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Contents

Original Article

If I Cry, Do You Care?

Individual Differences in Empathy Moderate the Facilitation of Caregiving Words After Exposure to Crying Faces

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Abstract. Crying is a powerful solicitation of caregiving, yet little is known about the cognitive processes underpinning caring responses to crying others. This study examined (1) whether crying (compared to sad and happy) faces differentially elicited semantic activation of caregiving, and (2) whether individual differences in cognitive and emotional empathy moderated this activation. Ninety participants completed a lexical decision task in which caregiving, neutral, and nonwords were presented after subliminal exposure (24 ms) to crying, sad, and happy faces. Individuals low in cognitive empathy had slower reaction times to caregiving (vs. neutral) words after exposure to crying faces, but not after sad or happy faces. Results are discussed with respect to the role of empathy in response to crying others.

Keywords: crying faces, empathy, caregiving, lexical decision task, individual differences

The ability to correctly identify the facial expressions of others is fundamental to successful human interaction. Indeed, it is widely believed that facial expressions depicting internal states evolved to facilitate the communication of different emotions and thus oil the course of social interaction (Blair, 2005). A wealth of studies now point to the different perceptual, cognitive, and behavioral responses elicited by different emotional expressions, but responses to crying faces have been largely neglected in this research. The current study addresses this gap in the literature by examining responses elicited by crying faces[1], and considers how these might differ from responses elicited by sad faces.

Crying is a powerful signal of need for care, and tearing has been heralded as an evolutionary breakthrough in human emotional signaling (Provine, Krosnowski, & Brocato, 2009). To date, research on adult crying has focused mainly on self-reported patterns of own crying (see Vingerhoets & Cornelius, 2001). However, a handful of studies have examined responses to the crying of others and suggest that crying faces elicit specific responses that are different from both sad faces without tears and other basic emotional expressions such as fear and anger. For example, both Cornelius and Lubliner (2003) and Provine et al. (2009) found that pictures of crying faces with the tears digitally removed were judged as less sad and more ambiguous in emotional valence than crying faces with tears. When compared to judgments of basic emotional expressions (neutral, angry, and fearful), crying faces are judged as less aggressive, more evoking of sadness, emotional support, comfort, and empathy, and less evoking of avoidance behavior in the perceiver (e.g., Cornelius & Lubliner, 2003; Hendriks & Vingerhoets, 2006). In line with these findings, Hendriks, Croon, and Vingerhoets (2008) examined hypothetical responses to crying and noncrying others and found that, regardless of whether the hypothetical crying other was a friend or a stranger, crying faces elicited more emotional support. However, they also found that crying others were attributed more negative and fewer positive characteristics compared to noncrying others.

Taken together, these findings suggest that crying faces (and persons) can evoke different cognitive and behavioral responses compared to noncrying sad faces (and persons), and in particular that crying faces facilitate emotionally supportive (e.g., caregiving) responses in the perceiver. Al-

[1] Although crying may signify a number of emotions, here we follow other researchers by focusing on crying out of sadness and distress in order to examine responses to this, the simplest message thought to be communicated by tears.

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though the above self-report data point to important differences in the conscious evaluations of crying versus sad faces without tears, research has yet to compare responses to each at the preconscious level – or to examine the individual differences that might moderate them. Given the likely social desirability biases associated with people's self-reported responses to crying others (reflecting perhaps the social norm that we must "be nice to those who are upset"), an examination of preconscious processes is perhaps particularly informative. In addition, given that crying faces elicit caregiving and empathic responses in the perceiver (Kottler & Montgomery, 2001), it is likely that these responses would be moderated by individual differences in dispositional empathy.

Empathy refers to our ability to share and understand the emotional states of others (Singer & Lamm, 2009) and serves to facilitate prosocial interactions (e.g., Batson, 1998; Dovidio, Allen, & Schroeder, 1990). Current conceptualizations of empathy suggest it is composed of overlapping yet dissociable emotional and cognitive subcomponents (see Blair, 2005; Singer & Lamm, 2009). Emotional empathy is the tendency to feel or share the emotional experience of another person, through emotional mimicry and emotional contagion. Cognitive empathy refers to the ability to take the perspective of another and put oneself in his/her shoes (Blair, 2005; Singer & Lamm, 2009). Cognitive empathy allows humans to predict and understand the behavior of others in terms of attributed mental states and is thought to occur subconsciously and automatically.

To date, only a few studies have examined the extent to which the empathy subcomponents are involved in facilitating prosocial behavioral responses to a person in need. One such study by Masten, Morelli, and Eisenberger (2011) investigated empathy for "social pain" and subsequent prosocial behavior. Results showed that activity in the medial prefrontal cortex, which is often associated with cognitive empathy (Blair, 2005), played a crucial role in the link between empathy and prosocial behavior. Moreover, while other emotional expressions have a clear valence (e.g., happy and sad), crying can occur when an individual is in emotional or physical distress *or* when that person is experiencing extreme joy or happiness (Vingerhoets, Boelhouwer, Van Tilburg, & Van Heck, 2001). The cognitive complexity associated with the demands of interpreting and responding appropriately to crying faces points to a specific role for cognitive empathy in the processing of, and cognitive responses to, crying faces. Cognitive empathy could also serve to help identify the needs of a crying other by facilitating automatic mentalizing and perspective-taking with the target.

Equally, some studies have linked emotional empathy to cognitive-affective response to emotionally distressed others. Emotional empathy is positively associated with emotional expression recognition (e.g., Gery, Miljkovitch, Berthoz, & Soussignan, 2009; Martin, Berry, Dobranski, van Horne, & Dodgson, 1996), which in turn is a prerequisite for providing a caring response (Blair, 2005). Overall, these findings suggest key roles for both cognitive and emotional empathy in responding to crying others.

The present study addresses two major questions. First, do crying faces and sad faces elicit different patterns of semantic activation of caregiving? Second, do individual differences in cognitive and emotional empathy moderate this semantic activation? We measured dispositional cognitive and emotional empathy and used an adapted lexical decision task (LDT; Meyer & Schvaneveldt, 1971) to assess the facilitation of caregiving versus neutral words after subliminal exposure to crying, sad, and, as a nondistressed but valenced control, happy faces. We chose a LDT to investigate preconscious associations between crying others and care representations as an established and reliable implicit tool for examining individual differences in automatic information processing (Meyer & Schvaneveldt, 1971; Mikulincer, Gillath, & Shaver, 2002; Rule, Macrae, & Ambady, 2009). In a LDT, participants decide whether the letter-string on the screen is a word or nonword and indicate their answer as quickly and accurately as possible via button-press. Generally, reaction time (RT) latencies to words in a LDT are interpreted as indexing the extent to which cognitive representations are activated after a prime, such as a word or visual stimulus (e.g., Fischler & Bloom, 1979; Mikulincer et al., 2002). Consequently, in line with this previous research (Mikulincer et al., 2002), we interpreted RT latencies to caregiving words as indicating the extent to which caregiving schemata were activated in response to the face prime. Based on past self-report findings concerning cognitive evaluations of crying in others, and research investigating individual differences in cognitive and emotional empathy, our predictions were as follows:

Hypothesis 1: We expected that priming with crying (vs. sad or happy) faces would facilitate the semantic activation of caregiving representations, as indexed by faster RTs to caregiving vs. neutral words. This finding would fit with past self-report findings suggesting that crying faces facilitate emotional support responses in the perceiver (e.g., Cornelius & Lubliner, 2003; Hendriks & Vingerhoets, 2006; Hendriks et al., 2008).

Hypothesis 2: Individuals lower (vs. higher) in *cognitive* empathy would display slower activation of caregiving representations after exposure to crying faces, as indexed by slower RTs to caregiving vs. neutral words. This pattern would support previous findings linking cognitive empathy to prosocial responses to distress (Masten et al., 2011) and our assertion that crying is a cognitively complex emotion to which to respond appropriately.

Hypothesis 3: Individuals lower (vs. higher) in *emotional* empathy would display slower activation of caregiving representations after exposure to crying faces, as indexed by slower RTs to caregiving vs. neutral words. This would fit with previous findings linking emotional empathy to expression recognition (Gery et al., 2009; Martin et al., 1996) and emotional expression recognition being a prerequisite for providing a caring response (Blair, 2005).

Method

Participants

Ninety participants (45 females) took part (M_{AGE} = 22.9, *SD* = 5.53, range 18–56 years). This included 56 undergraduates and 14 postgraduates (recruited by adverts within a British university) and 20 members of the community (recruited through verbal/email contact after expressing an interest in taking part in research studies). All participants were native English speakers with normal or corrected-to-normal vision. Full ethical approval and informed consent were obtained. Participants were incentivised with confectionary for their time.

Stimuli and Apparatus

Since the literature investigating adult crying is still in its infancy, no established set of crying faces were available at the time of testing. Consequently, we modified a set of 10 faces from the Macbrain database (Tottenham et al., 2009) by digitally adding tears to open-mouthed sad expressions using Adobe Photoshop image software (see Figure 1 for an example). We selected the open-mouthed expressions as our crying faces given that these facial gestures are more likely when crying (Patel, 1993) and we digitally added tears to these images since previous research has identified the addition of tears to be the key distinguishing feature between sad and crying faces (Provine et al., 2009). These stimuli, along with 10 happy and 10 sad faces (closed-mouthed) of the same identity, were rated by an independent sample (*n* = 56) according to the extent to which they convincingly displayed each expression (sad, crying, happy; 1 = *not at all*, 7 = *extremely*). The 3 male and 3 female identities with the highest overall ratings for each dimension were used (18 faces in total) and all expressions of these chosen identities received strong average convincingness ratings (sad = 5.07; happy = 5.77; crying = 5.91). All selected face stimuli were of Caucasian ethnicity and aged 21–30 years. This demographic was selected to match the demographic of the participant pool.

We used scrambled faces to backwards-mask the stimuli. To create these we divided the inner region of each neutral face using a 6 × 8 matrix of 1.7 cm^2 tiles and randomly rearranged the tiles. This method ensured that facial features (nose, eyes, mouth) remained intact, but no facial expression was visible. Six masks were created, one for each identity. All faces and masks were displayed as 24 cm × 18 cm.

Five words were selected from a previously-rated set of words (Rowe & Carnelley, 2003) on the basis that they depicted caregiving behaviors (Support, Care, Cuddle, Reassure, Protect). In addition, 5 neutral words and 10 nonwords were obtained from another previously-rated set (Fussell, Rowe, & Mohr, 2011). The selected neutral and caregiving words were comparable in word frequency (log frequency 9.2 for neutral words and 9.4 for caregiving words; Balota et al., 2007). All words/nonwords were presented in the center of the screen in black, Times New Roman, font size 12.

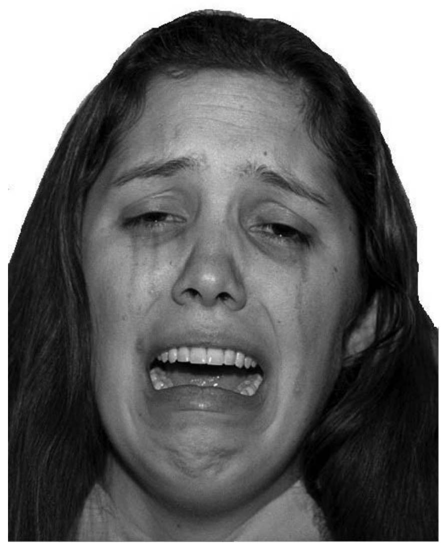

Figure 1. Example of crying face stimuli.

Materials and Procedure

Participants completed the Empathy Quotient (EQ) (Baron-Cohen & Wheelwright, 2004) which assessed dispositional empathy. The EQ contains 40 questions and 20 filler items. Participants indicated the extent to which they endorsed each statement (1 = *strongly agree*, 4 = *strongly disagree*). An empathic response (e.g., agreeing with an empathic behavior) scored 2 if strong and 1 if mild, whereas a nonempathic response (e.g., disagreeing with an empathic behavior) scored 0 regardless of strength (Baron-Cohen & Wheelwright, 2004). Following Muncer and Ling (2006), we calculated total scores for Cognitive Empathy (11 items, e.g., "I am good at predicting how someone will feel;" current α = .82, *M* = 14.39, *SD* = 4.65, range 3–25) and Emotional Empathy (11 items, e.g., "I tend to get emotionally involved with a friend's problems;" current α = .78, *M* = 13.8, *SD* = 4.85, range = 1–24). The two subscales were positively correlated, $r(88) = .43$, $p < .001$. Muncer and Ling also identify a Social Skills sub scale, which was not relevant to our hypotheses and so not used in this study.

Participants then completed a computerized LDT run using an E-Prime software program (Psychology Software Tools, Pittsburgh, PA, USA). A block of 8 practice trials was followed by 4 blocks of 90 test trials (30 crying, 30 sad, and 30 happy faces, subliminally presented) resulting in 360 test trials. The trials were presented in a randomized order, with each word/nonword presented 18 times in total. Faces and words were randomly combined ensuring 50% of letter strings were nonwords, 25% neutral words, and 25% caregiv-

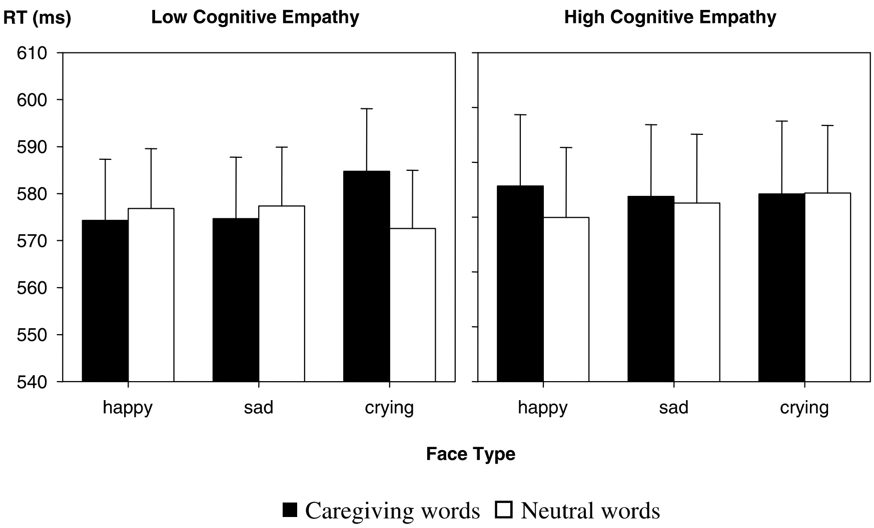

Figure 2. RTs to caregiving and neutral words as a function of face type at relatively low (M – 1 SD) and high (M + 1 SD) levels of cognitive empathy (means and standard errors estimated while controlling for emotional empathy).

ing words. All stimuli were presented in the center of the screen. Each trial began with the appearance of a fixation cross (500 ms). This was followed by the subliminal face prime (24 ms) of either a crying, sad, or happy face. The face prime was masked with a scrambled face of the same identity (1000 ms). Finally, a caregiving word, neutral word, or nonword was displayed until a response was recorded. The next trial began immediately. Participants were told that on each trial they would be presented with a scrambled face followed by a letter-string and were instructed to respond as quickly and accurately as possible to classify each letter string, using the left (nonword) and right (word) arrow keys, with their dominant hand. Participants were also instructed to maintain central fixation throughout the task.

Results

Data for nonwords and incorrect responses were excluded. RT outliers below 250 ms and above 1000 ms were also removed[2]. See Table 1 for total errors and mean RTs. We simultaneously entered cognitive empathy and emotional empathy as centered continuous predictors in a 3 (Face: happy vs. sad vs. crying) × 2 (Word: caregiving vs. neutral) GLM analysis with repeated measures on the latter two factors (for similar procedures see Van Breukelen & Van Dijk, 2007). There were no significant main effects or interactions involving emotional empathy. However, there was a significant Word × Face × Cognitive Empathy interaction, $F(2, 174) = 3.18$, $p = .044$, $\Delta\eta^2 = .035$. Simple contrasts examining different levels of the Face variable indicated that this interaction was significant for happy vs. crying faces, $F(1, 87) = 5.38$, $p = .023$, $\Delta\eta^2 = .058$, and showed a trend toward significance for sad vs. crying faces, $F(1, 87) = 3.32$, $p = .072$, $\Delta\eta^2 = .037$. The relevant mean RTs are displayed in Figure 2.

Table 1. Total percentage error and mean RT for each condition

Condition		Errors	RT (ms)	
Face	Word	%	Mean	*SD*
Happy	Neutral	2.0	567.2	46.3
	Caregiving	1.7	577.3	54.9
Sad	Neutral	2.2	568.6	47.5
	Caregiving	2.1	575.3	62.0
Crying	Neutral	1.9	572.9	51.9
	Caregiving	1.9	582.8	62.6

We probed the three-way interaction in a manner conceptually equivalent to testing simple slopes in regression (Aiken & West, 1991). That is, we re-ran the full GLM centering cognitive empathy around either high (1 *SD* above mean) or low (1 *SD* below mean) values. Estimated means and simple effects of other factors at this high/low value indicate responses to different types of face for participants with relatively high/low levels of cognitive empathy respectively. The Word × Face interaction was not significant at high levels of empathy, $F(2, 174) = 0.57$, $p = .565$, $\Delta\eta^2 = .007$. However, the Word × Face interaction was significant at low levels of empathy, $F(2, 174) = 4.37$, $p = .014$, $\Delta\eta^2 = .048$ (and simple contrasts showed that the two-way interaction was significant for both happy vs. crying faces, $F = 6.08$, $p = .016$, $\Delta\eta^2 = .065$, and sad vs. crying faces, $F = 6.20$, $p = .015$, $\Delta\eta^2 = .066$). Pairwise comparisons with Bonferroni correction showed that participants with low cognitive empathy were slower to respond to caregiving words than neutral words following

[2] We defined outliers as any RT less than 250 ms, which indicate "fast guesses" (Whelen, 2008) or long RTs greater than 1000 ms. The percentage of trials where there were RT outliers or incorrect responses was low at only 6.1%. The use of absolute cut-offs such as these has been found to be the most effective strategy for increasing power when compared to other common approaches such as excluding a certain number of standard deviations from the mean (Ratcliff, 1993).

subliminal exposure to a crying face, $t(87) = 2.39$, $p < .02$, $d = 0.99$, but not following happy or sad faces, $ts(87) < 0.57$, $ps > .56$, $ds < 0.23$ (Figure 2). Participants with high cognitive empathy did not differ in their responses to caregiving versus neutral words after any type of face, $ts(87) < 1.15$, $ps > .25$, $ds < 0.45$.

Discussion

Theory and past self-report research suggest that (1) crying faces are evaluated differently compared to noncrying sad faces in that they more effectively facilitate emotional support responses, and (2) empathy plays a crucial role in eliciting support to emotionally distressed others. In the present study we experimentally examined these two assertions at the preconscious level, by measuring dispositional cognitive and emotional empathy and using a LDT involving caregiving and neutral words, preceded by subliminal presentation of crying, sad and happy faces. While we did not find our anticipated main effect of face type on RTs to the LDT, we did find an interaction showing that individuals low in cognitive empathy displayed slower activation of caregiving representations to crying (versus sad and happy) faces. These findings show that for those low in cognitive empathy, crying faces elicit different caregiving-related cognition compared to sad faces. To our knowledge, this study is the first to show this effect.

Lexical decision tasks have previously been shown to elucidate individual differences in the processing of emotional information (e.g., Mikulincer et al., 2002; Rule et al., 2009). The facilitation of context-relevant information after a prime indicates that this information has been activated by the prime and has caused a spreading of activation to other context relevant information (e.g., Fischler & Bloom, 1979; Meyer & Schvaneveldt, 1971). Consequently, the slowing of response to caregiving words (vs. neutral) after the crying face primes suggests that caregiving representations are less readily activated in response to crying faces among those low in cognitive empathy.

The finding that individuals low in cognitive empathy responded more slowly to caregiving words after crying faces has important implications for the role of empathy in responding to others in emotional distress. First, it supports the body of research suggesting that the ability to empathically respond to others' needs underpins altruism and prosocial behavior (Batson, 1998; Dovidio et al., 1990) by demonstrating a link between perception of emotional expressions of distress and slower activations of care representations among those low in cognitive empathy. Our finding also extends the current literature by showing that cognitive empathy could be especially important in facilitating automatic representations of care for crying others, since our results suggest that automatic representations were inhibited in participants low in cognitive empathy. This is consistent with Masten et al.'s (2011) finding that the medial prefrontal cortices (linked to cognitive empathy) underpinned the link between dispositional empathy and prosocial behavior. While the present study did not assess prosocial behavior directly, activation of care representations can be posited to be an important first step in providing a caring response. Indeed, previous research has found reliable associations between individual differences in RT latencies in a LDT and actual behavior (e.g., Campos-Melady & Smith, 2012; Kemeny et al., 2012). Further research could extend the current work by examining whether and how the differences in RT latencies found in the present study translate into behavior.

Our pattern of results suggests that it was specifically *cognitive* empathy (i.e., the ability to take others' perspective) and not *emotional* empathy (i.e., the tendency to feel what others are feeling) that predicted semantic activation of caregiving to crying faces. Although our crying face stimuli depicted emotional distress, crying can occur when in physical distress and also when experiencing extreme happiness (Vingerhoets et al., 2001). This ambiguity of context would presumably require more complex mentalizing and perspective-taking processes (which individuals low in cognitive empathy lack) to induce care-related thoughts. Also, cognitive empathy is likely to be important for facilitating fast activation of care representations so that the perceiver can understand the emotional state of the target and provide an appropriate response. Future research could seek to disentangle this by comparing the effects of ambiguously vs. nonambiguously valenced crying images on the preconscious activation of caregiving.

It is also possible that in our study cognitive empathy played a more central role in responses to crying faces because the task we used relied on semantic activation – a cognitive index of caregiving. Emotional empathy, in contrast, might influence physiological reactivity or facial expression when viewing crying others. However, given that both the present study and that of Masten et al. (2011) found a special role for cognitive empathy in supporting the link between empathy and care-related responses, it is unlikely that our result can be purely attributed to task demands.

One limitation of our finding is that crying faces display stronger emotional intensity than sad faces (Vingerhoets et al., 2001), which could have affected the semantic activation elicited by the two face types. Such variation in magnitude of affect is difficult to control for without creating crying face stimuli that are low on ecological validity. However, this limitation is a problem for any study investigating crying compared to sad faces without tears, and by using happy faces as our control we attempted to account for any differences in intensity of valence.

Contrary to findings from self-report studies (Cornelius & Lubliner, 2003; Provine et al., 2009) we did not observe that crying faces per se facilitated the activation of caregiving representations relative to sad faces without tears. One explanation is that despite the general idea that crying elicits caregiving behavior (Kottler & Montgomery, 2001), crying others can also be attributed negative characteristics (Hendriks et al., 2008). For example, research has found that medical students who cry at work experience strong negative reactions from their colleagues (Wagner, Hexel, Bauer, & Kropiunigg, 1997). Relatedly, the crying faces may have been perceived as faces of victims. Victims of crime are commonly blamed for their negative experiences by others and activate negative cognitions (e.g., Bieneck & Krahe, 2011). It is possible that the negative elements of the victim stereotype potentially activated in our implicit task may have limited the facilitation of care-related representations, and that the self report findings described above (Cornelius & Lubliner, 2003; Hendriks & Vingerhoets, 2006) partly reflect social desirability biases. Unfortunately, our data do not allow us to examine this possibility, but further research could do so by showing participants the faces they were exposed to during the task (once the task was over) and assessing their feelings and thoughts about them. A final explanation for our null finding relates to the ecological validity of the crying face stimuli used. In real life, we rarely observe a completely still face, and in addition to tears, crying has specific motion signatures (e.g., heaving shoulders) and sometimes audible cues. While our stimuli were not low on ecological validity relative to other facial stimuli used across empirical psychology research, and we identified individual differences in line with our predictions, future studies of crying could use stimuli higher in ecological validity, such as video stimuli of crying actors or investigate actual behavioral interactions with crying others. Our null result does highlight the need to further investigate responses to crying others using experimental methodologies, given that the self-report literature on adult crying suggests that, in general, crying faces elicit emotional support.

A fruitful avenue for future research might be to replicate the current study using stimuli depicting familiar faces instead of faces of strangers. Even though Hendriks et al. (2008) did not find any differences in responses to vignettes about a crying stranger or friend, the impact of the actual faces of close others on empathic responding is a key issue and one likely to augment the ecological validity of the study (we rarely witness strangers crying). Indeed, de Vingemont and Singer (2006) comment that empathic responses are impacted by similarity and familiarity of the other person, in addition to how much care he/she is perceived to need.

In conclusion, the present findings support and extend existing research on responses to crying faces. This is the first experimental study of preconscious responses to crying compared to sad and happy faces and the first study to show that empathy subtypes may differentially impact semantic activation of caregiving representations. We hope that these initial findings provide a springboard for further investigations of individual differences in care-related responses to crying others.

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