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**Implicit measures of child abuse and neglect: A systematic review**

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## Abstract

Interest in child maltreatment research has been growing in the last two decades. The main approach underlying this research has relied upon self and family reports. These methods may be problematic because they often require conscious awareness, generate socially desirable over accurate responses or can be biased by parents' unrealistic expectations, misattributions and perceptual errors. Simultaneously, research has been adapting methods from social cognition research in an attempt to access the implicit and spontaneous processes underlying the information processing related to parent-child interactions, exploring parental cognitions and emotions that may constitute important contributions to explain abusive and neglectful parenting.

In this paper we review the research on child abuse and neglect using implicit measures. Using combinations of words related with child abuse and neglect, and with autonomic and affective variables assessed by the implicit measures, we have conducted a systematic review of 33 studies, and we examined the variables explored, the type of measures used and the results obtained.

The research reviewed points out the importance of assessing parental representations in parent-child interactions and analyzing the differences between maltreating and non-maltreating parents. Specifically, physically abusive parents tend to show more difficulties in recognizing children's emotions, reveal more biases in their perceptions and attributions about children and behave more aggressively. Further research with maltreating parents, namely neglectful, using implicit measures is still required.

Keywords: child abuse, child neglect, implicit measures

## **Introduction**

Child abuse and neglect constitute the most common types of child maltreatment, with long-term impacts on child development (De Paúl & Guibert, 2008; Hildyard & Wolfe, 2002). While aggressive behavior is the hallmark of abusive parenting, child neglect is characterized by parental omissions regarding child physical and educational needs or failure to provide sufficient supervision. Over the last two decades, child maltreatment has been a topic of interest for many researchers involved in the study of the complex and often private dynamics of families' daily interactions. However, the main approaches underlying this assessment, frequently based on self-report and observational measures, are known to be influenced by a set of variables that often do not allow the accurate assessment of the parental cognitions that may shape parental abusive or neglectful behaviors (e.g., Russa & Rodriguez, 2010). More recently, and based on a social information processing model applied to child maltreatment (Crittenden, 1993; Milner, 1993, 2003), some researchers have been employing methods adapted from social cognition research, in an attempt to access the implicit and spontaneous information processing underlying child maltreatment. This paper aims to present a systematic review of the research conducted on child maltreatment using these types of methods that, along with self-report and observational methods, may contribute to a more effective comprehension of the phenomena.

### **Assessing child abuse and neglect**

Child abuse and neglect has long been a topic in the literature but it is only during the 90s that the scientific community started to focus the research on the definition and evaluation of abusive parenting (e.g., Cicchetti, 1991; Cicchetti & Lynch, 1995; Dubowitz, Klockner, Starr, & Black, 1998; Milner, 1993).

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

Abuse and neglect are among the most prevalent forms of maltreatment.

Internationally, the *World Report on Violence and Health* (WHO, 2002) gives an account of the large number of deaths of children due to parental neglect and abuse, particularly in the age group between 0 and 4 years old. For example, in Portugal in 2013, there were 18910 child neglect cases referenced to child protection services (almost thirty percent of the references), and 6864 cases of physical and emotional abuse (about sixteen percent; Comissão de Proteção de Crianças e Jovens, 2014; Camilo & Garrido, 2013). However, if we consider the likelihood of unreported cases, as well as the constraints in identifying these cases, these numbers are probably underestimated.

The assessment of maltreating parental practices remains therefore a big challenge for researchers and professionals. The traditional approaches used in child abuse and neglect domain have been observational methods or self and family reports (Russa & Rodriguez, 2010; see Calheiros, Garrido, Lopes, & Patrício, 2015; Garrido, Patrício, Calheiros, & Lopes, 2016 for reports by laypersons and professionals). These metrics depend upon a conscious awareness of feelings, cognitions and behaviors towards the child and are influenced by social desirability (e.g., Fazio & Olson, 2003; Greenwald et al., 2002), in an attempt to avoid social judgments or even legal intervention (Portwood, 2006). Moreover, maltreating parents may have unrealistic expectations, perceptual biases about their interactions with their children, or misattribute their children's behavior (Hansen & MacMillan, 1990; Lau, Valeri, McCarthy, & Weisz, 2006) that influence the reports. There are also problems associated with retrospective reporting, namely memory distortions caused by time passage or by the informant's knowledge of subsequent events (Bauer & Twentyman, 1985), making these type of reports susceptible to misrepresentation (Fazio & Olson, 2003).

Recently, in the context of child maltreatment, a social information-processing model has been applied to parent-child interactions, suggesting that abusive and neglectful parents

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

may incur in biases or errors in the information processing during these interactions (Crittenden, 1993; Milner, 1993, 2003). In this model, parental cognitive representations are a key element in the explanation of child abuse and neglect. These cognitive representations refer to the knowledge structures that help people organize their experiences and respond to stimulus events. Furthermore, they are characterized by their automaticity and low level of awareness (Bugental, 1992; Sigel, 1985) because “knowledge that is deeply processed, and routinized and easily activated will be automatized” (McGillicuddy-DeLisi & Sigel, 1995, p. 347). In the implicit social cognition literature, these representations are understood as *implicit cognitions*, that include unconscious effects of past experiences on feelings, thoughts and actions (Greenwald & Banaji, 1995) or evaluations with an unknown origin, that are activated in an automatic manner, which may influence people’s responses in an uncontrollable manner (Wilson, Lindsey, & Schooler, 2000).

In order to reduce the influence that explicit assessment techniques usually have on participant’s candor and accuracy (Fazio & Olson, 2003), implicit measures may constitute an important way to assess parental cognitive representations. As a way to infer mental contents without asking directly for a verbal report, implicit measures reveal the spontaneous influence cognitive representations have on behavior (De Houwer, 2006; Fazio & Olson, 2003).

### **Implicit measures**

Current theory and research offers a very well established set of experimental paradigms that provide access to cognitive processes occurring beyond conscious awareness using implicit measures (e.g., Gawronski, 2009; Greenwald & Banaji, 1995). In these implicit means of assessment, individuals are less certain of what is being assessed or how scores are measured, and thus providing a better experimental control (Fazio & Olson, 2003).

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

The characterization of these paradigms is dependent on several factors. Namely, the inherent automaticity in the procedures, the level of awareness of the mental process, the level of intentionality (control of the person over the starting of the mental process), the level of controllability (control of the person over the ending of the mental process), and the overall level of cognitive load present (Bargh, 1994). In an attempt to measure individual differences in psychological phenomena, implicit measures have been particularly important in the study of attitudes, stereotypes, close relationships and health behavior (for a review, see Fazio & Olson, 2003).

Priming paradigms are very popular in social psychology and are often used as an implicit measure to assess what is activated from memory during the presentation of some attitude object. Early studies began with semantic priming (Meyer & Schvaneveldt, 1971), inferring that the presentation of a stimulus that activates related concepts in memory, reduces the time to identify those concepts. For example, *nurse* is recognized more quickly following *doctor* than following *bread*. Very similar to this is the evaluative priming paradigm, based on the assumption that the automatic activation of the evaluation associated with a prime produces a processing advantage for evaluatively congruent targets (Fazio & Olson, 2003). Therefore, participants are faster to identify a positive target when the prime is positive, and faster to identify a negative target when the prime is negative. For example, when primed with “cockroach” participants are quicker to identify a negative target word (i.e., “disgusting”) as negative, but are slower to identify a positive target word (e.g., “appealing”) as positive (e.g., Fazio, Sanbonmatsu, Powell, & Kardes, 1986). Priming techniques therefore reveal the influence of the accessibility of a schema (prime-related mental constructs) in information processing activities (encoding, interpretations, response selection; Bargh & Chartrand, 2000). Other popular implicit measures include the Implicit Association Test (e.g., Greenwald, McGhee, & Schwartz, 1998); Affect Misattribution

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

Procedure (e.g., Payne, Cheng, Govorun, & Stewart, 2005); Approach/Avoidance Tasks (e.g., Solarz, 1960; Chen & Bargh, 1999); Go/No Go Association Task (e.g., Nosek & Banaji, 2001), among others.

Psychophysiological approaches (e.g., Cacioppo, Petty, & Andersen, 1988) such as facial electromyography, startle eye blink, blood pressure, heart rate and skin conductance, also constitute implicit measures with applications in several research areas. These techniques assess the emotional reactivity of the participants to the object, indicating a change in some behavior or measure of bodily function (Weisse, Davidson, & Baum, 1989). For example, cardiovascular measures, such as electrocardiograph waveforms and respiration, have been used as an index of adaptive emotional regulation and responsiveness to the social environment, based on the assumption that the heart produces electric signals sensitive to affective states, motivation, attention and reflexes. Hemodynamic responses, specifically blood pressure, have also been used to index psychological states like stress, threat and effort. Skin conductance has been used to measure peripheral responses to the extent that electrodermal activity is a measure of eccrine sweat glands that can be used as an indicator of general arousal. Another popular measure is electromyography, namely facial electromyography that measures facial muscle activity associated with emotional expressions. The startle eye blink modification is also a very popular measure, assessing muscle activity of the lower lid reacting to a startling stimulus, indicating the valence of the stimuli (for a review, see Blascovich, Mendes, Vanman, & Dickerson, 2011; Snowden & Barrett, 2006). Implicit measures are already extensively used in social cognition literature and can be easily extended to child abuse and neglect assessment to complement the traditionally self-report methods.

In order to assess parental cognitions and information processing related to parent-child interactions, some research has been using implicit measures to examine parents' errors



## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

in emotion recognition (e.g., Asla, De Paúl, & Pérez-Albéniz, 2011), physiological arousal (e.g., Frodi & Lamb, 1980), biases in the perceptions and attributions about children (e.g., Hiraoka et al., 2014), and parents' aggressive behaviors (e.g., Crouch, Skowronski, Milner, & Harris, 2008).

This paper presents a systematic literature review about the research in child abuse and neglect conducted with these types of measures, providing a comprehensive knowledge about the contribution of cognitive factors to the explanation of child abuse and neglect. The specific goals of this review are: (a) to summarize the research with implicit measures applied to the study of child abuse and neglect; (b) to analyze the different variables, methodologies and procedures used in these studies; (c) to compare the results testing the same hypotheses; (d) and to discuss this literature in light of the criteria and recommendations for the use of implicit measures pointed out in the literature (e.g., De Houwer, 2006).

### **Method**

#### **Information sources and search strategy**

A systematic electronic search was conducted in six databases, namely Academic Search Complete, ERIC, PsycARTICLES, PsycINFO, Psychology and Behavioral Sciences Collection and Scopus with the following restrictions: published between January 1970 and April 2015, from academic journals and in English language. The studies were identified using all possible combinations of the following groups of search terms: (a) child abuse OR child neglect OR abusive parents OR child maltreatment OR low-risk and high-risk parents OR child physical abuse; AND (b) implicit attitudes OR information processing OR schemata OR parental cognitions OR parental attributions OR emotion recognition OR autonomic and affective responses OR parental attitudes OR aggression; NOT (c) sexual abuse OR domestic

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

violence. Additionally, a hand search was performed in the references of the relevant papers and previous reviews of the literature on this subject (e.g., McCanne & Hagstrom, 1996).

### **Inclusion criteria**

Studies were considered for this review if they met a set of inclusion criteria: (1) was an empirical and quantitative study; (2) included adult participants, with 18 years and older, parents or non-parents; (3) evaluated, as an independent variable, child abuse or child neglect perpetration (referenced to child protection services) or the potential of risk of being perpetrators of child abuse (studies covering sexual abuse were not included); (4) used implicit measures (namely, experimental paradigms from social cognition and psychophysiological measures); and (5) assessed to parental representations.

### **Study selection and data extraction**

According to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement (Liberati et al., 2009), we conducted a four-phase process to select the relevant studies based on a sequential examination of the title, abstract and full text. As illustrated in the Figure 1, the initial search resulted in 1760 articles that were reduced to 1196 when all duplicates were deleted. From these, 60 were selected for further analysis of the full text based on the information included in the title and abstract. Subsequently we excluded 27 of full text papers that did not meet the inclusion criteria, namely 24 of them used self-report methods such as scales, interviews, observations and vignettes; one did not have an abusive or high-risk of child abuse sample; one had an abusive sample, but evaluated as an independent variable the mother's perceived control; and, finally, one used regression methods to analyze the results in a prediction model, instead of variance analyses as all the other studies. Data extraction was performed using a qualitative synthesis

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

form, summarizing hypotheses of the research, sample size and characteristics (parents or non-parents, type of maltreatment or at risk of abuse and respective risk assessment instrument), implicit measure description, and main results.

The studies reported compared samples of abusive/ neglectful parents and non-abusive/ non-neglectful parents, as well as samples (of parents and non-parents) with high and low-risk of child abuse. Studies that used abusive or neglectful parents recruited them in child protection services, where they had been referred for abusive or neglectful parental practices (e.g., Camras et al., 1988; Francis & Wolfe, 2008; Hildyard & Wolfe, 2007). The remaining studies used samples of individuals with high and low-risk of child physical abuse assessed with two different instruments: *Child Abuse Potential Inventory* (CAPI; Milner, 1986) that consists of a paper and pencil questionnaire with 160 items evaluating a set of characteristics, which have been shown to be present in abusive parents, in comparison with non-abusive, including intrapersonal factors (distress, rigidity, unhappiness) and interpersonal characteristics (problems with child and self, problems with family, and problems with others; e.g., Hiraoka et al., 2014; Rodriguez, 2013); *Adult-Adolescent Parenting Inventory* (AAPI; Bavolek, Kline, McLaughlin, & Publicover, 1979), a paper and pencil questionnaire to assess attitudes towards parenting and child-rearing among adolescents and adults, that includes 32 items grouped into 4 scales (inappropriate parental expectations of the child, lack of empathy toward children's needs, parental value of physical punishment, and parent-child role reversal). These tools were both validated with parents and non-parents samples and provide a reliable measure of risk for child abuse.

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INSERT FIGURE 1

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## Results

As shown in Figure 1, 33 manuscripts were included for further analysis in this review. In order to provide a clear organization of the literature reviewed the included articles were divided into three sections based on the type of dependent variable assessed. The first section presents studies that explored the affective dimension of parents' representations, namely parents' errors in emotion recognition and physiological arousal. The second section includes research examining the cognitive dimension of parents' representations, specifically parents' biases in their perceptions and attributions about children. Finally, the third section focuses on research developed regarding the behavioral dimension of parents' representations, that is, aggressive behaviors.

### **Affective dimension of parental representations**

Some of the models attempting to explain aggressive behavior in the context of child maltreatment, namely physical abuse (e.g., Asla, De Paúl, & Pérez-Albéniz, 2011; Azar, 1991; Pérez-Albéniz & De Paúl, 2005, 2006) suggest that abusive parents may present difficulties in feelings of empathy for their children because they cannot recognize children's emotions. Milner (2000) also suggests that this difficulties increase when parents are dealing with a stressful condition, as subsequently documented by Asla, De Paúl and Pérez-Albéniz (2011). Another set of studies (e.g., Reijman et al., 2014) propose that abusive responses can be related with physiological reactivity to negative infant stimuli such as crying or stressful interactions. Table 1 describes the studies included in this section.

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INSERT TABLE 1

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## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

Kropp and Haynes (1987) conducted one of the first studies, which sought to evaluate the ability of abusive versus non-abusive mothers to identify the general and specific emotional signals of children. Since then a set of experimental studies have emerged with this same objective of comparing and analyzing errors in emotion recognition between abusive and non-abusive parents (Camras et al., 1988; During & McMahon, 1991; Francis & Wolfe, 2008) and comparing parents presenting high and low-risk for physical child abuse (Asla, De Paúl, & Pérez-Albéniz, 2011; Balge & Milner, 2000; Rodriguez, 2013). Based on the same theoretical model of information processing, but applied to child neglect (Azar, Reitz, & Goslin, 2008; Crittenden, 1993), Hildyard and Wolfe (2007) examined the differences in emotion recognition between neglectful and non-neglectful mothers. Generally, these studies used different measures and findings have been inconsistent.

Some studies (Camras et al., 1988; Kropp & Haynes, 1987) used the Facial Action Coding System (FACS), which provides a common pattern to categorize systematically the physical expression of emotions and to code the facial expressions of the pictures used. Both studies presented the pictures of emotional expressions to abusive and non-abusive mothers and asked them to identify the emotion displayed, using the label of the emotion (Kropp & Haynes, 1987) or emotions previously described in a story format (Camras et al., 1988). During and McMahon (1991) used the same stimuli material of Camras and colleagues (1988), but added children's pictures. Although the first study conducted by Kropp and Haynes (1987) indicated that abusive mothers showed more errors in recognizing specific emotional expressions and labeled negative affect more often as positive, the two later studies (Camras et al., 1988; During & McMahon, 1991) using the same Facial Action Coding System, unsuccessfully tried to replicate these findings and found no differences between abusive and non-abusive mothers. Camras and colleagues (1988) suggested that these

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

inconsistent findings could be related to the use of full-frontal facial expressions as stimuli, instead of the different angles' pictures used by Kropp and Haynes (1987).

To examine the differences in the abilities of high-risk compared to low-risk mothers in accurately recognizing emotions in children and adults, Balge and Milner (2000) and Asla, De Paúl and Pérez-Albéniz (2011), tried to provide a more precise assessment of emotion recognition abilities. Both studies used the *Diagnostic Analysis of Nonverbal Behavior II* (DANVA II) and varied the amount of information in the stimuli, particularly visual and auditory stimuli presented at high or low intensity levels (i.e., varying the clarity of the expressed emotion). Additionally they introduced a situational stress condition, to explore whether a stressful situation could increase the difficulties in emotion recognition, especially for parents with high-risk of physical child abuse. Using the *DANVA II* with mothers at high and low-risk of physical child abuse, Balge and Milner (2000) found that high-risk mothers made more emotion recognition errors although the differences between the two groups were not significant. The authors justified the lack of differences between the groups of mothers with the possible ineffectiveness of the situational stress condition. Using the same instrument, Asla, De Paúl and Pérez-Albéniz (2011) found that high risk fathers made more errors in *DANVA II* emotion recognition than low-risk fathers, but no differences were found for mothers (like in the study of Balge & Milner, 2000). Comparing fathers with mothers, the former group made more errors in *DANVA II* emotion recognition, but only those in high-risk situations. The study by Asla and colleagues (2011) included an additional task of emotion recognition (i.e., *Subtle Expression Training Tool/Micro Expression Training Tool – SETT/METT*) that assessed the ability to recognize emotions before and after receiving some explanatory information about the emotion expressed. The results from this task showed that high-risk parents made more errors than low-risk parents, but only when they were experiencing stress. Another gender interaction was significant: like in the DANVA II tool,

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

the high-risk fathers made significantly more errors in the *METT/SETT* than members of the other groups. These findings are consistent with the findings of three previous studies which failed to find emotion recognition deficits in abusive/high risk mothers (Balge & Milner, 2000; Camras et al., 1988; During & McMahon, 1991).

In order to surpass some limitations of the previous studies, another study evaluated the differences in children's emotion recognition accuracy between low and high-risk parents, varying face angle and face presentation time that seemed to influence participants' responses (Wagner et al., 2015). Similar to previous studies (Balge & Milner, 2000; Camras et al., 1988; During & McMahon, 1991), no differences were observed. Despite that, the results showed an overall tendency for high-risk parents to display lower emotion recognition accuracy, compared with low-risk parents. This study was conducted without control for parent gender effects, which could be significant for these findings since with the exception of the work by Kropp and Haynes (1987), studies using samples of mothers have revealed no differences related to abuse/risk group (Balge & Milner, 2000; Camras et al., 1988; During & McMahon, 1991), in opposition to fathers (Asla et al., 2011).

To access parental perceptions of infants' feelings, Hildyard and Wolfe (2007) and Francis and Wolfe (2008) applied the *IFEEL Pictures* task, a series of 30 photographs of children's emotional expressions. Specifically, the task is to categorize the pictures according to the comprehensive IFEEL Pictures Lexicon clusters (surprise, interest, joy, contentment, passive, sad, cautious/shy, shame/guilt, disgust/dislike, anger, distress, fear, or other, for the unclear responses). These studies applied the measure to different kinds of samples. Hildyard and Wolfe (2007) tested the hypothesis that neglectful and non-neglectful mothers would present differences in recognizing children's emotions, and Francis and Wolfe (2008) applied the task to physically abusive and non-abusive fathers. The Hildyard and Wolfe (2007) study showed differences in mothers' perception and labeling of infants' emotions with the *IFEEL*

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

*Pictures* task. Neglectful mothers were less likely to use the label “interest” and were more likely to label infants’ facial expressions as representing feelings of “sadness” and “shame”, and used significantly more non-emotion words (“other” words) than non-neglectful mothers. Further, the Francis and Wolfe’s study (2008) revealed differences between abusive and non-abusive fathers, using the same measure. Abusive fathers labeled infants’ facial expressions more often as representing “anger” and “fear”, used more non-emotion words (“other” words), and also used the “interest” label less often (as the neglectful mothers in Hildyard & Wolfe’s, 2007).

The Rodriguez (2013) study stands out because it asked mothers to identify their own child’s emotion. Rodriguez (2013) used a behavioral simulation of parental empathy - *Matching Affect to Child Task (MATCh)* – to test the hypothesis that high-risk mothers would demonstrate low empathy for their children. Mothers watched a video of their child listening to a story (previously shown to the child on a video with an actor demonstrating emotions) and were asked to identify what emotion their child felt at the end of the story. Similarly to Hildyard and Wolfe (2007) and Francis and Wolfe’s (2008) studies, these results confirmed the theoretical hypothesis, suggesting that high-risk mothers demonstrated poorer empathic ability on the analog task, when compared with mothers with low-risk of child physical abuse (Rodriguez, 2013).

A recent meta-analysis of published studies regarding emotion recognition accuracy differences between abusive/high-risk parents and non-abusive/low-risk parents (Wagner et al., 2015) included the studies presented before with the exception to the two studies that used the *IFEEL Pictures* task (Francis & Wolfe, 2008; Hildyard & Wolfe, 2007). The results of the meta-analysis revealed differences between abusive or high-risk of physical abuse parents and non-abusive or low-risk of physical parents, in emotion recognition accuracy



## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

with a medium effect-size (Wagner et al., 2015). However, the small number of studies in the meta-analysis precluded the possibility of a search for additional moderators.

The results of the reviewed studies reveal some inconsistencies that could be related with the type of stimuli, sample and measures used. Regarding this latter issue, participants' awareness could have been controlled in order to tap more effective spontaneous reactions, namely by assessing not only accuracy but also reaction times (e.g., De Houwer, 2006; Fazio & Olson, 2003). Additionally, the results obtained in these studies may also have been influenced by material effects, as with the exception of Rodriguez' (2013), most of the visual stimuli (faces) was from other than participant's own children. Finally, there was no control for the age of the children presented in the pictures or videos. All these aspects leave room for the possibility that the children's faces displayed could have different ethnicity, gender, age, etc., from the participants own children, interfering with parents' accuracy to identify the child's emotions. Some of these issues may explain the inconsistencies observed in emotion recognition between the abusive/high-risk parents and non-abusive/low-risk parents.

In contrast, studies evaluating physiological reactivity of parents when exposed to negative child stimuli suggest consistency in the differences between abusive and non-abusive parents, indicating that abusive parents show higher reactivity in comparison with the others. Specifically, two studies (Disbrow, Doerr, & Caulfield, 1977; Frodi & Lamb, 1980) assessing psychophysiological responses of abusive and non-abusive parents when they were watching videos of crying and smiling infants report differences between the two groups. Disbrow and colleagues (1977) found that abusive and neglectful parents show similar physiological responses to pleasant and unpleasant stimuli, contrary to non-abusive parents. The results from Frodi and Lamb's study (1980) showed that the crying infant elicited heart-rate acceleration and increases in skin conductance and diastolic blood pressure, especially for the abusive parents compared with non-abusive parents. This study was later replicated by

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

Pruitt and Erickson (1985), but with a non-parents sample. The results indicated that high-risk participants revealed a consistently higher heart rate compared to the low-risk group, during the cry segments but also during the smile ones, and no significant differences were observed in the skin conductance measure. In an attempt to expand Frodi and Lamb's research, Friedrich and colleagues (1985) tested the differences in the psychophysiological responses to stressful stimulus between abusive, neglectful and control low-income mothers. However, the authors found no significant differences between groups in heart rate and finger blood volume, even if the results in skin conductance showed the same tendency of Frodi and Lamb's study (1980), with the abusive and neglectful mothers displaying more arousal to infant cries.

Testing the same hypothesis that high-risk of abuse individuals (parents and non-parents) would demonstrate greater arousal to infant cry sounds, two other studies were conducted. Stasiewicz and Lisman (1989) evaluated diastolic blood pressure and heart rate, and Crowe and Zeskind (1992) measured the heart rate and skin conductance of high- and low-risk for child abuse non-parents during the presentation of a crying infant sound, and the latter found that high-risk individuals revealed an higher heart rate when exposed to infant cries, compared to low-risk ones.

Two additional studies conducted by Wolfe, Fairbank, Kelly, and Bradlyn (1983), and by Reijman and colleagues (2014), assessed parents physiological reactivity to stressful situations related to child rearing, when presented with interactive mother-child scenarios (Wolfe et al., 1983) and crying sounds (Reijman et al., 2014). Both studies found significant differences between abusive and non-abusive mothers. Specifically, in Reijman and colleagues' (2014), abusive mothers displayed lack of cardiac control (i.e., there was no negative correlation between heart rate and pre-ejection period – systolic - of the cardiac cycle). In the Wolfe and colleagues (1983) study, abusive mothers revealed a greater

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

physiological arousal (observed in heart rate, skin conductance and respiration rate) during stressful interactions than non-abusive mothers. Casanova, Domanic, McCanne and Milner, (1992) found the same differences between high- and low-risk mothers, but presenting them non-child-related stressful stimulus. High-risk mothers showed higher and prolonged sympathetic nervous system reactivity than low-risk mothers, specifically a skin conductance increase when exposed to cold water and higher heart rate in the second stressful situation, suggesting that they are more reactive to repeated exposure to stressful situations.

Finally, Milner and colleagues (2011) examined whether parents' event related potentials (ERP), that is, a brain response to an external event, could vary according to the risk level for child physical abuse. During a priming procedure, high and low-risk individuals (non-parents) were presented with child vs. non-child pictures followed by positive and negative words. While individuals responded in a similar way to non-child pictures, when child pictures were presented low-risk individuals showed greater N400 and N300 responses to negative, relative to positive, word descriptors; whereas high-risk individuals showed no ERP differences to the different word descriptors. Results indicate that high and low-risk individuals have greater accessibility to different pre-existing child-related schemata. While low-risk parents readily access positive schemas, which are likely to decrease the likelihood of negative child-related evaluations, high-risk individuals have pre-existing positive and negative child-related schemata that are equally accessible. Authors concluded that the greater accessibility to negative child-related schemata in high-risk parents may increase the likelihood of negative child-related evaluations and attributions that have been associated to child physical abuse risk.

### **Cognitive dimension of parental representations**

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

The social information processing model applied to abusive parenting suggests that abusive or at risk parents may present biases or errors in information processing related to parent-child interactions, which may increase their risk of engaging in abusive behaviors (Milner, 1993, 2003).

Specifically, research has been looking at a number of different ways to discern between parents at high and low-risk of child physical abuse: examining the cognitive schemata of parents (e.g., Hiraoka et al., 2014), the manner they perceive (e.g., Crouch et al., 2010a) and interpret (e.g., Farc, Crouch, Skowronski, & Milner, 2008) the child's signals, states and behaviors. The majority of these studies have applied priming techniques with verbal (Crouch et al. 2010a, 2010b; Hiraoka et al., 2014; Risser, Skowronski, & Crouch, 2011; Rodriguez, Cook, & Jedrzewski, 2012) or non-verbal materials (Farc et al., 2008; McCarthy et al., 2013). Most of these studies adapted very well established priming paradigms, which comply with a set of criteria that an ideal implicit measure should integrate. However, the aggregate results revealed some inconsistencies that will be discussed. Table 2 provides detailed information about the studies reviewed in this section.

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### INSERT TABLE 2

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Studies using evaluative priming techniques (Farc et al., 2008; Risser et al., 2011) explored the differences between high and low-risk parents, analyzing whether participants with a high-risk of physical abuse reported more negative evaluations of ambiguous child pictures. These studies examined the relation between parents' hostility-related schema and the ratings of ambiguous child pictures using supraliminal and subliminal priming tasks. Specifically, they analyzed the extent to which children's facial expressions (ambiguous vs.

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

neutral) speeded up parents' responses to the valence of an adjective). Using a similar technique, Crouch and colleagues (2010a) evaluated parents' accessibility of positive and negative words following the presentation of positive, ambiguous, or negative child and adult faces. The authors hypothesized that high-risk parents' responses would have shorter latencies for negative words following presentation of ambiguous and negative face primes, and would display longer latencies to positive words regardless of the valence of the face prime.

Surprisingly, only the results by Farc and colleagues (2008) presented significant differences between the groups, namely that high-risk parents, compared to low-risk parents, rated ambiguous child pictures as more hostile, negative and difficult. Moreover, the combined conditions of high-risk parents and hostile priming displayed the highest hostility ratings. On the other hand, none of the other two studies (Crouch et al., 2010a; Risser, Skowronski, & Crouch, 2011) found effects of the child physical abuse risk in the perceptions of children. To explain the absence of significant differences between parent risk groups, the authors suggested that high-risk parents might have deficits in attentional control that may influence their susceptibility to incongruent prime-target trials. Therefore they proposed that alternative methods should be used to solve the problem of the incongruent stimuli namely, changing the tasks to requiring positive/negative judgments and using only neutral picture primes or blocking trials by affect type (Crouch et al., 2010a; Risser et al., 2011). An important aspect taken into account by Farc and colleagues (2008) was the control of the participants' awareness, contrary to Risser and colleagues (2011).

Using a type of semantic priming, namely a word completion task, Hiraoka and colleagues (2014) assessed the accessibility of aggression-related words before and after exposure to an aversive event (a social stressor and a painful task) among parents within a range of child physical abuse risk. The proportion of words classified as aggressive in the

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

word completion tasks was used as an index of accessibility of aggression-related schemata. The authors hypothesized that the accessibility of aggression-related words would be greater for high-risk parents, especially after exposure to an aversive event. Specifically, after experiencing a painful event, high-risk parents demonstrated higher accessibility of aggression-related schemata. The authors suggested that these findings were consistent with the possibility that aversive events in caregiving routines (e.g., biting, hair pulling) may result in heightened accessibility of aggression-related schemata among high-risk parents.

In the same line of research, but without using priming procedures, Rodriguez, Cook and Jedrzejewski (2012) used the reading inconsistency paradigm (readers are slower in reading and rereading text that is inconsistent with their expectations and knowledge) to assess parental attributions about a child intentionality and empathy, comparing parents with high and low-risk of physical child abuse. The task consisted of reading vignettes about attributions of child behavior and empathy while an eye tracking apparatus measured reading time. Likewise, to explore parental attributions about the child's behavior, McCarthy and colleagues (2013) evaluated parents' tendency to infer positive and negative traits from children's behaviors, differentiating between parents at high and low-risk for child physical abuse. In a process dissociation procedure, participants completed a false-recognition task, including a set of behavioral descriptions (implying a positive or negative trait) paired with child photographs. Crouch and colleagues (2010b) used another type of measure adapted from memory studies to examine the automatic encoding of negative and positive cues (positive and negative words) in ambiguous caregiving contexts. Specifically, parents were shown sentences that described a caregiving scenario that specifically included the child's name, the child's action (e.g., "kicked his legs") and the caregiving context (e.g., "as his mother changed his diaper"). Then they had to memorize the sentences. The authors predicted that high-risk parents would display greater recall of negative cues and less recall of positive cues.

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

Overall, the results of these three studies indicated differences in parent interpretations about children's states and behavior. Specifically, high-risk parents were faster in reading non-empathic vignettes and vignettes attributing negative behaviors to the child's intent, suggesting they engage in processes that are consistent with their expectations and knowledge (Rodriguez et al., 2012). High-risk parents were equally likely to indicate negative traits regardless of how the traits were implied (i.e., vaguely or strongly) in the child's behavior, in contrast with low-risk parents, that were significantly less likely to indicate vaguely negative traits (McCarthy et al., 2013). Despite no differences observed in the level of recall for negative cues, high-risk parents (compared to low-risk parents) registered higher recall of negative than positive cues (Crouch et al., 2010b).

In a nutshell, the majority of the studies examining the cognitive dimension of parental representations found significant differences between parents at high and low-risk for child physical abuse.

### **Behavioral dimension of parental representations**

Based on theoretical models of aggression, several authors have suggested that physically abusive parents could present lack of empathy for their children (e.g., Milner, 2000) and consequently increase their likelihood to behave aggressively towards them.

A set of studies explored aggression and empathy, comparing parents at high and low-risk (Crouch et al., 2008, 2012), non-parents at high and low-risk (De Paúl, Pérez-Albéniz, Ormaechea, Vergara, & Cadiz, 2006; Pérez-Albéniz & De Paúl, 2005, 2006), and maltreating (neglectful/abusive) and non-maltreating mothers (Compier-de Block et al., 2015). Some of these studies identified differences in empathy and aggression inhibition when individuals are exposed to victims' suffering (Pérez-Albéniz & De Paúl, 2005, 2006; De Paúl et al., 2006). Others used handgrip modulation as a measure of the use of excessive force (Crouch et al.,

2008; Compier-de Block et al., 2015). Still others had participants give blasts of sound and used this as a measure of aggression (Crouch et al., 2012). Table 3 includes the studies reviewed in this section.

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### INSERT TABLE 3

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The first set of studies (Pérez-Albéniz & De Paúl, 2005, 2006), used computer simulations demonstrating the behavior of a fictitious participant (an adult victim) and measured the feedback responses (positive or negative) that should be given to that supposed participant. The feedback responses were shocks of different intensities and, in the pain condition, participants saw the degree of pain experienced by this supposed victim and some physiological signals simulating the victim's response to the shocks. The study by De Paúl and colleagues (2006), examined these responses, but applied them to the behaviors of a child in the presence of the child's pain cues (i.e., fictitious physiological information of the child, like heart rate and blood pressure). The participants had to help the fictitious child navigate a maze on a computer screen without error. Overall, the results of these studies indicated that, high-risk participants (non-parents) utilized higher levels of punitive responses when instructed to provide feedback in a teaching situation (De Paúl et al., 2006; Pérez-Albéniz & De Paúl, 2005, 2006), revealing less empathy for the victim and less aggression inhibition in the presence of a victim's pain.

Two other studies (Compier-de Block et al., 2015; Crouch et al., 2008) examined parental responses to infant crying, hypothesizing that the ability to modulate grip strength would discriminate participants based on either their risk of child physical abuse, or maltreating status. However in the study by Crouch and colleagues (2008), participants first



## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

completed a scrambled sentence task (i.e., reorder words to form a complete sentence) with negative words for the hostile priming condition and neutral words for the neutral priming condition. Results indicated that regardless the parental risk for child physical abuse, infant crying produced an increase of the risk of aggressive parental responses because it stimulates high levels of negative and hostile feelings, specifically for the high-risk parents (Crouch et al., 2008). Also maltreating mothers used excessive force while listening to infant crying and laughter compared to non-maltreating mothers, especially neglectful mothers (Compier-de Block et al., 2015). A similar study by Bauer and Twentyman (1985) examined maternal attributions of their children's behavior, hypothesizing that maltreating mothers would attribute more negative intentionality to their child's behavior in comparison with non-maltreating mothers. After listening to audio tapes with stressful parent-child interactions followed by a child crying sound, and non-stressful parent-child interactions, followed by a fire alarm or car horn sound, participants were asked to rate their annoyance by adjusting a sliding lever. The results indicated that physically abusive mothers demonstrated higher rates of annoyance, although they found no differences for the neglectful mothers, as compared to the non-maltreating group.

Crouch and colleagues (2012) examined the influence of the interpersonal experiences on the accessibility of positive and negative schemata. During a word game on a computer screen, when the participant was the fastest, he/she should give a sound blast to a fictitious loser. The results revealed that high-risk parents selected higher sound blasts levels both initially and when provoked.

Results of these studies are consistent in indicating that high-risk/maltreating parents have lack of empathy and behave more aggressively, when compared to low-risk/non-maltreating parents. These results may suggest that, in response to infant signals, high-risk/maltreating individuals may be insufficiently able to regulate physical force. However

these studies have some important limitations. For example, the studies by Crouch and colleagues (2012) and by Pérez-Albéniz & De Paúl (2005, 2006) may not be generalizable to child maltreatment given that the supposed victim was not a child. Other studies used samples of non-parents undergraduate students (De Paúl et al., 2006; Pérez-Albéniz & De Paúl, 2005, 2006). Finally, none of these studies used reaction time tasks, which would allow assessment of other aspects of information processing namely accessibility and automaticity.

### **General discussion**

The assessment of child maltreatment has largely been based on self-report and observational measures, known to be influenced by a set of variables that may bias the identification of parental abusive or neglectful behaviors (e.g., Russa & Rodriguez, 2010). More recently a few studies have been adopting social cognition research methods, attempting to access to the implicit and unconscious processes underlying parents' information processing related to parent-child interaction. This paper revisited the research conducted in child maltreatment using these types of methods, providing a comprehensive review about the contribution of cognitive factors to the explanation of child abuse and neglect.

The reviewed research can be organized in three main domains, namely: parental errors in emotion recognition and physiological reactivity (affective dimension of parental representations), parental biases in the perceptions and attributions about children (i.e., cognitive dimension of parental representations) and parental aggressive behaviors (i.e., behavioral dimension of parental representations). The majority of these studies analyzed the differences between high-risk of physical abuse, abusive, or neglectful parents and those at low-risk of physical abuse, non-abusive, or non-neglectful parents. Overall, the studies reviewed present consistent results, indicating that parents in the former group seem to have

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

higher autonomic reactivity to negative child related stimulus (e.g., Reijam et al., 2014), more biases in the perceptions and attributions about children (e.g., Farc et al., 2008; Hiraoka et al., 2014), higher lack of empathy and more aggressive behaviors (e.g., Compier-de Block et al., 2015; Crouch et al., 2008). However, the studies exploring errors in recognizing child emotions revealed inconsistent results. Replication studies are required to clarify these inconsistencies.

The application of social cognition research methods, namely experimental designs and implicit measures, to child maltreatment research constitutes an innovative and important strategy to access parental cognitions and behaviors related to parent-child interactions while avoiding some of the problems associated with the use of self-reports and observational methods. Nevertheless, a set of criteria for the use of implicit measures broadly described in the literature (e.g., Fazio & Olson, 2003; De Houwer, 2006) should be considered. The observation of these criteria, namely those related to measurement characteristics, may actually permit the clarification of some of the inconsistencies observed. The implicit measures literature asserts that this type of measurement provides an index of a cognitive representation even though participants are not aware of what is being measured, do not have conscious access to that cognition and have no control over the measurement outcome (e.g., De Houwer, 2006). Some of the studies presented in this literature review did not observe all of these characteristics, especially those in the domain of parents' emotion recognition. On the other hand, some studies applied measures closer to the definition of "implicit measures", especially the ones that controlled participants' awareness (e.g., Farc et al., 2008), such as those on parental biases in perceptions and attributions about children and those on parental aggressive behaviors. Moreover, some of the reported results may have been constrained by the limitations that are inherent to laboratorial experiments, namely threats to the internal validity (e.g., derived from the experimenter's expectations; Orne, 1962; Rosenthal, 1966)

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

and limited external validity (i.e., the generalization of results across different settings and populations; Weber & Cook, 1972).

There are also limitations regarding the sample in most of studies. Some of the research, despite evaluating the risk for child physical abuse (e.g., De Paúl et al., 2006; Pérez-Albéniz & De Paúl, 2005, 2006), was conducted with samples of non-parents, which may have compromised the results because the individuals had not experienced, as parents, an interaction with their child in a real family context. Additionally, studies with participants who have a high-risk of abuse instead of participants with a history of actual abuse (e.g., McCarthy et al., 2013; Risser et al., 2011; Rodriguez, Cook, & Jedrzewski, 2012), may not allow the generalization of the results to actual abusive parents. Further research with abusive samples is required in order to establish direct associations with child physical abuse perpetration. Gender effects were rarely controlled for. Given that fathers perpetrate a substantial proportion of child physical abuse (Trocmé, Fallon, MacLaurin, & Neves, 2005) and studies generally include mothers only, the exclusion of fathers stands out as an important issue. Finally, and with the exception of three studies conducted with neglectful parents (Compier-de Block et al., 2015; Friedrich et al., 1985; Hildyard & Wolfe, 2007), the majority of the research reviewed focused on child physical abuse. Therefore the empirical studies using implicit measures with neglectful samples are still scarce.

This paper is likely to contribute to the clarification of parental cognitive representations underlying child abuse and neglect, assessed with measures that do not imply conscious awareness and are independent of social desirability. However, it is important to replicate the reviewed studies in order to gain more consistency in the results, improve the procedures and supersede the sampling limitations identified. Additionally, this area of research could benefit from using other types of procedures, like the *Implicit Association Test* (Greenwald, McGhee, & Schwartz, 1998) which examines the strength of the association between mental

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

representations of objects (i.e., concepts) in memory. It is very well established in the literature, has predictive validity independently of the explicit measures (Greenwald, Poehlman, Uhlmann, & Banaji, 2009), and good reliability (Nosek, Greenwald, & Banaji, 2005). There are other valid measures that could be used, like *Affect Misattribution Procedure* (Payne, Cheng, Govorun, & Stewart, 2005), *Go/No-Go Association Task* (Nosek & Banaji, 2001) or *Approach Avoidance Task* (Rinck & Becker, 2007).

Overall, the general hypotheses that abusive parents are more reactive to child-related stressful situations, present more biases in processing information related to parent-child interactions and are less likely to show empathy for their children were supported by the evidence of the revisited studies. Though the emotion recognition hypothesis still needs more research given the inconsistent results.

Nevertheless, implicit measures constitute a promising approach with potential practical implications for future work with abusive and neglectful parents, in assessing the cognitive basis of parental practices, and its potential role in shaping the information processing that may contribute to child abuse and neglect.

### References<sup>1</sup>

- \*Asla, N., De Paúl, J., & Pérez-Albéniz, A. (2011). Emotion recognition in fathers and mothers at high-risk for child physical abuse. *Child Abuse & Neglect, 35*, 712–721.
- Azar, S. T. (1991). Models of physical child abuse: A metatheoretical analysis. *Criminal Justice and Behavior: Special Issue on Physical Child Abuse, 18*, 30–46.
- Azar, S. T., Reitz, E. B., & Goslin, M. C. (2008). Mothering: Thinking is part of the job description: Application of cognitive views to understanding maladaptive parenting and

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<sup>1</sup> References marked with an asterisk were included in the review.

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

doing intervention and prevention work. *Journal of Applied Developmental Psychology*, 29(4), 295–304.

- \*Balge, K. A., & Milner, J. S. (2000). Emotion recognition ability in mothers at high and low risk for child physical abuse. *Child Abuse & Neglect*, 24 (10), 1289–1298.
- Bargh, J. A. (1994). The four horsemen of automaticity: Awareness, intention, efficiency and control in social cognition. In R. S. Wyer, & T. K. Srull (Eds.), *Handbook of Social Cognition* (2<sup>nd</sup> ed., pp.1-40). Hillsdale, NJ: Erlbaum.
- Bargh, J. A., & Chartrand, T. L. (2000). Studying the mind in the middle: A practical guide to priming and automaticity research. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (pp. 253-285). New York, NY: Cambridge University Press.
- \*Bauer, W. D., & Twentyman, C. T. (1985). Abusing, neglectful, and comparison mothers' responses to child-related and non-child-related stressors. *Journal of Consulting and Clinical Psychology*, 53, 335–343.
- Bavolek, S. J., Kline, D. F., McLaughlin, J. A., & Publicover, P. R. (1979). Primary prevention of child abuse: Identification of high risk adolescents. *Child Abuse & Neglect*, 3, 1071–1080.
- Blascovich, J., Mendes, W.B., Vanman, E., & Dickerson, S. (2011). *Social Psychophysiology for Social and Personality Psychology*. London, UK: Sage
- Bugental, D. B. (1992). Affective and cognitive processes within threat-oriented family systems. In I. E. Sigel, A. V. McGillicuddy-DeLisi, & J. Goodnow (Eds.), *Parental belief systems: The psychological and affective consequences for children* (pp. 219–248). New York, NY: Laurence Erlbaum Associates.

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

- Cacioppo, J. T., Petty, R. E., & Andersen, B. L. (1988). Social psychophysiology as a paradigm. In H. L. Wagner (Ed.), *Social psychophysiology and emotion: Theory and clinical applications* (pp. 273–294). London, UK: Wiley.
- Calheiros, M. C., Garrido, M. V., Lopes, D., & Patrício, J. N. (2015). Social images of residential care: How children, youth and residential care institutions are portrayed? *Children & Youth Services Review, 55*, 159–169.
- Camilo, C., & Garrido, M. V. (2013). Desenho e avaliação de programas de desenvolvimento de competências parentais para pais negligentes: Uma revisão e reflexão. *Análise Psicológica, 31*, 245–268.
- \*Camras, L. A., Ribordy, S. C., Hill, J., Martino, S., Spaccarelli, S., & Stefani, R. (1988). Recognition and posing of emotional expressions by abused children and their mothers. *Developmental Psychology, 24*, 776–781.
- \*Casanova, G. M., Domanic, J., McCanne, T. R., & Milner, J. S. (1992). Physiological responses to non-child-related stressors in mothers at risk for child abuse. *Child Abuse & Neglect, 16*, 31–44.
- Cicchetti, D. (Ed.). (1991). Defining psychological maltreatment [Special issue]. *Development and Psychopathology, 3*(1).
- Cicchetti, D., & Lynch, M. (1995). Failures in the expectable environment and their impact on individual development: The case of child maltreatment. In D. Cicchetti & D. J. Cohen (Eds.), *Developmental psychopathology: Risk, disorder, and adaptation* (Vol. 2, pp. 32-71). New York, NY: Wiley.
- Crittenden, P. (1993). An information-processing perspective on the behavior of neglectful Parents. *Criminal Justice and Behavior, 20*, 27–48.

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

Comissão Nacional de Proteção de Crianças e Jovens em Risco (2014). *Relatório anual da avaliação da atividade das Comissões de Proteção de Crianças e Jovens 2013*. Lisboa, PT: Comissão Nacional de Proteção de Crianças e Jovens em Risco.

\*Compier-de Block, L., Alink, L., Reijman, S., Werner, C., Maras, A., Rijnberk, C., IJzendoorn, M., & Bakermans-Kranenburg, M. (2015). Handgrip force of maltreating mothers in reaction to infant signals. *Child Abuse & Neglect, 40*, 124–131.

\*Crouch, J. L., Skowronski, J. J., Milner, J. S., & Harris, B. (2008). Parental responses to infant crying: The influence of child physical abuse risk and hostile priming. *Child Abuse & Neglect, 32*, 702–710.

\*Crouch, J. L., Risser, H., Skowronski, J. J., Milner, J. S., Farc, M. M., & Irwin, L. (2010a). Does accessibility of positive and negative schema vary by child physical abuse risk? *Child Abuse & Neglect, 34*, 886–895.

\*Crouch, J. L., Milner, J. S., Skowronski, J. J., Farc, M. M., Irwin, L., & Neese, A. (2010b). Automatic encoding of ambiguous child behavior in high and low risk for child physical abuse parents. *Journal of Family Violence, 25*, 73–80.

\*Crouch, J. L., Irwin, L. M., Wells, B. M., Shelton, C. R., Skowronski, J. J., & Milner, J. S. (2012). The Word Game: An innovative strategy for assessing implicit processes in parents at risk for child physical abuse. *Child Abuse & Neglect, 36*, 498–509.

\*Crowe, H. P., & Zeskind, P. S. (1992). Psychophysiological and perceptual responses to infant cries varying in pitch: Comparison of adults with low and high scores on the Child Abuse Potential Inventory. *Child Abuse & Neglect, 16*, 19–29.

De Houwer, J. (2006). What are implicit measures and why are we using them. In R. W. Wiers & A. W. Stacy (Eds.), *The handbook of implicit cognition and addiction* (pp. 11–28). Thousand Oaks, CA: Sage Publications.



## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

- De Paúl, J., & Guibert, M. (2008). Empathy and child neglect: A theoretical model. *Child Abuse & Neglect, 32*, 1063–1071.
- \*De Paúl, J., Pérez-Albéniz, A., Ormaechea, A., Vergara, A., & Cádiz, B. (2006). Aggression inhibition in high- and low-risk subjects for child physical abuse: Effects of a child's hostile intent and the presence of mitigating information. *Aggressive Behavior, 32*, 216–230.
- \*Disbrow, M., Doerr, H., & Caufield, C. (1977). Measuring the components of parents' potential for child abuse and neglect. *Child Abuse and Neglect, 1*, 279–296.
- Dubowitz, H., Klockner, A., Starr, R., & Black, M. (1998). Community and professional definitions of child neglect. *Child Maltreatment, 3*, 235–243.
- \*During, S. M., & McMahon, R. J. (1991). Recognition of emotional facial expressions by abusive mothers and their children. *Journal of Clinical Child Psychology, 20*(2), 132–139.
- \*Farc, M. M., Crouch, J. L., Skowronski, J. J., & Milner, J. S. (2008). Hostility ratings by parents at risk for child abuse: Impact of chronic and temporary schema activation. *Child Abuse & Neglect, 32*, 177–193.
- Fazio, R. H., Sanbonmatsu, D. M., Powell, M. C., & Kardes, F. R. (1986). On the automatic activation of attitudes. *Journal of Personality and Social Psychology, 50*, 229–238.
- Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology, 54*, 297–327.
- Fazio, R. H., Jackson, J. R., Dunton, B. C., & Williams, C. J. (1995). Variability in automatic activation as an unobtrusive measure of racial attitudes: A bona fide pipeline? *Journal of Personality and Social Psychology, 69*, 1013–1027.
- \*Francis, K. J., & Wolfe, D. A. (2008). Cognitive and emotional differences between abusive and non-abusive fathers. *Child Abuse & Neglect, 32*, 1127–1137.

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

- \*Friedrich, W. N., Tyler, J. D., & Clark, J. A. (1985). Personality and psychophysiological variables in abusive, neglectful, and low-income control mothers. *The Journal of Nervous and Mental Disease*, *173*, 449–460.
- \*Frodi, A., & Lamb, M. (1980). Child abusers' responses to infant smiles and cries. *Child Development*, *51*, 238–241.
- Garrido, M. V., Patrício, J. N., Calheiros, M. M., & Lopes, D. (2016). *Comparing the social images of youth in and out of residential care*. Unpublished manuscript.
- Gawronski, B. (2009). Ten frequently asked questions about implicit measures and their frequently supposed, but not entirely correct answers. *Canadian Psychology*, *50*, 141–150.
- Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review*, *102*, 4–27.
- Greenwald, A. G., McGhee, D. E., & Schwartz, J. K. L. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology*, *74*, 1464–1480.
- Greenwald, A. G., Banaji, M. R., Rudman L. A., Farnham, S. D., Nosek B. A., & Mellott D. S. (2002). A unified theory of implicit attitudes, stereotypes, self-esteem, and self-concept. *Psychological Review*, *109*, 3–25.
- Greenwald, A. G., Poehlman, T. A., Uhlmann, E., & Banaji, M. R. (2009). Understanding and using the Implicit Association Test: III. Meta-analysis of predictive validity. *Journal of Personality and Social Psychology*, *97*, 17–41.
- Hansen, D. J., & MacMillan, V. M. (1990). Behavioral assessment of child abusive and neglectful families: Recent developments and current issues. *Behavior Modification*, *14*, 255–278.

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

Hildyard, K., & Wolfe, D. (2002). Child neglect: Developmental issues and outcomes. *Child Abuse & Neglect, 26*, 679–695.

\*Hildyard, K., & Wolfe, D. (2007). Cognitive processes associated with child neglect. *Child Abuse & Neglect, 31*, 895–907.

\*Hiraoka, R., Crouch, J. L., Reo, G., Wagner, M., Milner, J. S., & Skowronski, J. J. (2014). Pain tolerance, pain sensitivity, and accessibility of aggression-related schemata in parents at-risk for child physical abuse. *Child Abuse & Neglect, 38*, 1840–1847.

\*Kropp, J., & Haynes, M. (1987). Abusive and nonabusive mothers' ability to identify general and specific emotion signals of infants. *Child Development, 58*, 187–190.

Lau, A. S., Valeri, S. M., McCarty, C. A., & Weisz, J. R. (2006). Abusive parents' reports of child behavior problems: Relationship to observed parent-child interactions. *Child Abuse & Neglect, 30*, 639–655.

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gøtzsche, P. C., Ioannidis, J. P. A., & ... Moher, D. (2009). The PRISMA Statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. *PLoS Medicine, 6*, 1–6.

McCanne, T. R., & Hagstrom, A. H. (1996). Physiological hyperreactivity to stressors in physical child abusers and individuals at risk for being physically abusive. *Aggression and Violent Behavior, 1*, 345–358.

McGillicuddy-DeLisi, A. V., & Sigel, I. E. (1995). Parental beliefs. In M. H. Bornstein (Ed.), *Handbook of parenting: Status and social cognitions of parenting* (Vol. 3, pp. 333–358). Hillsdale, NJ: Lawrence Erlbaum.

\*McCarthy, R. J., Crouch, J. L., Skowronski, J. J., Milner, J. S., Hiraoka, R., Rutledge, E., & Jenkins, J. (2013). Child physical abuse risk moderates spontaneously inferred traits from ambiguous child behaviors. *Child Abuse & Neglect, 37*, 1142–1151.

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

Meyer, D.E., & Schvaneveldt, R.W. (1971). Facilitation in recognizing pairs of words:

Evidence of a dependence between retrieval operations. *Journal of Experimental Psychology*, *90*, 227-234.

Milner, J. S. (1986). *The Child Abuse Potential Inventory: Manual* (2nd ed.). Webster, NC: Psytec.

Milner, J. S. (1993). Social information processing and physical child abuse. *Clinical Psychology Review*, *13*, 275–294.

Milner, J. S. (2000). Social information processing and child physical abuse: Theory and research. In D. J. Hansen (Ed.), *Nebraska symposium on motivation. Motivation and child maltreatment* (Vol. 45, pp. 39–84). Lincoln, NE: University of Nebraska Press.

Milner, J. (2003). Social information processing in high-risk and physically abusive parents. *Child Abuse & Neglect*, *27*, 7–20.

\*Milner, J. S., Rabenhorst, M. M., McCanne, T. R., Crouch, J. L., Skowronski, J. J., Fleming, M. T., Hiraoka, R., & Risser, H. J. (2011). Event-related potentials: Search for positive and negative child-related schemata in individuals at low and high risk for child physical abuse. *Child Abuse & Neglect*, *35*, 249–266.

Nosek, B. A., & Banaji, M. R. (2001). The Go/No-Go Association Task. *Social Cognition*, *19*, 625–666.

Nosek, B. A., Greenwald, A. G., & Banaji, M. R. (2005). Understanding and using the Implicit Association Test: II. Method variables and construct validity. *Personality and Social Psychology Bulletin*, *31*, 166–180.

Orne, M. T. (1962). On the social psychology of the psychological experiment: With particular reference to demand characteristics and their implications. *American Psychologist*, *17*, 776-783.

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

Payne, B. K., Cheng, S. M., Govorun, O., & Stewart, B. D. (2005). An inkblot for attitudes: Affect misattribution as implicit measurement. *Journal of Personality and Social Psychology, 89*, 277–293.

\*Pérez-Albéniz, A., & De Paúl, J. (2005). Empathy in individuals at risk for child physical abuse: The effects of victim's pain cues on aggression. *Aggressive Behavior, 31*, 338–349.

\*Pérez-Albéniz, A., & De Paúl, J. (2006). Empathy and risk status for child physical abuse: The effects of an adult victim's pain cues and an adult victim's intent on aggression. *Aggressive Behavior, 32*, 421–432.

Portwood, S. G. (2006). Self-report approaches. In M. M. Feerick, J. F. Knutson, P. K. Trickett, & S. M. Flanzer (Eds.), *Child abuse and neglect: Definitions, classifications, & a framework for research* (pp. 233–253). Baltimore, MD: Paul H. Brookes Publishing Co.

\*Pruitt, D. L., & Erickson, M. T. (1985). The Child Abuse Potential Inventory: A study of concurrent validity. *Journal of Clinical Psychology, 41*, 104–111.

\*Reijman, S., Alink, L. A., Compier-de Block, L., Werner, C., Maras, A., Rijnberk, C., &... Bakermans-Kranenburg, M. (2014). Autonomic reactivity to infant crying in maltreating mothers. *Child Maltreatment, 19*, 101–112.

Rinck, M., & Becker, E. S. (2007). Approach and avoidance in fear of spiders. *Journal of behavior therapy and experimental psychiatry, 38*, 105–120.

\*Risser, H. J., Skowronski, J. J., & Crouch, J. L. (2011). Implicit attitudes toward children may be unrelated to child abuse risk. *Child Abuse & Neglect, 35*, 514–523.

\*Rodriguez, C. M., Cook, A. E., & Jedrziwski, C. T. (2012). Reading between the lines: Implicit assessment of the association of parental attributions and empathy with abuse risk. *Child Abuse & Neglect, 36*, 564–571.

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

- \*Rodriguez, C. M. (2013). Analog of parental empathy: Association with physical child abuse risk and punishment intentions. *Child Abuse & Neglect*, 37, 493–499.
- Rosenthal, R. (1966). *Experimenter effects in experimental research*. East Norwalk, CT: Appleton-Century-Crofts.
- Russa, M. B., & Rodriguez, C. M. (2010). Physical discipline, escalation, and child abuse potential: Psychometric evidence for the analog parenting task. *Aggressive behavior*, 36, 251–260.
- Sigel, I. E. (1985). A conceptual analysis of beliefs. In I. E. Sigel (Ed.), *Parental belief systems: The psychological consequences for children* (pp. 345–372). Hillsdale, NJ: Lawrence Erlbaum.
- Snowden, P.T., & Barrett, P. (2006). Psychophysiological Methods. In G.M. Breakwell, C. Fife-Schaw, S. Hammond & J. Smith (Eds.), *Research Methods in Psychology* (pp. 146-159). London: Sage.
- \*Stasiewicz, P. R. & Lisman, S. A. (1989). Effects of infant cries on alcohol consumption in college males at risk for child abuse. *Child Abuse & Neglect*, 13, 463–470.
- Trocme, N., Fallon, B., MacLaurin, B., & Neves, T. (2005). What is driving increasing child welfare caseloads in Canada? Analysis of the 1993 and 1998 Ontario Incidence Studies of Reported Child Abuse and Neglect. *Child Welfare*, 84(3), 341-359.
- \*Wagner, M. F., Milner, J. S., McCarthy, R. J., Crouch, J. L., McCanne, T. R., & Skowronski, J. J. (2015). Facial emotion recognition accuracy and child physical abuse: An experiment and a meta-analysis. *Psychology of Violence*, 5(2), 154–162.
- Weber, S. J., & Cook, T. D. (1972). Subject effects in laboratory research: An examination of subject roles, demand characteristics, and valid inference. *Psychological Bulletin*, 77, 273-295.

## IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

Weisse, C. S., Davidson, L. M., & Baum, A. (1989). Arousal theory and stress. In H. Wagner & A. Manstead (Eds.), *Handbook of Social Psychophysiology* (pp. 283-302).

Chichester, UK: John Wiley & Sons, Ltd.

Wilson, T. D., Lindsey, S., & Schooler, T. Y. (2000). A model of dual attitudes. *Psychology Review*, *107*(1), 101–126.

\*Wolfe, D. A., Fairbank, J. A., Kelly, J. A., & Bradlyn, A. S. (1983). Child abusive parents physiological responses to stressful and non-stressful behavior in children. *Behavioral Assessment*, *5*, 363–371.

World Health Organization (2002). *World report on violence and health*. Geneva: World Health Organization.

# IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT

Figure 1

*Results of the search strategy based on the PRISMA statement (Liberati et al., 2009)*

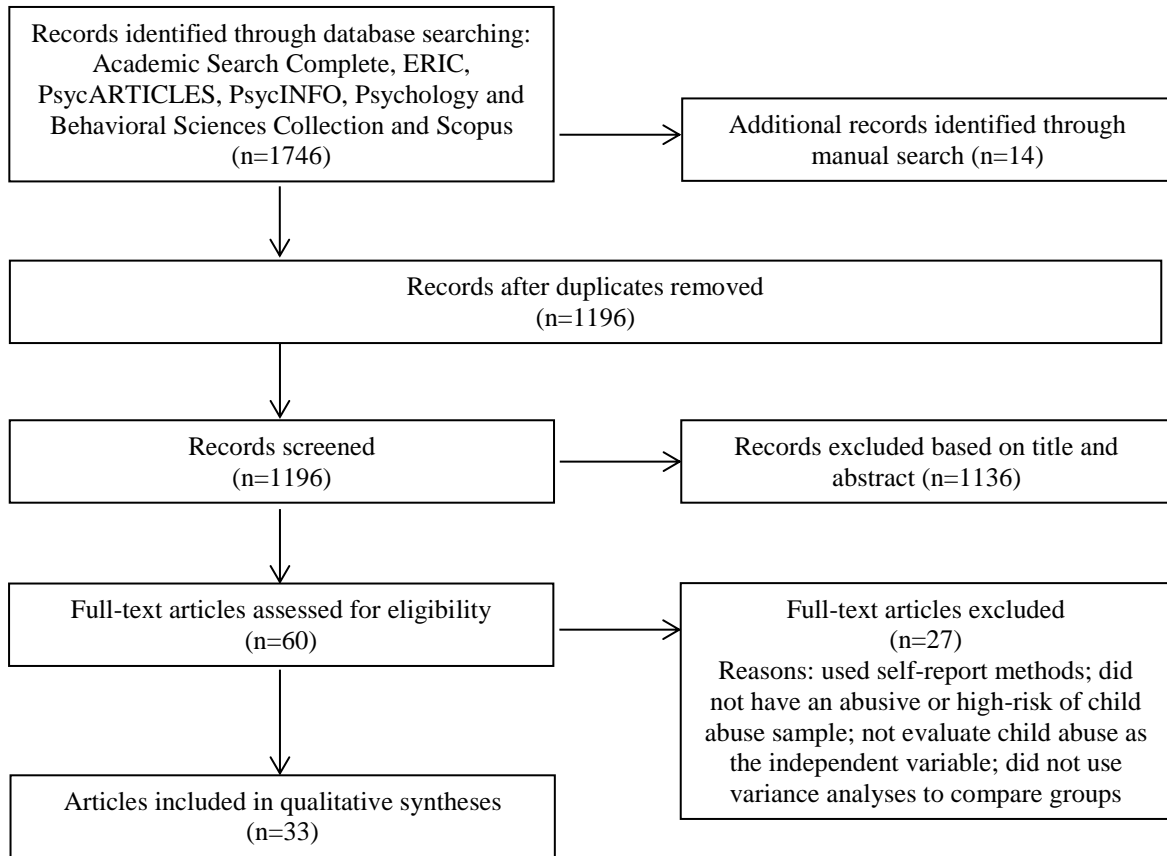




Table 1

*Summary of studies related with the affective dimension of parental representations.*

<b>Authors/Year</b>	<b>Hypothesis</b>	<b>Sample</b>	<b>Implicit measure</b>	<b>Results</b>
Asla, De Paúl, & Pérez-Albéniz, 2011	Parents at high-risk for physical child abuse show more deficits in emotion recognition than parents at low-risk	64 parents at high-risk and 80 parents at low-risk (fathers and mothers) of physical child abuse (evaluated with CAPI)	Subtle Expression Training Tool/Micro Expression Training Tool – SETT/METT; Diagnostic Analysis of Nonverbal Accuracy II - DANVA II	High-risk fathers showed more deficits in emotion recognition than low-risk fathers, but no differences were found for mothers
Balge & Milner, 2000	Mothers at high-risk for physical child abuse make more errors in recognizing emotions in children and adults, compared with mothers at low-risk	16 mothers at high-risk and 16 mothers at low-risk of child physical abuse (evaluated with CAPI)	Diagnostic Analysis of Nonverbal Behavior II - DANVA II	High-risk mothers, compared to low-risk mothers, made more emotion recognition errors although the differences between two groups were not significant
Camras et al., 1988	Abusive mothers have more difficulties in emotion recognition, than non-abusive mothers	20 abusive and 20 non-abusive mothers	Emotion recognition task previously categorized with the Facial Action Coding System (FACS) – adult faces	No differences between abusive and non-abusive mothers
Casanova, Domanic, McCane, & Milner, 1992	At-risk mothers show more sympathetic nervous system reactivity to non-child-related stimuli, than low-risk mothers	15 mothers at high-risk and 15 mothers at low-risk of child physical abuse (evaluated with CAPI)	Psychophysiological measures: heart rate and skin conductance – collected during the presentation of stressors (cold pressor, stressful accidents video, unsolvable anagrams and car horn audiotape)	At-risk mothers showed higher and prolonged sympathetic activation to non-child-related stressful stimuli
Crowe & Zeskind, 1992	High-risk subjects (even before they have children) exhibit greater physiological arousal to cry sounds than low-risk individuals	30 undergraduate students, non-parents: 15 at low-risk and 15 at high-risk of child physical abuse (evaluated with CAPI)	Psychophysiological measures: heart rate and skin conductance – collected during the presentation of 2 stimuli tapes of infant cries (4 phonated and 4 hyperphonated)	High-risk subjects revealed higher heart rate and an increase in skin conductance, especially during the phonated cry stimulus, than low-risk group
Disbrow et al., 1977	Abusive parents show more inability to relate with others and to tolerate stress, compared with control subjects	37 neglectful/abusive families (mothers and fathers) and 32 non-neglectful/non-abusive families (mothers and fathers)	Physiological measures: heartbeat, diastolic blood pressure, respiration rate, skin conductance and skin temperature – collected during the presentation of stimulus tapes with parents-child interactions	Abusive and neglectful parents showed similar physiological responses for pleasant and unpleasant stimuli, contrary to non-abusive parents

During & McMahon, 1991	Abusive mothers have less ability to decode facial expressions, compared with non-abusive mothers	23 abusive and 23 non-abusive mothers	Emotion recognition task previously categorized with the Facial Action Coding System (FACS) – adult and children pictures	No differences between abusive and non-abusive mothers
Francis & Wolfe, 2008	Abusive fathers tend to perceive children’s emotional cues more negatively than non-abusive fathers	24 abusive and 25 non-abusive fathers	IFEEL Pictures task: 30 pictures of children emotional expressions, categorized according to the IFEEL Pictures lexicon clusters	Abusive fathers were more likely to label infants’ facial expressions as representing negative emotions, such as anger and fear
Friedrich, Tyler, & Clark, 1985	Abusive, neglectful and control low-income mothers differ in psychophysiological reactivity to stressful stimuli	14 physical abusive, 13 neglectful and 15 non-abusive mothers	Psychophysiological measures: skin conductance, heart rate and finger blood volume – collected during the presentation of audiotape segments of an infant cry, a noxious tone and a white noise	Abusive and neglectful mothers showed increased skin conductance and failed to habituate to stressful stimuli, compared with non-abusive mothers (no significant differences observed in heart rate or finger blood volume)
Frodi & Lamb, 1980	Abusive mothers respond more negatively to infant cries, compared with non-abusive mothers	14 abusive and 14 non-abusive mothers	Psychophysiological measures: heart rate, skin conductance and diastolic blood pressure – collected during the presentation of 2 videos with a quiet infant and a crying or smiling infant	Crying infant increased heart rate, skin conductance and diastolic blood pressure, especially for the abusive mothers compared with non-abusive mothers
Hildyard & Wolfe, 2007	Neglectful mothers show more difficulties in recognizing children emotions, compared with non-neglectful mothers	34 neglectful mothers and 33 non-neglectful mothers	IFEEL Pictures task: 30 pictures of children emotional expressions, categorized according to the IFEEL Pictures lexicon clusters	Neglectful mothers were more likely to label infants’ facial expressions as representing feelings of Sadness and Shame, and used significantly more non-emotion words (“Other” words) than non-neglectful mothers
Kropp & Haynes, 1987	Abusive mothers make more errors in interpreting emotion signals than non-abusive mothers	20 abusive and 20 non-abusive mothers	Emotion recognition task previously categorized with the Facial Action Coding System (FACS) – adult faces	Abusive mothers showed more errors in recognizing specific emotional expressions and in labeling negative affect as positive
Milner et al., 2011	High-risk individuals (even before they have children) have higher levels of accessibility of negative child-related schemata, automatically activated by ambiguous child stimuli	14 undergraduate students: 7 at low-risk and 7 at high-risk for child physical abuse (evaluated with CAPI)	Electroencephalography (ERP) data, eye movements and eye blinks collected during a priming procedure, with the presentation of child vs. non-child pictures followed by positive and negative words	High-risk individuals have pre-existing positive and negative child-related schemata that were equally accessible; low-risk individuals readily access to positive schemas which are likely to decrease the likelihood of negative child-related

				evaluations
Pruitt & Erickson, 1985	High-risk individuals (even before they have children) are more reactive to infant cries, when compared to low-risk non-parents individuals	44 non-parents males and females: 22 at low-risk and 22 at high-risk for child physical abuse (evaluated with CAPI)	Psychophysiological measures: heart rate and skin conductance – collected during the presentation of videos with a quiet infant and a crying or smiling infant	Despite no significant differences in the skin conductance measure, high-risk individuals showed a higher heart rate compared to low-risk ones, who showed low heart rate especially during the cry and smile segments
Reijman et al., 2014	Maltreating parents show greater physiological reactivity to crying sounds, compared with non-maltreating parents	45 maltreating (abusive and neglectful) and 45 non-maltreating mothers	Psychophysiological measures: heart rate, skin conductance, pre-ejection period and vagal tone – collected during the presentation of crying sounds	Abusive mothers displayed lack of cardiac control (no negative correlation between heart rate and pre-ejection period – systolic period of the cardiac cycle)
Rodriguez, 2013	High-risk mothers demonstrate low empathy for their children, compared with low-risk mothers	20 mothers at high-risk and 26 mothers at low-risk of child physical abuse (evaluated with CAPI)	Behavioral simulation of parental empathy - Matching Affect to Child Task (MATCh)	High-risk mothers demonstrated poorer empathic ability when compared with mothers with low-risk of child physical abuse
Stasiewicz & Lisman, 1989	High-risk subjects (even before they have children) demonstrate greater arousal when exposed to infant cries, than low-risk subjects	32 undergraduate students, males and non-parents: 16 at low-risk and 16 at high-risk for child abuse (evaluated with AAPI)	Psychophysiological measures: diastolic blood pressure and heart rate – collected during the presentation of an audiotape with a medically at-risk infant cry or a smoke detector alarm	No significant differences between high-risk and low-risk subjects during either stimuli
Wagner et al., 2015	High-risk parents show less accuracy in recognizing children emotion	51 high-risk and 61 low-risk parents (mothers and fathers; evaluated with CAPI)	Emotion recognition task, varying face angle and face presentation time	No differences between high-risk and low-risk parents
Wolfe, Fairbank, Kelly, & Bradlyn, 1983	Abusive mothers demonstrate higher arousal than non-abusive ones to scenes labeled as stressful	7 abusive and 7 non-abusive mothers	Psychophysiological measures: Heart rate, skin conductance and respiration rate – collected during the presentation of a 30-min. video with stressful and non-stressful situations involving a mother and a child	Abusive mothers were more aroused during stressful scenes than non-abusive mothers

Table 2

*Summary of studies related with the cognitive dimension of parental representations.*

<b>Authors/Year</b>	<b>Hypothesis</b>	<b>Sample</b>	<b>Implicit measure</b>	<b>Results</b>
Crouch et al., 2010a	High-risk (vs. low-risk) parents are faster in responding to negative words following ambiguous and negative face primes, and slower to positive words.	16 high-risk and 51 low-risk parents (evaluated with CAPI)	Picture priming technique with a lexical decision task: presentation of positive and negative words after the presentation of positive, ambiguous, or negative child and adult faces	No differences between high and low-risk individuals
Crouch et al., 2010b	High-risk parents have higher recall of negative cues and lower recall of positive cues in ambiguous caregiving contexts, compared to low-risk parents	25 high-risk and 41 low-risk parents (evaluated with CAPI)	Recall task: parents were asked to memorize sentences including a child's name, a child's action (e.g., "kicked his legs") and a caregiving context (e.g., "as his mother changed his diaper"), and recall them	Despite no differences observed in the recall level for negative cues, high-risk parents registered higher recall of negative than positive cues, compared to low-risk parents
Farc, Crouch, Skowronski, & Milner, 2008	High-risk parents rate ambiguous child-related stimuli as more hostile than low-risk of child physical abuse parents	Experiment 1: 29 high-risk and 79 low-risk parents; Experiment 2: 45 high-risk and 43 low-risk parents (evaluated with CAPI)	Rating of ambiguous child pictures using supraliminal and subliminal priming tasks	High-risk, compared to low-risk parents, rated ambiguous child pictures as more hostile, negative and difficult
Hiraoka et al., 2014	High-risk parents show higher accessibility of aggression-related words than low-risk ones, especially after exposure to an aversive event	40 high-risk and 51 low-risk parents (evaluated with CAPI)	Word completion task to evaluate the accessibility of aggression-related words before and after exposure to an aversive event (a social stressor and a painful task)	High-risk parents demonstrated higher accessibility of aggression-related schemata after experiencing the painful event, compared with low-risk parents
McCarthy et al., 2013	High-risk parents form more negative and less positive spontaneous trait inferences than low-risk parents, especially when behavioral information is ambiguous	33 high-risk and 25 low-risk parents (evaluated with CAPI)	False-recognition task, including a set of behavioral descriptions (implying a positive or negative trait) paired with child photographs, to evaluate parents' tendency to infer positive and negative traits from children's behaviors	High-risk parents were equally likely to indicate negative traits regardless of whether the traits were vaguely or strongly implied in the child's behavior; low-risk parents, were significantly less likely to indicate vaguely negative traits
Risser, Skowronski, & Crouch, 2011	High-risk parents show more negative implicit attitudes toward children compared with moderate and low-risk parents	Study 1: 90 students (32 high, 28 moderate, 30 low-risk); Study 2: 95 parents (35 high, 20 moderate, 40 low-risk). All evaluated with CAPI	Evaluative priming procedure: words were preceded by photographs of child or adult faces with positive, neutral, or negative expressions	No differences between high and low-risk individuals

Rodriguez, Cook, & Jedrzewski, 2012	High-risk parents tend to be faster in reading non empathic vignettes and vignettes attributing negative behaviors to the child's intent, compared with low-risk parents	26 parents with low and high-risk of child physical abuse (evaluated with CAPI)	Reading inconsistency paradigm (readers are slower in reading text that is inconsistent with their expectations and knowledge): reading vignettes about attributions of child behavior and empathy while reading time was measured with an eye tracking apparatus	High-risk parents revealed to be faster in reading non empathic vignettes and vignettes attributing negative behaviors to the child's intent, suggesting they engage in processes that were consistent with their expectations and knowledge
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Table 3

*Summary of studies related with the behavioral dimension of parental representations.*

<b>Authors/Year</b>	<b>Hypothesis</b>	<b>Sample</b>	<b>Implicit measure</b>	<b>Results</b>
Bauer & Twentyman, 1985	Maltreating mothers attribute more negative intentionality to their child's behavior in comparison with non-maltreating mothers	12 physically abusive, 12 neglectful and 12 non-maltreating mothers	Annoyance rating by adjusting a sliding lever, after listening audio tapes with stressful parent-child interactions followed by a child crying sound, and non-stressful parent-child interactions, followed by a fire alarm or car horn sound	Physically abusive mothers demonstrated higher rates of annoyance, compared to the non-maltreating group
Compier-de Block et al., 2015	Maltreating mothers are less able to regulate the distress elicited by infant signals, and use more excessive force than non-maltreating ones especially in response to infant crying	43 maltreating (abusive and neglectful) and 40 non-maltreating mothers	Modulation of handgrip strength after being exposed to child laughter and crying sounds	Maltreating mothers used excessive force while listening to infant crying and laughter compared to non-maltreating mothers, especially neglectful mothers
Crouch et al., 2008	High-risk parents use excessive force in response to infant crying compared with low-risk parents, especially in the hostility priming condition	32 high-risk and 52 low-risk parents (evaluated with CAPI)	Modulation of handgrip strength after being exposed to a video of a crying infant, and completed a scrambled sentence task with negative or neutral words	Regardless the parental risk for child physical abuse, infant crying produced an increase of the risk of aggressive parental responses, particularly for the high-risk parents
Crouch et al., 2012	High-risk parents display higher levels of aggressive behavior in response to negative interpersonal experiences, compared to low-risk parents	20 high-risk and 50 low-risk parents (evaluated with CAPI)	Word Game: during a lexical decision task in a computer screen, when the participant was the fastest, he/she should give a sound blast to a fictitious loser	High-risk parents selected higher levels of sound blasts both initially and when provoked
De Paúl et al., 2006	High-risk subjects for child physical abuse, in the presence of a child's pain cues, select more aggressive responses when the child's behavior is inadequate or ambiguous, even if the child's behavior could be explicable by mitigating information	125 high-risk and 125 low-risk undergraduate students (evaluated with CAPI)	Presentation of a maze on a computer screen asking to help a child get through the maze without error, and giving fictitious physiological information of the child's pain	High-risk participants showed more aggression than low-risk participants when mitigating information was provided
Pérez-Albéniz & De Paúl, 2005	Individuals at high-risk for child physical abuse display lower levels	40 high-risk and 40 low-risk undergraduate female students	Computer simulations: presentation of the behavior of a fictitious	High-risk participants (non-parents) utilized higher levels of punitive

	of empathy and less inhibition of aggression in the presence of a victim's pain cues	(evaluated with CAPI)	participant (an adult victim), asking for feedback responses (positive or negative), namely shocks of different intensities. In pain conditions, the degree of pain and the physiological victim's response to the shocks are presented	responses, revealing less empathy for the victim and less aggression inhibition in the presence of a victim's pain
Pérez-Albéniz & De Paúl, 2006	High-risk for child physical abuse individuals, compared to low-risk ones, make attribution errors about the other's hostile intent and these errors are associated with the non-inhibition of aggressive reaction in the presence of victim's pain cues	48 high and 47 low-risk undergraduate female students (evaluated with CAPI)	Computer simulations: initial learning task in which participants heard noises as a punishment or received a green light as a reward; second teaching task, in which participants administered shocks as a punishment, or a green light as a reward, to a supposed opponent participant	High-risk participants (non-parents) aggressed more than low-risk participants regardless of the victim's intent

