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# Handgrip force of maltreating mothers in reaction to infant signals☆

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ABSTRACT

Handgrip force responses to infant signals were examined in a sample of 43 maltreating and 40 non-maltreating mothers. During a standardized handgrip paradigm, mothers were asked to squeeze a handgrip dynamometer at maximal and at half of their maximal handgrip strength while listening to infant crying and laughter sounds. Maltreating mothers used excessive force more often while listening to infant crying and laughter than non-maltreating mothers. Of the maltreating mothers, only neglectful mothers ($n = 20$) tended to use excessive force more often during crying than non-maltreating mothers. Participants did not rate the sounds differently, indicating that maltreating mothers cannot be differentiated from non-maltreating mothers based on their perception of infant signals, but show different *behavioral responses* to the signals. Results imply that, in response to infant signals (i.e., crying or laughing), maltreating mothers may be insufficiently able to regulate the exertion of physical force.



Child maltreatment is a major problem throughout the world (Stoltenborgh, Bakermans-Kranenburg, Van IJzendoorn, & Alink, 2013; Stoltenborgh, Bakermans-Kranenburg, & Van IJzendoorn, 2013). Important risk factors for child maltreatment are low education, unemployment, single parenthood, parental psychopathology, and parents' own experiences with child abuse and neglect (Egeland, Jacobvitz, & Sroufe, 1988; Euser et al., 2013; Pears & Capaldi, 2001; Walsh, MacMillan, Jamieson, 2002). However, little is known about the *processes* on the level of the parent that may lead to child maltreatment. There is some evidence that maltreating parents and parents at risk for child maltreatment show different physiological responses to child signals compared to non-maltreating parents (e.g., Bugental, Lewis, Lin, Lyon, & Kopeikin, 1999; Joosen et al., 2013; Lin, Bugental, Turek, Martorell, & Olster, 2002; for a review see McCanne & Hagstrom, 1996). In addition, parents at risk for maltreatment tend to interpret child signals as more negative and hostile (Crouch, Skowronski, Milner, & Harris, 2008; Farc, Crouch, Skowronski, & Milner, 2008). As a next step in unraveling the processes leading to maltreatment, we investigated maltreating mothers' use of excessive force using a handgrip dynamometer during listening to infant signals (laughter and crying).

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Infant vocalizations, including laughter and crying, are powerful cues eliciting parental proximity and care (Bowlby, 1969/1982; Groh & Roisman, 2009). Infant laughter is a uniquely rewarding experience for parents, generally stimulating feelings of love and happiness (Bowlby, 1969/1982; Groh & Roisman, 2009; Mendes, Seidl-de-Moura, & de Oliveira Siqueira, 2009). However, for some parents the rewarding effect of laughter may be attenuated or even absent (Arteche et al., 2011; Reck et al., 2004). Crying signals infant distress and alerts parents to tend to the needs of the infant. While crying generally elicits parental proximity, it is also an aversive stimulus (Fujiwara, Barr, Brant, & Barr, 2011; Murray, 1985) which can evoke irritation and may trigger harsh or even abusive parenting responses (Out, Bakermans-Kranenburg, Van Pelt, & Van IJzendoorn, 2012; Soltis, 2004).

Physiological reactivity to infant signals has been suggested as a mechanism explaining the divergence in parenting responses (McCanne & Hagstrom, 1996; Murray, 1985; Out et al., 2012; Out, Pieper, Bakermans-Kranenburg, & Van IJzendoorn, 2010). Some studies suggest that abusive parents or parents at risk for abuse are unable to regulate the physiological stress elicited by infant crying and laughter, and experience physiological hyperreactivity to stressors, particularly to child-related stimuli (McCanne & Hagstrom, 1996). However, there is also evidence for a *decreased* physiological response in insensitive mothers (Joosen et al., 2013), possibly explaining their lack of appropriate activity in response to their child's behavior.

Cognitive processes (schemata) and attributions of child behavior may also play a role in explaining differences in parenting responses. For example, there is evidence that the accessibility of hostility-related schemata is related to child abuse risk (Farc et al., 2008). Parents at high risk for physical abuse rated children in pictures ambiguously depicting them to be either cooperative or hostile as more hostile. The authors propose that the accessibility of hostility-related schemata promotes attributions of hostile intent and thereby aggressive parenting behaviors. Given that these hostility-related schemata are accessed relatively automatically, high-risk parents may perceive hostile intent as originating from the child, without recognizing the contribution of their own perceptual and interpretive biases. In line with this, pregnant women's beliefs about infant's negative intentions predicted child maltreatment in the first years of life (Berlin, Dodge, & Reznick, 2013).

Exploring this issue further, Crouch et al. (2012) examined implicit changes in schema accessibility during the course of an interpersonal exchange game involving aggressive response options in which participants were led to believe that they were competing against other players. They found that for parents at high risk for child physical abuse, positive schemata became less accessible whilst negative schemata became more accessible following lost rounds. This indicates that for these parents, positive schema accessibility is hindered by negative interpersonal experiences. These automatic processes may play a role in both the development and maintenance of the maladaptive behavior patterns found in at-risk and abusive parents. Mothers at risk for abuse may also have a tendency to attribute positive child behavior to more external causes and negative child behavior to more internal causes than do control mothers (Dadds, Mullins, McAllister, & Atkinson, 2003).

In addition to physiological and cognitive processes, behavioral responses to standardized child stimuli have been used to examine child abuse risk. For example, a handgrip dynamometer has been used to assess the use of excessive force in pseudo-parenting contexts. In one of the first studies using a handgrip dynamometer, the effect of perceived control on punitive force was tested (Bugental et al., 1999). In a simulated computer interaction mothers attempted to provide training to an unrelated child, and they used a dynamometer to provide feedback to children regarding their performance. Women who perceived themselves as low in power in the caregiving role used more excessive force (punitive power) when children were ambiguously responsive to their instructions. The use of excessive punitive force was interpreted as an analog of reactive force to children's disobedience. Bugental et al. (1999) reason that a negatively distorted view of the motives of children might result in parental use of exaggerated punitive force as a defense against the presumed power of children, increasing the risk of child maltreatment. This reasoning finds support in Crouch et al.'s (2008) results that while watching video segments of an infant in quiet, smiling, and crying states, parents at risk for child abuse who were primed with hostile words, tended to use more excessive force on the dynamometer.

In another study, the handgrip dynamometer was used to assess excessive force during exposure to infant crying in adult females with secure versus insecure AAI classifications (Riem, Bakermans-Kranenburg, Van IJzendoorn, Out, & Rombouts, 2012). Not only did insecure individuals use more excessive force during infant crying, they also experienced more irritation than individuals with a secure representation. In addition, the use of excessive force in response to infant crying was reduced by intranasally administered oxytocin, but only for individuals without experiences of harsh discipline in their own childhoods (Bakermans-Kranenburg, Van IJzendoorn, Riem, Tops, & Alink, 2012).

An important limitation of the studies using the hand grip dynamometer as an indicator of the use of excessive force in parenting contexts so far is that they focused on parents potentially *at risk* for child maltreatment, instead of actually maltreating parents. It is essential to also investigate parents who have been reported for *substantiated* child maltreatment. In addition, most studies to date have focused on physically abusing parents or parents at risk for physical abuse (e.g., Crouch et al., 2008; Crouch et al., 2012; McCanne & Hagstrom, 1996; Out et al., 2012). It is possible that processes that may lead to child maltreatment are different for abusing and neglecting parents. Child neglect is a form of maltreatment that involves acts of *omission* rather than commission (i.e., abuse), and is defined as a persistent failure to meet the child's physical and emotional needs (Dubowitz, Black, Starr, & Zuravin, 1993). Neglectful mothers show lower levels of emotional expression (Camras et al., 1988), lower levels of empathy and emotional insight (Rodrigo et al., 2011; Shahar, 2001), and lower rates of (positive) interaction (Aragona & Eyberg, 1981; Bousha & Twentyman, 1984) as compared to control mothers. Child abuse, on the other hand, implies a *committed* rather than an omitted act, either verbally or physically.