

How to build a helpful baby: a look at the roots of prosociality in infancy

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The ability to show concern for others in need and distress is thought to be a vital building block for prosocial tendencies among humans. The current review shows that such other-oriented emotional processes play an important role in guiding prosocial behavior from early in development. Recent research supports the view that infants genuinely care about others in need and distress, but also that a caring continuum exists, which underpins variability in infant prosocial action. Novel methods measuring brain, pupillary, and postural responses have provided insights into affective predictors, motivators, and consequences of prosocial behavior in infants. These advances foster a more mechanistic understanding of the ontogenetic roots of prosociality and attest to infants' affective competency in engaging prosocially with others.

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Introduction

Humans are intensely social beings [1]. From birth, infants possess biases that preferentially orient them to their social environment. For instance, infants prefer to look at faces and biological motion, and they also prefer to listen to voices when compared to other visual and auditory stimuli in their environment [2–4]. These biases are thought to serve as a basis for the social development and learning that take place during the first year of life. By the end of the first year, infants have become competent at detecting and sharing attentional, emotional, and intentional states with others [5–7]. These early emerging competencies are considered to play a critical role in guiding effective social interactions throughout the lifespan. They can therefore be seen as preconditions for our ability to engage in prosocial and cooperative activities

with other humans. What is currently only poorly understood is whether and how social skills that develop during infancy link up with the propensity to display prosocial behaviors later in toddlerhood. Are there specific social sensitivities that are known to develop during the first years of life that function as precursors and even predictors of prosocial behavior? And if that is the case, how exactly do these precursors/predictors impact prosocial responding? In the following, I will review work that informs these questions by highlighting what we have recently learned about the development of specific processes during infancy that may critically shape the early ontogeny of prosocial behavior.

Concern for others, its development, and its link to prosocial behavior

One process that has been prominently discussed as driving prosocial responding is concern or empathic concern, which is the other-oriented affective ability to care about the welfare of another person in need or distress [8**]. Recent work with adults shows that concern is linked to prosocial action and is psychologically distinct from empathy (feeling what the other feels) [9,10]. But what is known about these processes early in ontogeny? As early as 18 months of age, toddlers who show greater facial signs of empathic concern for someone experiencing a distressing (harmful) situation are more likely to help that person [11**]. Importantly, this study demonstrates that this effect occurs even when the person does not display any overt signs of distress to the toddlers, indicating early sophisticated concern for others [12]. There also is longitudinal research to show that infants' empathic concern as measured from facial responses correlates positively with prosocial behavior displayed later in toddlerhood [13**]. Given these findings, it is important to more closely examine the nature and emergence of affective processes in infancy that might play a role in concern linked to prosocial responding.

Traditionally, infants' responding to emotional expressions in others has been dismissed as 'immature' emotional contagion arising from the confusion of self and other, whereas 'mature' empathic concern is considered to critically rely on self-other discrimination as indexed by performance in the mirror-self recognition task [14–16]. This pervasive view in the development of empathy literature is difficult to maintain not least because the experimental evidence for self-other confusion is weak [17*] and cross-cultural work questions the universality of the association between mirror-self recognition and

empathic responding [18]. The possibility that empathic concern develops earlier than previously thought has been raised by Davidov and colleagues [17[•]], receiving support from the longitudinal study mentioned above in which 8-month-old infants showed facial signs of concern [13^{••}]. Furthermore, most investigations of empathic concern have neglected a rich and ever-growing body of research regarding emotion processing during infancy, which might provide valuable insights into the development of empathic concern.

Emotion processing research has shown that infants competently detect, discriminate, and integrate emotional expressions from others' faces, voices, and bodies [5,19–21]. One emotional expression that is of particular interest with respect to empathic concern and prosocial behavior is fear [8^{••}]. Facial fear displays are commonly classified and used as threat stimuli [22]. However, research on the psychology of prosociality has shown that, in adulthood, the capacity to help and benefit others is intimately tied to processes that make us recognize and care about others' emotional displays of distress as exemplified in fearful faces [23–26]. In fact, there is evidence that extremely antisocial psychopaths and extremely prosocial individuals show substantial differences in fear processing and may thus represent opposite ends of a caring continuum [8^{••}]. Specifically, when compared to a control group, anonymous kidney donors show increased neural and behavioral sensitivity to seeing others in distress (fearful faces) [25^{••}]. In contrast, psychopaths exhibit decreased sensitivity to fearful faces when compared to control individuals [26]. Moreover, research with a typical population of adults has demonstrated that better recognition of fear from faces is associated with higher levels of prosocial behavior [23,24]. Taken together, this line of research with adults strongly suggests that variability in responding to fearful faces is linked to variability in prosocial behavior, raising the question when this link emerges in development.

In a recent study, we demonstrated that heightened sensitivity to fearful faces is linked to enhanced prosocial behavior in 5-year-old children in two different cultures [27]. In this study, children in both India and Germany who were quicker to orient to fearful faces displayed greater prosocial behavior in a dictator game. Thus, the fundamental link between variability in responding to fear in others and prosocial behavior already exists in preschool-age children. However, it is important to emphasize that the ability to detect and sensitively respond to various emotional facial expressions including fear emerges during the first year of life [21]. This is well before the age of 14 months at which helping behavior has first been observed in experimental contexts [28]. More specifically, it is around 7 months of age, but not younger, that human infants show increased neural and behavioral (attentional) responses to fearful faces and distinguish

them from other positive and negative facial expressions [29–33]. Given this evidence from behavioral and neuroscience research, infancy can be considered a sensitive developmental period during which fear processing skills come online. Thus, exploring what accounts for individual differences in responsiveness to fearful faces during this sensitive period in ontogeny offers a unique opportunity to understand the foundations of prosocial behavior in human development. This is because responsiveness to fear in others may represent a marker (or precursor) of empathic concern.

In support of this idea, a recent study found that variability in neural responses (measured by functional near-infrared spectroscopy) and attentional responses (measured by eye tracking) to fearful faces at age 7 months predict prosocial behavior at 14 months (Grossmann *et al.*, unpublished). Importantly, this study revealed that responsiveness to fearful faces but not happy or angry faces selectively predicts prosocial behavior. This finding is noteworthy because it establishes a clear link to existing work with adults [8^{••}], showing that fear processing is selectively linked to prosocial responding from early in ontogeny. Nonetheless, other negative facial expressions might also engender concern in the observer [8^{••}]. For example, another facial expression that has been extensively used in adult studies on empathy is pain [34]. However, infant research shows that while 8-month-old infants are able to discriminate painful faces from other similar looking negative facial expressions such as anger, infants' viewing of painful faces does not result in the brain responses associated with empathic responding to pain found in adults [35]. This line of work shows that when elucidating the foundations of prosocial behavior in early development, it is essential to focus on specific other-oriented emotional processes and their individual variability.

New psychophysiological measures of prosocial motivation

Another powerful and promising measure that has recently been introduced and used to study the role of emotional processes in toddlers' prosocial behavior is pupil dilation [36^{••},37]. Pupillary responses predominantly reflect autonomic nervous system activity, and pupil dilation (as opposed to constriction) is considered a correlate of internal arousal [37]. Most strikingly, research using this method has revealed that the degree to which seeing someone needing help elicits pupil dilation in 2 year olds relates to subsequent displays of helping behavior, with greater pupil dilation being associated with a shorter latency to help [38,39[•]]. Thus, in a given situation greater emotional arousal predicts toddlers' helping behavior, suggesting that internal arousal processes function as a motivational force guiding early prosociality. This finding critically adds to the notion that variability in other-oriented emotional

processes links to variability in prosocial behavior. Moreover, it is important to mention that the emotional arousal seen in response to others' needs appears to be genuinely prosocial and caring in nature as it reduces not only when the toddler herself provides help but also when the toddler watches somebody else provide the person in need with help, suggesting that children are motivated to see others helped rather than to themselves receive credit for helping [38]. This is also in line with research showing that toddlers help anonymously [40]. Further support for the interpretation that toddlers' emotional arousal reflects genuine prosocial tendencies comes from the finding that pupil dilation only diminishes when the person in need receives the help (object) they needed but not when simply handed something that equally restores the physical order of things [39]. In summary, the research examining toddlers' pupillary responses demonstrates that it is possible to effectively capture variability in other-oriented internal arousal processes linked to prosocial behavior. An important extension of this line of work would be a longitudinal study, which examines variability in infants' pupillary responses to different emotional expressions in the first year of life [41], and then tests how this relates to variability in prosocial behavior in toddlerhood.

In addition to asking what emotional processes predict (or motivate) prosocial behavior as done by the work employing pupil dilation measures, it is also essential to look at the emotional processes that follow helping behaviors. Most recently, using depth sensor imaging technology, it has been shown that toddlers' body posture is elevated as much after helping another person to achieve a goal as when toddlers achieve a goal themselves [42]. This suggests that helping another person results in a positive and potentially rewarding emotional state in 2-year-old children, which likely serves as a potent motivator for future prosocial actions.

Conclusions

The evidence presented in the current review demonstrates that other-oriented emotional processes play an important role in guiding prosocial behavior from early in human development. This research shows the importance of using psychophysiological methods that adequately track individual variability in these emotional processes and allow us to predict prosocial behavior both longitudinally and cross-sectionally. Studying individual variability thereby offers a unique way to arrive at a more mechanistic understanding of the ontogeny of prosocial behavior and provides support for the notion that a caring continuum exists from early in development.

Emerging evidence suggests that prosocial behavior is rooted in a genuine concern for others that develops in infancy. These insights are based upon new marker tasks that rely on infants' psychophysiological responses to

seeing others in need or distress, which capture variability in emotional processes linked to concern. Novel methods measuring sympathetic emotional arousal through pupillary responses and positive affect through body posture reveal important information regarding affective predictors, motivators, and consequences of prosocial behavior displayed by toddlers. These advances have not only opened the door to fostering a more mechanistic understanding of prosocial tendencies in infancy but are also beginning to change the way we think about infants' abilities to engage with and care about others in need and distress. In recent years, the field has come a long way toward dismantling the long-held view of infants as immature social beings simply infected by another person's displays of need and distress. This view is being replaced by empirical evidence attesting to infants' competent navigation of their social environment and their genuine prosocial orientation toward social partners. Yet there is much to be learned about the early origins of prosocial behavior and this should be seen as a call for more research. A promising avenue appears to be an interdisciplinary approach that combines psychophysiological and behavioral methods with the aim of uncovering the foundational mechanisms that underpin variability in early prosociality.

Conflict of interest statement

Nothing declared.

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