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## Research article

# The past is present: The role of maltreatment history in perceptual, behavioral and autonomic responses to infant emotional signals

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## ABSTRACT

In the current study associations between parents' experiences of childhood maltreatment and their perceptual, behavioral and autonomic responses to infant emotional signals were examined in a sample of 160 parents. Experienced maltreatment (both physical and emotional abuse and neglect) was reported by the participants and, in approximately half of the cases, also by their parents. During a standardized infant vocalization paradigm, participants were asked to squeeze a handgrip dynamometer at maximal and at half strength while listening to infant crying and laughter sounds and to rate their perception of the sounds. In addition, their heart rate (HR), pre-ejection period (PEP), and vagal tone (RSA) were measured as indicators of underlying sympathetic and parasympathetic reactivity. Results indicated that participants did not differ in their perceptions of the infant vocalizations signals according to their maltreatment experiences. However, maltreatment experiences were associated with the modulation of behavioral responses. Experiences of neglect during childhood were related to more handgrip force during infant crying and to less handgrip force during infant laughter. Moreover, a history of neglect was associated with a higher HR and a shorter PEP during the entire infant vocalization paradigm, which may indicate chronic cardiovascular arousal. The findings imply that a history of childhood neglect negatively influences parents' capacities to regulate their emotions and behavior, which would be problematic when reacting to children's emotional expressions.

## 1. Introduction

The experience of childhood maltreatment (i.e., abuse and neglect) has long-term negative consequences for a range of behaviors, including those associated with later parenting (Norman et al., 2012; Pears & Capaldi, 2001). Emotional dysregulation can be considered a key pathway through which experiences of child maltreatment influence how parents respond to their children. Numerous studies have shown that adverse caregiving experiences, including child maltreatment, contribute to emotion dysregulation in general (e.g., Dvir, Ford, Hill, & Frazier, 2014), yet fewer attempts have been made to study the effects of childhood maltreatment on emotion regulation specifically in response to child emotional signals. Only three studies so far have examined whether parents' history of maltreatment was related to their emotion regulation and responding to infant emotional signals, using relatively small samples of mothers only (Casanova, Domanic, McCanne, & Milner, 1994; Compier-de Block et al., 2015; Reijman et al., 2014). Since

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emotion regulation and responding to infant emotional signals are considered important mechanisms underlying sensitive parenting (e.g., Joosen et al., 2013; Reijman et al., 2016), a significant gap in the literature exists. In the current study, we examined whether parents' childhood maltreatment experiences contribute to their emotion regulation and response to infant distress in a large sample of both mothers and fathers. Previous studies have used either cognitive, physiological, or behavioral measures as indices of emotion regulation in response to infant emotional signals (e.g., Compier-de Block et al., 2015; Groh & Roisman, 2009). To our knowledge this study is the first to examine all three domains, in both fathers and mothers.

Attachment theory (Bowlby, 1969) offers an integrative theoretical framework to understand how exposure to childhood maltreatment can impact adult processing of and responding to child emotional signals. A central tenet of attachment theory (Bowlby, 1969) is that children develop an internal working model (i.e., a mental representation) of the self and others through repeated interactions with their primary caregiver(s), which guides their future social and emotional behavior. These internal working models are assumed to characterize distinct strategies of emotion regulation that children and adults employ to manage distress and negative emotions in a range of contexts, including interactions of parents with their children (Mikulincer & Shaver, 2008). Experiences of childhood maltreatment have been longitudinally linked to adults' formation of insecure working models (Raby, Labella, Martin, Carlson, & Roisman, 2017), and insecure working models in turn have been found to translate into insensitive caregiving behavior (Dykas & Cassidy, 2011). Moreover, it has been suggested that individual variation in adults' internal working models as reflected in different styles of emotional responding is most evident when adults are confronted with attachment-related stressors (Kobak, Cole, Ferenz-Gillies, Fleming, & Gamble, 1993). Infant crying is a typical attachment-related stressor and has been shown to elicit physiological arousal in both parents and non-parents, and in both females and males (Frodi, Lamb, Leavitt, & Donovan, 1978; Groh & Roisman, 2009). Crying may be adaptive and necessary for a baby's survival (Bowlby, 1969), but it can also evoke irritation and may trigger abuse and neglect (e.g., Out, Bakermans-Kranenburg, van Pelt, & van IJzendoorn, 2012).

An important prerequisite for emotion regulation and responding to emotional stimuli is the ability to process social information effectively (Gross, 2002). According to Dykas and Cassidy (2011), individuals process social information in accordance with their attachment-related experiences. Secure individuals draw on their positive attachment-related knowledge to process social information in a positively biased manner, whereas insecure individuals process attachment-relevant social information in a negatively biased manner. Thus, parents' experiences of childhood maltreatment might influence the way in which they process child emotional signals. Indeed, it was shown that mothers who received harsh parenting during childhood had more negative attitudes about their child's behavior (Daggett, O'Brien, Zanolli, & Peyton, 2000). Furthermore, adults with a history of parental emotional rejection have been found to make more negative attributions (e.g., child just wants attention, is selfish) about a distressed infant (Leerkes & Siepak, 2006).

The experience of childhood maltreatment may also compromise parents' autonomic responses to child emotional signals. The autonomic nervous system (ANS) is part of the peripheral nervous system that influences the function of internal organs, and has two main divisions: the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS). Generally, the SNS causes bodily energy mobilization during stressful or emergency situations, whereas the PNS is concerned with energy conservation and restoration during resting states (Larsen, Schneiderman, & DeCarlo Pasin, 1986). Measurement of heart rate (HR) alone does not indicate whether SNS or PNS influences are predominant. A widely used measure to monitor changes in cardiac SNS activity is the pre-ejection period (PEP), which is determined by indirect measurement of systolic time intervals and reflects cardiac contractility (Newlin & Levenson, 1979). The degree of cardiac control by the PNS division is commonly quantified by measuring the amplitude of respiratory sinus arrhythmia (RSA; Porges, 1995). In a typical stress response, HR will increase, PEP will decrease due to a shortening of the systolic period, and RSA will decrease due to inhibition of the vagal brake.

Studies that focused on the association between ANS reactivity to psychosocial stressors and childhood maltreatment mainly point to physiological *hyper*-reactivity in response to stressors (i.e., overarousal) after childhood maltreatment (e.g., Heim et al., 2000; Dale et al., 2009), but *hypo*-reactivity (i.e., underarousal) has also been documented (e.g., Ginty, Masters, Nelson, Kaye, & Conklin, 2016). To our knowledge only two studies have associated maltreatment experiences with ANS reactivity specifically to child emotional signals (Casanova et al., 1994; Reijman et al., 2014). In both studies differential reactivity to infant emotional signals was found depending on maltreatment experiences, however, conclusions warrant caution because sample sizes were small.

In addition to ANS reactivity, which reflects responsiveness to distress, a history of childhood maltreatment may compromise sustained (i.e., basal) ANS activation. Sustained ANS activation may more generally represent the capacity for emotion regulation (Appelhans & Luecken, 2006). In spite of a paucity of research, convergent findings point to chronic ANS arousal as a result of childhood maltreatment experiences (e.g., Dale et al., 2009; Miskovic, Schmidt, Georgiades, Boyle, & MacMillan, 2009).

The influence of childhood maltreatment experiences on emotion regulation and responding may not only be reflected in physiological dysregulation, but also in behavioral dysregulation. A documented way to operationalize behavioral responses to infant signals is to use a handgrip dynamometer to measure participants' use of excessive force when exposed to infant stimuli. According to Bugental, Lewis, Lin, Lyon, and Kopeikin (1999) adults who process the motives of their children in a negatively biased manner might use excessive punitive force in order to control their children. This reasoning finds support in the study of Riem, Bakermans-Kranenburg, van IJzendoorn, Out, and Rombouts (2012) who used the handgrip dynamometer to examine the association between attachment representations and behavioral reactivity to infant crying. Adults with insecure attachment representations experienced more irritation and used more excessive force when listening to infant crying than individuals with secure representations. Lack of modulation of handgrip force might thus be a correlate of insecure internal working models. Moreover, research has shown that maltreating mothers used excessive force more often while listening to infant crying and laughter than non-maltreating mothers (Compier-de Block et al., 2015). The inability to modulate behavioral responses to infant emotional signals might, therefore, be a risk factor for maltreating behavior. Although the association between excessive handgrip force and maltreatment history was not

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