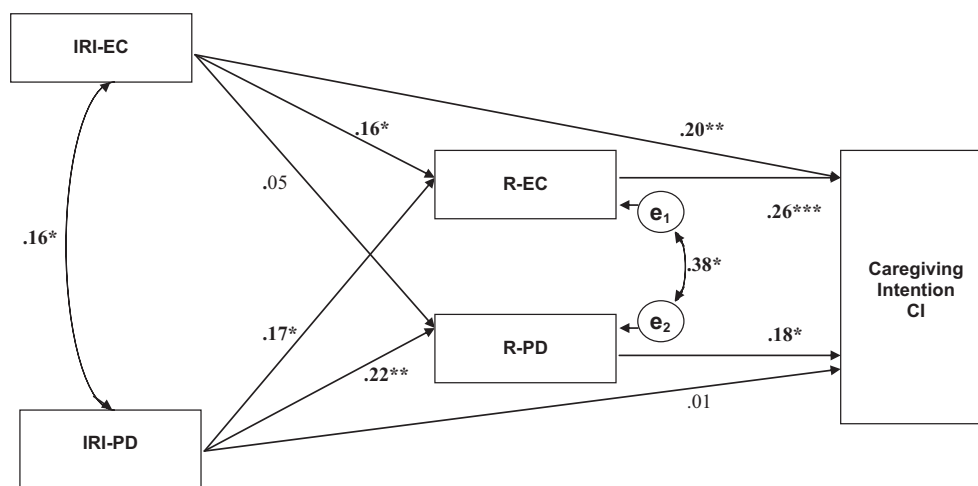


Fig. 2. Path diagram of the prediction of the Caregiving Intention (CI) from dispositional and response variables. Path values are standardized regression coefficients (betas). Boldface coefficients are significant beta weights. IRI, the Interpersonal Reactivity Index (IRI); IRI-EC, IRI-Empathic Concern; IRI-PD, IRI-Personal Distress; R-EC, Response Empathic Concern; R-PD, Response Personal Distress; CI, Caregiving Intention; e_1 , the error term for R-EC; e_2 , the error term for R-PD. * $p < .05$. ** $p < .005$. *** $p < .0005$.

CI as predicted in the fifth hypothesis, Dispositional Empathic Concern (IRI-EC), instead, showed a direct and positive effect of .20 on caregiving intention. In contrast, Dispositional Personal Distress (IRI-PD), as predicted, showed an indirect effect on CI through R-PD and also R-EC. Adding IRI-PD's indirect effect through R-EC ($.17 \times .26$) and that through R-PD ($.22 \times .18$), the indirect effect of IRI-PD on CI through the two response emotions was .08—an effect relatively smaller than the direct effect of IRI-EC.

Notably, as shown in Fig. 2, the coefficient between the two residual terms was .38, which is quite close to the zero-order correlation (.39) between R-EC and R-PD. Therefore, the two emotions in cry responding were associated in a way that was most likely due to the two residual terms and could not be accounted for by their relations to dispositional characteristics and how the two dispositional emotions were related.

4. Discussion

The results from this study highlight a largely overlooked association between empathy and distress in response to infant crying. Overall, our findings contrast the notions that emphasize a sharp disparity between empathy and distress based on their qualitative differences and distinct motivational goals associated with them. Empathy and distress appear more closely related than commonly thought. Their context-specific associations are potentially important to a better description of how emotional processes operate in adults' responses to infant crying.

4.1. The associations between empathy and distress

Several findings pointed to the links between empathy and distress. First, empathy and distress covaried in the same direction both in disposition and in cry responding. In addition, empathy in cry responding appeared to reflect individual differences in a general propensity toward negative arousal across time and context. Furthermore, it seemed that high levels of aversive arousal constituted a necessary condition for perceived aversiveness to bring forth empathic concern in response to a crying infant. All these findings suggest a need to focus more on the interrelation between empathy and distress rather than merely their counteracting effects on each other.

In light of the well-documented links between parental negative emotions and insensitive parenting (Dix, 1991; Eisenberg, Fabes, & Murphy, 1996; Leerkes, 2010; Milner, Halsey, & Fultz, 1995; Perez-Albeniz & de Paul, 2003), it was somewhat surprising to find the positive association between distress and empathy in cry responding and the role of sufficient levels of distress arousal in moderating the relation between perceived aversiveness and response empathy. One potentially important explanation for these findings could be that the evoked distress emotions captured by the measure of the current study might not have reflected entirely self-oriented affect. The measure of response personal distress was limited in its capacity to inform if the distress emotions were guided by concerns for the baby's welfare or the caregiver's own interest. Considering the experimental setting, for example, participants might have experienced negative arousal because they were concerned for the infant yet not allowed to come to the infant and offer help. Hence, part of the participants' feeling bothered, helpless, frustrated, and out of control might in fact have reflected participants' distress on behalf of the infant. As a result, the infant-oriented distress may have covaried positively with empathy and affected the relation between perceived aversiveness and response empathy. In this regard, Dix et al. (2004), Leerkes (2010), and Leerkes et al. (2004) provide a more refined approach to measuring parental emotional reactions and demonstrate that both positive and negative emotions in parenting can be self-oriented or child-oriented. Whether the emotional reactions to infant stimuli are negative or positive

may not be the most crucial determinant for supportive parenting; rather, it may be whether the emotional goals are child-oriented that best predicts parenting sensitivity. Taking into account motivational goals of emotional reactions seems to be particularly important when describing parental distress in response to infant crying.

Notably, however, despite the possibility that part of the cry specific distress emotions captured by the current measure may have been due to concerns for the infant, the relation between dispositional personal distress and response empathic concern suggested that there were indeed some potential connections between self-oriented emotions in disposition and other-oriented emotions in response. According to Davis (1983a, 1983b), the Personal Distress subscale of the IRI was designed to measure “self-oriented” feelings of personal discomfort and anxiety in tense social encounters; and it has been shown to positively correlate with the self-oriented measures of sensitivity to others. As with the reported links between dispositional measure of empathy and both empathic emotion and personal distress in reaction (Archer, Diaz-Loving, Gollwitzer, Davis, & Fbushee, 1981; Davis, 1983b), our findings also underscored the connection between empathy and personal distress across disposition and response. These findings imply a possibility that empathic concern and distress arousal might involve in a similar way vicarious affect processes evoked by perceiving another person in need, and that they might be tapping a person's general proclivity and response patterns to emotionally arousing stimuli across time and context. Following this proposition, there is a possibility that self-oriented emotions may convert into other-oriented emotions, as proposed by the developmental account for the origin of empathic concern on the basis of personal distress (Hoffman, 1975, 1982, 2000; Zahn-Waxler & Radke-Yarrow, 1990). Just as a global, reflexive state of emotional contagion may be an archaic antecedent of empathic emotion during the course of development, an undifferentiated state of distress arousal may precede during the course of cry responding and gradually transform into a much more regulated form of emotion organized around the welfare of the infant. On this basis, caregivers may prevent themselves from feeling besieged by unwanted guilt and confusion due to their possible negative arousal to infant's distress. Knowing that the goal is to come out of the undifferentiated state of distressed mood, while allowing cognitive mechanisms to regulate the negative emotions would potentially facilitate caregivers' parenting efficacy. Future research may benefit from disentangling the temporal relations (e.g., sequential relations using lagged analysis) of the two emotions during the course of cry responding. Also, longer bouts of cry samples may serve to reveal more information on the time course of empathy and distress and how their relations alter over time. Above all, research is needed to understand how the cognitive component of empathy potentially regulates distress emotions to generate emotions of empathic concern in response to infant crying.

The interpretations here make an implicit assumption that the perception of crying leads to distress, which, in turn, prompts empathy. It is, however, plausible that changes in empathy may lead to changes in distress (the more concerned one is for the infant, the greater arousal one might experience); and, furthermore, changes in empathy or distress may change perceived aversiveness (emotions affect perception). More research is needed to ascertain the causal directions between these variables.

4.2. *Empathy-related responding and caregiving intention*

The relation between empathy (both dispositional and response) and caregiving intention was consistent with prior work asserting the connection between empathy and prosocial action, explained by the presumed altruistic motivation to address others' needs. Conversely, the prediction of caregiving intention from distress (directly from evoked distress in cry responding and indirectly from dispositional distress) was consistent with still other findings linking distress arousal and helping with underlying egoistic motives for arousal reduction (e.g., Schaller & Cialdini, 1988; see also Piliavin, Dovidio, Gaertner, & Clark, 1981, for a review). Whether altruistic or egoistic motivations underlie intention to help is beyond the scope of this study. Also, given the nature of the current measure of response personal distress, it was not clear if the distress emotions captured were completely egoistic. It is plausible that the caregiving intention might be in part due to some infant-oriented distress. When participants were bothered, frustrated, and feeling helpless because they were worried about the well-being of the infant, they were likely to intend to intervene and do this in a sensitive manner. Thus, the positive relation between response personal distress and caregiving intention should not be explained purely by egoistic motivations for arousal reduction. On the other hand, however, if the espoused goals from personal distress were organized around arousal reduction, the intention of picking up the baby might not guarantee caring handling of the infant in need. It is noteworthy that the current measure of caregiving intention only tapped one facet of intervention plan—picking up the baby, and would be bolstered by adding more items tapping intentions for other caregiving actions, e.g., checking on the baby, gentling touching the baby, talking to the baby, and even seeking some one with more infant caregiving experiences, etc. But much more importantly, whether adults truly transform caregiving intentions into real caregiving actions remains questionable, although behavioral intention has been considered to be predictors for actual behaviors (Ajzen, 1985, 1991). Also, it is unclear if strong caregiving intention would predict sensitive and supportive caregiving behaviors. One of the ways to address this issue as well as the ecological validity of play-back studies like this one would be to corroborate self-reported caregiving intentions with behavioral observations within natural settings. Despite the limitations, this study underscored that both empathic concern and distress emotions were involved in the process leading to intervening intention in cry responding. Hence, incorporating both emotions may potentially yield more fruitful information in the search for the underpinnings of caregiving motivations and actual behaviors.

4.3. Context-specific characteristics of empathy and distress in cry responding

One aspect of the results pointing to the unique variabilities of cry responding concerned the two response emotions' direct effects on caregiving intention, and their mediating roles in the relation between dispositional distress and caregiving intention. It appeared that the intention to intervene a crying infant was not solely dependent on stable dispositional characteristics; instead, response empathy and distress both functioned as important situational determinants of caregiving intention. Plainly, a better understanding of how empathy and distress elicit caregiving intention requires analysis integrating both trait and state levels.

Another aspect concerned the covariance between the two response emotions. The fact that the association between the two emotions in cry responding was mostly due to the two residual terms suggested that other factors, rather than dispositional emotions, largely affected the relation between the two response emotions. Therefore, the way in which empathy and distress covaried in cry responding was unique to the context of infant crying, and caution should be taken before generalizing the findings from this context to other empathy-arousing situations. One of the unique features of the empathy-arousing context in this study involved the setting of the experiment. Participants were exposed to a film of a distressed infant without being allowed to make a true caregiving response. The inability to provide help itself may be distressing and thereby may not reflect distress in other settings when intervention is possible. Also, responding to cries of an unfamiliar infant may likely differ from responding to cries of one's own child. Giving instructions to participants to imagine that the infant in the film was their own or a child they had responsibility to care for may have revealed information more relevant to caregiving in natural settings. Furthermore, it should be noted that the way empathy and distress covaried in cry responding may have reflected part of characteristics of the relatively young, largely non-parent college students recruited in this study. College students may differ from non-college individuals in that they may have stronger cognitive capacity (beneficial to convert distress arousal to empathic concern), greater inclination toward social compliance (leading to higher levels of self-reported empathy and caregiving intention), and less crafted self-concept and ideologies (Sears, 1986). Accordingly, they may have been more likely to endorse socially desirable measures of empathic concern and a desire to intervene the crying infant. Therefore, generalizations based on this sample need be augmented by means of replications with populations with different socio-economic characteristics.

Lastly, the conditions any empathy-arousing events may present are often necessary but not necessarily sufficient for the experience of empathy (Nezlek, Feist, Wilson, & Plesko, 2001). In the context of infant crying, caregivers' intervention may possibly be instigated merely by motivation to reduce aversive arousal, without any empathic concern for the infant, nor any cognitive component of perspective taking. When motivational goals concern merely arousal reduction, with infant's wellbeing and security overlooked or ignored, cry responding can be very different from that comprising genuine empathic concern for the benefits of an infant. When generalizing findings, careful observations on the conditions of each empathy-arousing context are essential to address contextual specificities of empathy-related emotions in general.

5. Conclusion

In this study, we addressed a potentially important question about how dispositional and cry specific empathy and distress underlie adult responses to infant crying. The findings that empathy and distress covaried in the same direction both in disposition and cry responding diverged from what had been described in the general empathy literature concerning their qualitative contrasts. Understanding individual differences in empathy-related responding to infant crying requires considerations of a person's disposition as well as the context-specific variabilities. In a complex reality, caregivers' sensitive and supportive parenting could potentially benefit from becoming cognizant about the relation between empathic and distress emotions and how their relation changes at different times and in different contexts.

References

- Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment, a psychological study of the strange situation*. Hillsdale, NJ: Erlbaum.
- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl, & J. Beckman (Eds.), *Action-control: From cognition to behavior* (pp. 11–39). Heidelberg, Germany: Springer.
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50., 179–211.
- Archer, R., Diaz-Loving, R., Gollwitzer, P., Davis, M., & Foushee, H. C. (1981). The role of dispositional empathy and social evaluation in the empathic mediation of helping. *Journal of Personality and Social Psychology*, 40., 786–796.
- Barr, R. G., Hopkins, B., & Green, J. A. (2000). Crying as a sign, a symptom, and a signal: Evolving concepts of crying behavior. In R. G. Barr, B. Hopkins, & J. A. Green (Eds.), *Crying as a sign, a symptom, and a signal* (pp. 1–7). London: Cambridge University Press.
- Batson, C. D., Fultz, J., & Schoenrade, P. A. (1987). Distress and empathy: Two qualitatively distinct vicarious emotions with different motivational consequences. *Journal of Personality*, 55., 19–39.
- Bell, S., & Ainsworth, M. (1972). Child development. *Infant Crying and Maternal Responsiveness*: 43., 1171–1190.
- Bornstein, M. H., & Tamis-LeMonda, C. S. (1989). Maternal responsiveness and cognitive development in children. In M. H. Bornstein (Ed.), *Maternal responsiveness: Characteristics and consequences. New directions for child development*, No. 34 (pp. 49–61). San Francisco: Jossey-Bass.
- Boukydis, C. F. Z. (1985). Perception of infant crying as an interpersonal event. In B. Lester, & Z. Boukydis (Eds.), *Infant crying: Theoretical and research perspectives* (pp. 187–216). New York: Plenum.
- Boukydis, C. F. Z., & Burgess, R. L. (1982). Adult physiological response to infant cries: Effects of temperament of infant, parental status, and gender. *Child Development*: 53., 1291–1298.
- Bowlby, J. (1969). *Attachment and loss: Vol. 1. Attachment*. New York: Basic Books.

- Cassidy, J. (1994). Emotion regulation: Influences of attachment relationships. In N. Fox (Ed.), *The development of emotion regulation, Monographs of the society for research in child development*, Vol. 59 (2–3, Serial No. 240, pp. 228–249).
- Cassidy, J. (1999). Overview of attachment theory. In J. Cassidy, & P. R. Shaver (Eds.), *Handbook of attachment* (pp. 1–17). New York: The Guilford Press.
- Coke, J., Batson, C., & McDavis, K. (1978). Empathic mediation of helping: A two-stage model. *Journal of Personality and Social Psychology*, 36., 752–766.
- Crockenberg, S., & Leerkes, E. M. (2003). Negative infant emotionality and the development of family relationships in infancy and early childhood. In A. C. Crouter, & A. Booth (Eds.), *Children's influence on family dynamics: The neglected side of family relationships* (pp. 57–78). Mahwah, NJ: Erlbaum.
- Davis, M. H. (1980). A multidimensional approach to individual differences in empathy. *JSAS: Catalog of Selected Documents in Psychology*, 10., 85.
- Davis, M. H. (1983a). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, 44., 113–126.
- Davis, M. H. (1983b). The effects of dispositional empathy on emotional reactions and helping: A multidimensional approach. *Journal of Personality*: 51., 167–184.
- Decety, J., & Meyer, M. (2008). From emotion resonance to empathic understanding: A social developmental neuroscience account. *Development and Psychopathology*: 20., 1053–1080.
- de Paul, J., & Guibert, M. (2008). Empathy and child neglect: A theoretical model. *Child Abuse and Neglect*: 32., 1063–1071.
- de Waal, F. B. M. (2008). Putting the altruism back into altruism: The evolution of empathy. *Annual Reviews of Psychology*: 59., 279–300.
- Dix, T. H. (1991). The affective organization of parenting: Adaptive and maladaptive processes. *Psychological Bulletin*: 110., 3–25.
- Dix, T. H. (1992). Parenting on behalf of the child: Empathic goals in the regulation of responsive parenting. In I. E. Sigel, A. V. McGillicuddy-DeLisi, & J. J. Goodnow (Series Eds.), & *Parental belief systems: The psychological consequences for children* : 2. (pp. 319–346). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Dix, T., Gershoff, E., Meunier, L., & Miller, P. (2004). The affective structure of supportive parenting: Depressive symptoms, immediate emotions, and child-oriented motivation. *Developmental Psychology*: 40., 1212–1227.
- Donate-Bartfield, E., & Passman, R. H. (1985). Attentiveness of mothers and fathers to their baby's cries. *Infant Behavior and Development*: 8., 385–393.
- Eisenberg, N., & Fabes, R. A. (1998). Prosocial development. In W. Damon (Series Ed.) & N. Eisenberg (Volume Ed.), *Handbook of child psychology, Vol. 3: Social, emotional, and personality development* (5th ed., pp. 701–778). New York: Wiley.
- Eisenberg, N., Fabes, R. A., & Murphy, B. C. (1996). Parents' reactions to children's negative emotions: Relations to children's social competence and comforting behavior. *Child Development*: 67., 2227–2247.
- Eisenberg, N., & Miller, P. A. (1987). The relation of empathy to prosocial and related behaviors. *Psychological Bulletin*: 94., 100–131.
- Eisenberg, N., Miller, P. A., Schaller, M., Fabes, R. A., Fultz, J., Shell, R., et al. (1989). The role of sympathy and altruistic personality traits in helping: A re-examination. *Journal of Personality*: 57., 41–67.
- Fabes, R. A., Eisenberg, N., & Miller, P. (1990). Maternal correlates of children's vicarious emotional responsiveness. *Developmental Psychology*: 26., 639–648.
- Feshbach, N. D. (1987). Parental empathy and child adjustment/maladjustment. In N. Eisenberg, & J. Strayer (Eds.), *Empathy and its development* (pp. 271–291). New York: Cambridge University Press.
- Feshbach, N. D., & Feshbach, S. (1982). Empathy training and the regulation of aggression. Potentialities and limitations. *Academic Psychology Bulletin*: 4., 399–413.
- Frodi, A. (1981). Contributions of infant characteristics to child abuse. *American Journal of Mental Deficiency*: 85., 341–349.
- Frodi, A. M. (1985). When empathy fails: Aversive infant crying and child abuse. In B. M. Lester, & C. F. Z. Boukydis (Eds.), *Infant crying: Theoretical and research perspectives* (pp. 263–277). New York: Plenum Press.
- Frodi, A. M., & Lamb, M. E. (1980). Child abusers' responses to infant smiles and cries. *Child Development*: 51., 238–241.
- Frodi, A. M., & Senchak, M. (1990). Verbal and behavioral responsiveness to the cries of atypical infants. *Child Development*: 61., 76–84.
- Gottman, J. (1997). *Raising an emotionally intelligent child: The heart of parenting*. New York: Simon & Schuster.
- Green, J. A., Jones, L. E., & Gustafson, G. E. (1987). Perception of cries by parents and nonparents: Relation to cry acoustics. *Developmental Psychology*: 23., 370–382.
- Gustafson, G. E., & Green, J. A. (1991). Developmental coordination of cry sounds with visual regard and gestures. *Infant Behavior and Development*: 14., 51–57.
- Gustafson, G. E., & Harris, K. L. (1990). Women's responses to young infants' cries. *Developmental Psychology*: 26., 144–152.
- Hoffman, M. L. (1975). Developmental synthesis of affect and cognition and its interplay for altruistic motivation. *Developmental Psychology*: 11., 607–622.
- Hoffman, M. L. (1982). Development of prosocial motivation: Empathy and guilt. In N. Eisenberg (Ed.), *The development of prosocial behavior* (pp. 281–313). New York: Academic Press.
- Hoffman, M. L. (2000). *Empathy and moral development: Implications for caring and justice*. New York: Cambridge University Press.
- Lamm, C., Batson, C. D., & Decety, J. (2007). The neural substrate of human empathy: Effects of perspective-taking and cognitive appraisal. *Journal of Cognitive Neuroscience*: 19., 42–58.
- LaGasse, L., Neal, A. R., & Lester, B. (2005). Assessment of infant cry: Acoustic cry analysis and parental perception. *Mental Retardation and Developmental Disabilities*: 11., 83–93.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.
- Leerkes, E. M. (2010). Predictors of maternal sensitivity to infant distress. *Parenting: Science and Practice*: 10., 219–239.
- Leerkes, E. M., & Crockenberg, S. C. (2006). Antecedents of mothers' emotional and cognitive responses to infant distress: The role of family, mother, and infant characteristics. *Infant Mental Health Journal*: 27., 405–428.
- Leerkes, E. M., Crockenberg, S. C., & Burrous, C. E. (2004). Identifying components of maternal sensitivity to infant distress: The role of maternal emotional competencies. *Parenting: Science and Practice*: 4., 1–23.
- Lin, H.-C., & Green, J. A. (2007). The effects of posture on newborn crying. *Infancy*: 11., 175–189.
- Martin, G. B., & Clark, R. D. (1982). Distress crying in neonates: Species and peer specificity. *Developmental Psychology*: 18., 3–9.
- Meaney, M. J. (2001). Maternal care, gene expression, and the transmission of individual differences in stress reactivity across generations. *Annual Reviews of Neuroscience*: 24., 1161–1192.
- Milner, J. S., Halsey, L. B., & Fultz, J. (1995). Empathic responsiveness and affective reactivity to infant stimuli in high- and low-risk for physical child abuse mothers. *Child Abuse and Neglect*: 19., 767–780.
- Murray, A. D. (1979). Infant crying as an elicitor of parental behavior: An examination of two models. *Psychological Bulletin*: 86., 191–215.
- Murray, A. (1985). Aversiveness is in the mind of the beholder: Perception of infant caring by adults. In B. Lester, & Z. Boukydis (Eds.), *Infant crying: Theoretical and research perspectives* (pp. 217–240). New York: Plenum Press.
- Nezlek, J. B., Feist, G. J., Wilson, F. C., & Plesko, R. M. (2001). Day-to-day variability in empathy as a function of daily events and mood. *Journal of Research in Personality*: 35., 401–423.
- Perez-Albeniz, A., & de Paul, J. (2003). Dispositional empathy in high- and low-risk parents for child physical abuse. *Child Abuse and Neglect*: 27., 769–780.
- Piliavin, J. A., Dovidio, J. F., Gaertner, S. L., & Clark, R. D., III. (1981). *Emergency intervention*. New York: Academic.
- Preston, S. D., & de Waal, F. B. M. (2002). Empathy: Its ultimate and proximate bases. *Behavioral and Brain Sciences*: 25., 1–72.
- Sagi, A., & Hoffman, M. L. (1976). Empathic distress in the newborn. *Developmental Psychology*: 12., 175–176.
- Schaller, M., & Cialdini, R. B. (1988). The economics of empathic helping: Support for a mood management motive. *Journal of Experimental Social Psychology*: 24., 163–181.
- Sears, D. O. (1986). College sophomores in the laboratory: Influences of a narrow database on social psychology's view of human nature. *Journal of Personality and Social Psychology*: 51., 515–530.
- Smith, A. (2006). Cognitive empathy and emotional empathy in human behavior and evolution. *The Psychological Record*: 56., 3–21.

- Tyson, P. D., & Sobschak, K. B. (1994). Perceptual responses to infant crying after EEG biofeedback assisted stress management training: Implications for physical child abuse. *Child Abuse and Neglect*: 18., 933–943.
- van IJzendoorn, M. H., & Hubbard, F. O. A. (2000). Are infant crying and maternal responsiveness during the first year related to infant-mother attachment at 15 months? *Attachment and Human Development*: 2., 371–391.
- Vecchio, T. D., Walter, A., & O'Leary, S. G. (2009). Affective and physiological factors predicting maternal response to infant crying. *Infant Behavior and Development*: 32., 117–122.
- Vitaglione, G. D., & Barnett, M. A. (2003). Assessing a new dimension of empathy: Empathic anger as a predictor of helping and punishing desires. *Motivation and Emotion*: 27., 301–325.
- Wiesenfeld, A., Whitman, & Malatesta, C. Z. (1984). Individual differences among adult women in sensitivity to infants: Evidence in support of an empathy concept. *Journal of Personality and Social Psychology*: 46., 118–124.
- Zahn-Waxler, C., & Radke-Yarrow, M. (1990). The origins of empathic concern. *Motivation and Emotion*: 14., 107–130.
- Zeifman, D. M. (2001). An ethological analysis of human infant crying: Answering Tinbergen's four questions. *Developmental Psychobiology*: 39., 265–285.
- Zeifman, E. M. (2003). Predicting adult responses to infant distress: Adult characteristics associated with perceptions, emotional reactions, and timing and intervention. *Infant Mental Health Journal*: 24., 597–612.
- Zeifman, D. M. (2004). Acoustic features of infant crying related to intended caregiving intervention. *Infant and Child Development*: 13., 111–122.
- Zeskind, P. S., & Lester, B. H. (1978). Acoustic features and auditory perceptions of the cries of newborns with prenatal and perinatal complications. *Child Development*: 49., 580–589.