IUL School of Social Sciences

Department of Social and Organizational Psychology

Caregiving is Also Thinking: Maternal Cognitions in Child Abuse and Neglect

Cláudia Sofia Dinis Camilo

Thesis specially presented for the fulfillment of the degree of

Doctor in Psychology

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Abstract

Child-maltreatment has long been recognized as a serious and prevalent social problem with multiple and long-term consequences for child development. This work examines child-maltreatment based on a Social Information Processing model, emphasizing the role of cognitive representations, and errors and biases in processing caregiving-related information on parental responses. Six articles present (a) a set of meta-analyses about the relation between parents' socio-cognitive variables and child-maltreatment, (b) a systematic review of implicit measures to assess parental cognitions in the context of maltreatment; (c) map and compare cognitive representations about parenting of referred and non-referred mothers; and (d) examine the association of implicit and explicit parental attitudes and (e) errors in emotion recognition, with self- and professionals-reported child abuse and neglect. The results of the reviews indicated that the associations of parental schemata and biased information processing with child maltreatment are significant, as well as that the potential of implicit measures in assessing parental cognitions may be valuable. Moreover, the empirical studies support the hypothesis that maladaptive parenting is characterized by rigidity schemata and associated with inadequate parental attitudes and errors in perceiving children's emotional signals, but mostly for neglect and particularly when hetero-reported. Theoretically, these findings support the SIP model and emphasize the potential utility of socio-cognitive approaches in the evaluation and explanation of child maltreatment. The reported studies also represent a valuable methodological approach for assessing both maltreatment and parental cognitions. Overall, this work presents a contribution to the still emerging research about parental cognitions in the context of child maltreatment, with important implications for research and intervention.

Keywords: Parental cognitions; Social information processing; Child abuse and neglect; Implicit measures; Measurement of maltreatment

PsycINFO Codes:

2340 Cognitive Processes

2900 Social Processes & Social Issues

2956 Childrearing & Child Care

3040 Social Perceptions & Cognitions

Resumo

O mau-trato infantil é amplamente reconhecido como um problema social prevalente, com consequências múltiplas e a longo-prazo para o desenvolvimento da criança. O presente trabalho examina o mau-trato à luz do modelo de Processamento de Informação Social (SIP), acentuando o papel das representações cognitivas, e de erros e enviesamentos no processamento da informação relativa ao cuidar, nas respostas parentais. Seis artigos apresentam (a) um conjunto de meta-análises sobre a relação entre variáveis sociocognitivas dos pais e o mau-trato, (b) uma revisão sistemática de medidas implícitas utilizadas para avaliar essas cognições em contextos de mau-trato; (c) mapeiam e comparam representações sobre parentalidade de mães sinalizadas e não-sinalizadas; e (d) examinam a relação entre atitudes parentais implícitas e explícitas e (e) erros no reconhecimento de emoções das crianças, e o abuso e negligência, auto e hétero-reportados. Os resultados dos estudos de revisão indicam que as associações entre esquemas cognitivos parentais e enviesamentos no processamento da informação e o mau-trato são significativas, assim como o potencial das medidas implícitas na avaliação das cognições parentais. Os estudos empíricos sugerem especificamente que a parentalidade desadaptativa é caracterizada por esquemas cognitivos rígidos, atitudes parentais inadequadas e erros na perceção dos sinais emocionais da criança, sobretudo na negligência, e quando reportada pelos profissionais. Teoricamente, estes resultados suportam o modelo SIP e enfatizam o potencial das abordagens sociocognitivas na avaliação e explicação do mau-trato. Os estudos reportados representam também um importante contributo metodológico para a avaliação do mau-trato e das cognições parentais. Este trabalho apresenta assim uma contribuição para a emergente pesquisa sobre cognições parentais no contexto do mau-trato, com implicações importantes para a investigação e intervenção.

Palavras-chave: Cognições parentais; Processamento de informação social; Abuso e negligência; Medidas implícitas; Avaliação do mau trato.

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GENERAL INTRODUCTION

1. THEORETICAL BACKGROUND

The quality of parenting has an undeniable importance in the child's full development (Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000). To ensure such development, it is expected that parents succeed in their main parental functions such as to take care of the child's basic needs, provide emotional care, support the development of the child cognitive, social and emotional competencies, provide guidance, set boundaries and limits, teach life skills, be a child advocate, and support the child's education, moral and spiritual guidance (Sanders & Turner, 2018).

Until the seminal paper "The Battered-Child Syndrome" (Kempe, Silverman, Steele, Droegemueller, & Silver, 1962), child maltreatment was not fully recognized as a social problem. However, it was only during the 1990s that the scientific community focused its efforts towards the definition and evaluation of maltreating parental practices (for a review see English, Thompson, Graham, & Briggs, 2005). In the last decades, research on maladaptive parenting in the form of child maltreatment has received substantial attention (Gabrielli & Jackson, 2019). Along the parenting continuum (Wolfe & McIsaac, 2011), the literature focusing on "positive parenting" has been exploring parental and contextual variables associated with optimal outcomes for children and parents. In contrast, the "negative parenting" literature has been addressing poor childrearing methods such as overly permissive or harsh and hostile parenting that lead to poor child outcomes (Taraban & Shaw, 2018).

1.1. Child Abuse and Neglect: Definition, prevalence, consequences, and assessment

Broadly defined, child maltreatment refers to any act or omission from the caregivers that (potentially) can harm the child's physical, mental, spiritual, moral, or social development (World Health Organization, 1999), and includes both abuse and neglect (U.S. Department of Health and Human Services, 2019). Specifically, child abuse occurs when a child is deliberately harmed, physically and psychologically, through violent acts such as spanking, spurning or threatening (American Professional Society on the Abuse of Children 1995; McCoy & Keen, 2014). Child neglect consists of parental omissions regarding the child physical, emotional and educational needs (Dubowitz et al., 2005; Mennen, Kim, Sang, & Trickett, 2010), such as inadequate or insufficient availability of food, lack of required medical attention, scarce parental support or engagement with the child, lack of supervision, or frequent absence from school (Gilbert et al.,

2009). Given their multifaceted and complex nature, the conceptualization of child abuse and neglect also needs to consider the severity and chronicity of parental maladaptive behaviors and the specific developmental needs of the child (Azar, 2002), as well as the social standards of each community (Calheiros, Monteiro, Patrício, & Carmona, 2016) and the legal frameworks of the states (Gilbert, Parton, Skivenes, 2011).

Internationally, the World Report on Violence and Health (World Health Organization, 2002) reports the high number of deaths of children who are victims of parental maltreatment, particularly within the 0-4 age group. In terms of prevalence, child neglect has been the most reported and substantiated type of maltreatment (Kim, Wildeman, Jonson-Reid, & Drake, 2017). However, physical and psychological abuse are also significantly represented (Finkelhor, Shattuck, Turner, & Hamby, 2014). Recent data on the global prevalence of maltreatment in self-report studies has estimated prevalence rates of physical and emotional abuse (226/1000 and 363/1000, respectively) as well as physical and emotional neglect (163/1000 and 184/1000, respectively) (Stoltenborgh, Bakermans-Kranenburg, Alink, & van IJzendoorn, 2015). In Portugal, neglect represents about 40% of the substantiated cases in Portuguese Child Protection Services agencies, and physical/psychological abuse 4.5% of the cases (Comissão Nacional de Promoção dos Direitos e Proteção das Crianças e Jovens, 2019). Nonetheless, prevalence studies have long acknowledged that many maltreatment cases are not identified and/or reported (Munro, 2011).

Despite the high prevalence of neglect, research has focused mostly on other types of maltreatment (Stoltenborgh et al., 2015), or on general child maltreatment based on Child Protection Services (CPS) records (Warmingham, Handley, Rogosch, Manly, & Cicchetti, 2018). For example, Figure 1 illustrates that research on child maltreatment has been dominated by sexual abuse, which is the less prevalent, whereas studies on physical and emotional neglect are significantly fewer. Moreover, the high co-occurrence of different types of maltreatment, namely neglect, emotional maltreatment, and physical abuse (Kim, Mennen, & Trickett, 2017), and the subsequent multiple victimization to which children are exposed (Debowska, Willmott, Boduszek, & Jones, 2017) prevent researchers from disentangling the antecedents, correlates, and consequences of each type of maltreatment.

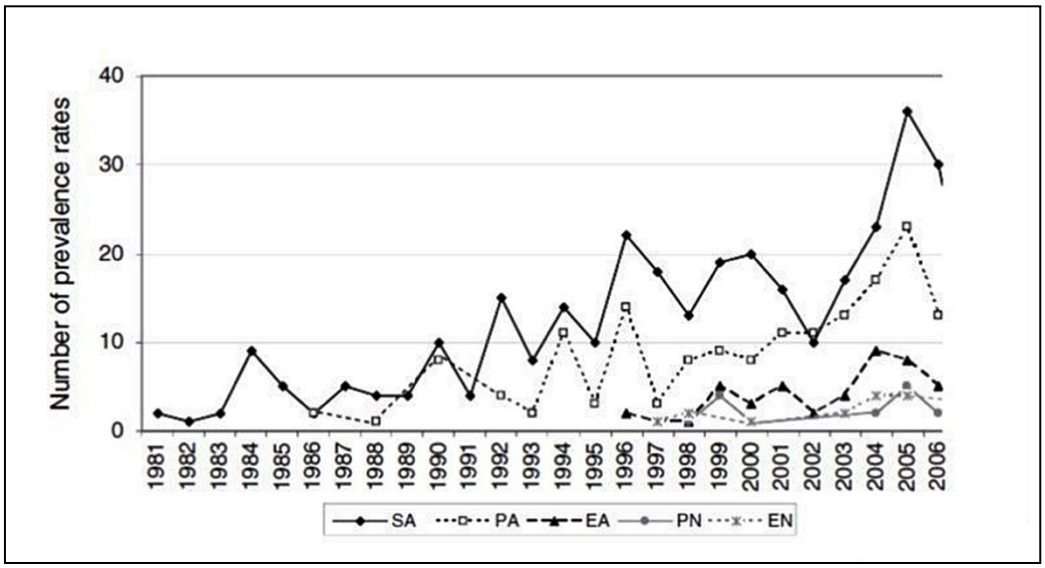


Figure 1. Number of prevalence studies per type of maltreatment per year (Stoltenborgh et al., 2015).

Note: SA = sexual abuse; PA = physical abuse; EA = emotional abuse; EN = emotional neglect; PN = physical neglect.

As for the consequences of maladaptive parenting, it is well established in the literature the impact that such parenting has on children's development, namely in terms of brain development, language and communication, social-emotional development, peer relationships, schooling and academic success, and physical health (for a review see Sanders & Turner, 2018). For example, the literature has reported strong associations between maltreatment experiences and externalizing and internalizing behaviors, ADHD, inefficient emotion regulation, as well as weaker IQ, literacy, numeracy and language skills (Maguire et al., 2015). Further, recent research specifically focusing on the neurobiological outcomes of child abuse and neglect, revealed the impact that the toxic stress associated with these victimization experiences have on the child's brain, affecting how children learn, solve problems, and relate to others (e.g., Shonkoff et al., 2012). Overall, these studies suggest that child maltreatment has crucial long-term consequences that go far beyond their immediate impact on the children. The future of the next generations is also likely to be compromised from mental and physical health problems and underachievement in education and future employment, which impacts economic productivity and the autonomy of individuals and

communities and increases the risks of aggression, crime and violence (Gilbert et al., 2009), burdening social and health systems and the state.

The impact of parenting on children's development has sparked efforts from the academic and practitioner communities in the family intervention domain (Sanders & Turner, 2018). These efforts have often been translated into a public health approach to prevention, with actions towards preventing the occurrence and recurrence of child maltreatment and the further impairment of children's health and development following the identification of maltreatment (Gray, 2017). More selective interventions with abusive and neglectful parents have also been implemented (Camilo & Garrido, 2013), focusing on parenting and on the parent-child relationship (e.g., Toth, Sturge-Apple, Rogosch, & Cicchetti, 2015). Studies evaluating the effectiveness of interventions with maltreating parents suggest that parental training leads to improvements in parenting competence and behavior, especially when involving cognitive-behavioral techniques (e.g., Kolko, Iselin, & Gully, 2011). For instance, recent meta-analyses showed encouraging results of parental training programs in decreasing child maltreatment (e.g., Gubbels, van der Put, & Assink, 2019; van der Put, Assink, Gubbels, & Boekhout van Solinge, 2018). However, the research on the effectiveness of universal and selective interventions has been predominantly conducted in English-speaking, high-income countries (Mikton & Butchart, 2009), and few studies have examined their long-term impact (Lundahl, Nimer, & Parsons, 2006).

The assessment of maltreating parental practices constitutes a big challenge for researchers and professionals. First, difficulties in accomplishing a consensual definition of child maltreatment have led to different operationalization of the concepts (Jackson, McGuire, Tunno, & Makanui, 2019). Second, measuring maltreatment requires the consideration of developmental needs because children experience different forms of maltreatment, with differential impact, at different ages (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998). Moreover, legal and cultural normative issues also need to be considered in the assessment of child maltreatment (e.g., Raman & Hodes, 2011). Finally, methodological issues such as sufficiently large representative samples and developmentally and culturally appropriate measures are of extreme importance to ascertain the occurrence of maltreatment (Cicchetti & Manly, 2001).

The most common approaches to assess child abuse and neglect have been self-report (of either victim or perpetrator), observational methods, or official CPS records. Self-report measures

are regularly used to assess parental practices, like disciplinary practices and caregiving behaviors. Among these, the most widespread are instruments such as the *Parent- Child Conflict Tactics Scale* (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998), the *Child Abuse Potential Inventory* (Milner, 1986), or the *Multidimensional Neglectful Behavior Scale – Parent Report* (Kantor, Holt, & Straus, 2003). Self-reports are important sources of data (Kaufman, Jones, Stieglitz, Vitulano, & Mannarino, 1994), but depend upon a conscious awareness of feelings and cognitions towards the events and are influenced by social desirability (e.g. Fazio & Olson, 2003; Greenwald et al., 2002), especially from perpetrators, in an attempt to avoid social judgments and legal consequences (Bennett, Sullivan, & Lewis, 2006; Portwood, 2006). Further, abusive and neglectful parents may have unrealistic expectations, perceptual biases about their interactions with their children, or misattribute their children's behavior (Hansen & MacMillan, 1990; Lau, Valeri, McCarty, & Weisz, 2006), which influence the reports. Moreover, retrospective reporting is prone to memory distortions caused by time passage or by knowledge of subsequent events (Bauer & Twentyman, 1985), making these reports susceptible to misrepresentation (Fazio & Olson, 2003). Observational methods such as the *Dyadic Parent-Child Interaction Scale* (Eyberg, Nelson, Duke, & Boggs, 2005) or the *Behavior Coding Scheme* (Forehand & McMahon, 1981) (for a review see Aspland & Gardner, 2003) provide a "window" into the real family dynamics and behaviors, assessed in a more consistent and reliable manner (Wilson, Rack, Shi, & Norris, 2008). However, these interactions may not be natural under the observation of professionals/researchers, and the method itself is time consuming, with high costs and highly sensitive to the influence of different variables such as the observer bias (e.g., Stowman & Donohue, 2005). Finally, CPS records are often based on reporting and/or diagnostic processes, based on the information gathered by caseworkers, and prone to cognitive biases or heuristic reasoning, or influenced by personal factors of the professionals (Enosh & Bayer-Topilsky, 2014; de Haan et al., 2019).

Considering the constraints described above, researchers on child abuse and neglect have been suggesting the use of multiple methods of information collection in risk assessment protocols (e.g., Schmidt, Banse, & Imhoff, 2015), and multiple sources of information (Ciccheti & Manly, 2001), in order to achieve a "best estimate" of maltreatment experiences (Kaufman et al., 1994).

1.2. The contribution of socio-cognitive approaches to child abuse and neglect

Single-cause explanations for child abuse and neglect have been recognized as simplistic given the well-documented heterogeneous nature of the pathways that might lead to maltreatment (Cicchetti & Valentino, 2006). Typically, child maltreatment research has been addressed by socio-ecological approaches, based on Belsky's model for the determinants of parenting (Belsky, 1984, and revisited by Taraban & Shaw, 2018). According to this approach, child development occurs in the interchange between risk and protective factors, from the child, the parents and the social context, that influence parental behaviors (for a review see Belsky & Jaffee, 2016).

Despite the importance of these models, recent socio-cognitive approaches to parenting have also been emphasizing the role of parental cognitions in determining parental behaviors towards children (e.g., Johnston, Park, & Miller, 2018; Sigel & McGillicuddy-DeLisi, 2002). Since the 1980's, socio-cognitive models explaining maladaptive parenting such as child abuse and neglect (e.g., Azar, Reitz, & Goslin, 2008; Larrance & Twentyman, 1983) have become more prominent, advocating the importance of the ways parents think about their children for parental-child interactions: "Mothers with flexible, complex, and appropriately differentiated schemas are better equipped to perceive the nuances of mother–child interaction and avoid biases in cue processing, leading to more efficient and competent parenting" (Azar et al., 2008, p.298).

Among the different socio-cognitive approaches to parenting (e.g., Azar et al., 2008), the Social Information Processing (SIP) model applied to abuse (Milner, 1993, 2003) and neglect (Crittenden, 1993) has reached some prominence. Based on information processing theories from social cognition, this model suggests that abusive and neglectful parents are unable to understand the signals or states of the child, interpret these signals correctly, and select and implement adequate responses due to bias and errors in processing caregiving related information (Figure 2).

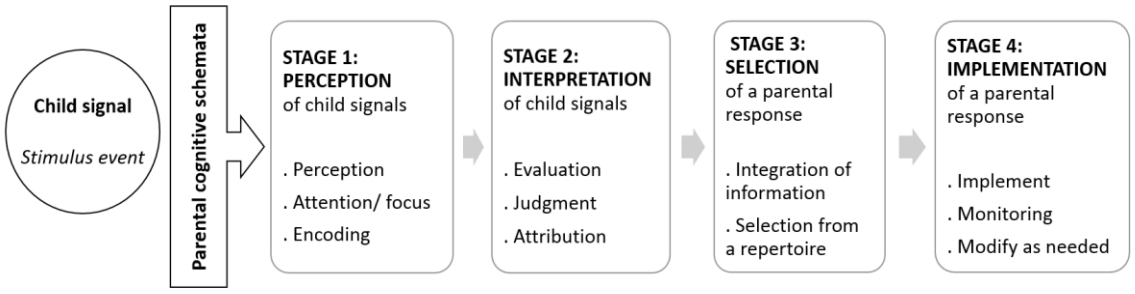


Figure 2. SIP model applied to child abuse and neglect (Crittenden, 1993; Milner, 1993, 2003).

Several authors have already empirically explored this framework and provided evidence on the important role of these cognitive-behavioral variables in shaping abusive and neglectful behaviors. Specifically, physical abuse has been associated with: a) more inaccurate and biased preexisting cognitive schemata, such as beliefs about childrearing, child-related expectations, and self-efficacy and control expectancies (e.g., Azar, McGuier, Miller, Hernandez-Mekonnen, & Johnson, 2017; Hiraoka et al., 2014); b) more errors and biases in attending and encoding the child's behavior (e.g., McCarthy et al., 2013; Asla, de Paúl, & Perez-Albeniz, 2011); c) more negative and biased judgments about children, interpretations of their behavior as more negative, wrong, and blameworthy, and attributions to internal, stable, and global child factors, motivated by hostile intent (e.g., Rodriguez, 2018); d) more errors in the integration of child-related information, and more inappropriate response selection, limited by a poor repertoire of parental responses (parenting skills) (e.g., Caselles & Milner, 2000; Rodriguez, Smith, & Silvia, 2016). Studies conducted with neglectful parents are scarcer but have already shown that neglectful parents demonstrate higher unrealistic expectations (Azar, Stevenson, & Johnson, 2012; Azar, Robinson, Hekimian, & Twentyman, 1984) and lower empathic concern (Rodrigo et al., 2011).

Considering that the SIP model applied to child abuse and neglect relies on the theoretical frameworks of social cognition, whose paradigms and methodologies are usually more experimental, the empirical test of the model has been giving particular prominence to the designs that allow access to parental cognitions implicitly and explicitly. For example, studies on parental cognitions have been considering dual-process models, acknowledging that cognitions exist at

different explicit and implicit levels (e.g., Johnston, Belschner, Park, Stewart, Noyes, & Schaller, 2017). Dual-process models are driven by the idea of two qualitatively distinct processing structures: explicit level, under high levels of conscious control, and more prone to cognitive distortions and reporting biases; and implicit level, more unconscious, impulsive, and stable (e.g., Greenwald & Banaji, 1995). At the implicit level, research has been using implicit measures to examine parents' attitudes toward child physical abuse (e.g., Rodriguez, Russa, & Harmon, 2011), errors in emotion recognition (e.g., Asla et al., 2011), biases in the perceptions and attributions about children (e.g., Hiraoka et al., 2014), parents' aggressive intentions (e.g., Crouch, Skowronski, Milner, & Harris, 2008) and parents' autonomic reactivity to child stimuli (e.g., Reijman et al., 2014).

Indeed, the application of implicit measures, extensively used in social cognition literature, to child abuse and neglect assessment may add an important contribution to the traditional self-report methods. However, the newness of these specific implicit measures to assess parental cognitions requires extra efforts in ensuring its internal and external validity (Drost, 2011).

1.3. Individual and contextual moderators of parents' processing of caregiving-related information

According to the SIP model (Crittenden, 1993; Milner, 2003), parents' cognitive processing may be influenced by individual characteristics and by contextual factors.

Parents' intellectual functioning has been one of the individual variables identified as a risk factor for abuse and neglect, interfering with information processing related to caretaking of children (e.g., Belsky & Jaffee, 2016). It is known that parents with cognitive difficulties are overrepresented in CPS (McConnell, Feldman, Aunos, & Prasad, 2011), particularly in cases of child neglect. Indeed, intellectual disabilities can lead to problems related to attention, risk assessment, perspective taking, planning, frustration tolerance, and trial and error learning, which may have some impact on an individual's capacity to parent a child effectively (Azar & Read, 2009; Conder, Mirfin-Veitch, Sanders, & Munford, 2011). Indeed, intellectual disabilities have been found to characterize some individuals with SIP difficulties (Azar et al., 2012). Likewise, parents' executive functions, that provide the foundation for higher-order cognitive skills, have been also related to caregiving quality (e.g., Deater-Deckard, Wang, Chen, & Bell, 2012)

Regarding contextual risk, highly conflicted marital relationships, violent neighborhoods, low social support, (Belsky & Jaffee, 2016), and socioeconomic status have been seen as important predictors of increased risk for child maltreatment (Van Ijzerdon et al, 2019), and specifically abuse (Stith et al., 2009) and neglect (Mulder, Kuiper, van der Put, Stams, & Assink, 2018). However, it is important to note that this association is not a direct one but one that is mediated by a set of stressful factors related to poverty that spill over to the parent-child interactions (e.g., Bywaters et al., 2016). Research exploring the relationship between child maltreatment and poverty has been suggesting that aside from failing to satisfy basic needs, the stress related to the poverty condition impacts cognitive processing, leading to misjudgments or oversights (Mani, Mullainathan, Shafir, & Zhao, 2013; Shah, Mullainathan, & Shafir, 2012). Parenting in the context of poverty and a chaotic environment requires demanding cognitive capacities to manage the multiple child needs in a risky context, interfering with cognitive processing of social information (Azar et al., 2008; Finegood, Raver, DeJoseph, & Blair, 2017).

2. Aims and Overview of the Current Research

Socio-cognitive approaches to parenting have emphasized the role of cognitive information processing mechanisms in determining parental behaviors towards children (e.g., Johnston et al., 2018; Mah & Johnston, 2008; Sigel & McGillicuddy-DeLisi, 2002). In the context of child abuse, Milner (1993, 2003) proposed a four-stage Social Information Processing (SIP) model to examine parental cognitions associated with this type of maltreatment. In the same year, Crittenden (1993) extended this approach to child neglect, proposing that neglectful parents cannot adequately respond to their child's needs because of errors or biases in information processing, particularly for information related to the child.

In the last decades, the SIP model and its components have been explored in the context of maltreatment research, examining different socio-cognitive variables or the model as a whole, using more experimental or correlational designs, and explicit or implicit measures. However, despite the promising findings that this research has been reporting, several questions remain unexplored. First, research on parental cognitions has been mostly addressing global maltreatment or child abuse, while overlooking knowledge about child neglect and often not distinguishing abuse from neglect. Specifically, it is known that child abuse and child neglect are different forms

of child maltreatment, with different determinants and consequences (e.g., Miller-Perrin & Perrin, 2013). Moreover, the paucity of research on child neglect constitutes a paradox considering this is the most prevalent form of child maltreatment (Stoltenborgh et al., 2015).

Second, the assessment of maltreatment used in most of these studies has largely relied on CPS records or on self-report measures of abuse risk. Considering the already described constraints of using these single measures, and the myriad social and cognitive bias that these measures are prone to (Fazio & Olson, 2003), research on child abuse and neglect should acknowledge the importance of using multiple sources of information (Ciccheti & Manly, 2001; Kaufman et al., 1994).

Finally, some research has been suggesting that parents' cognitive activities may be impacted by some personal characteristics and by contextual factors (e.g., Azar et al., 2008). Specifically, it is important to disentangle a possible confound between intellectual functioning in general and specific child-related cognitive processes. Moreover, the stressors associated with poverty have been found to influence information processing (e.g., Mani et al., 2013). However, few studies based on the SIP model of child abuse and neglect have considered these variables. Thus, it is important to consider their moderating role in the association between parents' cognitions and child abuse and neglect.

Based on a socio-cognitive approach, this work aims to explore the information processing mechanisms that are associated with abusive and neglectful parental behavior. Specifically, the present work examines parental cognitive representations, as well as the errors and biases in parents' cognitive processing of caregiving information associated with child abuse and child neglect.

Based on this overall goal, this thesis specifically aimed to (a) identify and systematize the state of the literature examining abusive/neglectful parents in their preexisting cognitive schemata and in subsequent stages of information processing, including perception of child signs and behaviors, interpretation of these signs and behaviors, and selection and implementation of parental responses. Further, considering the importance of the dual process models in the research of cognitive processes, we proposed to (b) identify, systematize and discuss the most common implicit measures applied to the study of child abuse and neglect. Moreover, given the importance of parents' schemas to subsequent information processing, and in turn to child abuse and neglect,

we proposed to: (c) map maternal representations about parenting, comparing mothers referred to CPS and mothers with no reference to these services and (d) examine the association of the first SIP components – mothers' preexisting schemata and perceptions of child's signals – to self and hetero-reported child abuse and neglect, using explicit and implicit measures. Additionally, we were interested in (e) exploring the role of intellectual functioning and poverty in social information processing associated with child abuse and neglect. Simultaneously, and to pursue these objectives, we (f) developed implicit measures to evaluate parental cognitions, and (g) conducted validation studies on self-report measures of child abuse and neglect.

Considering the valuable role of knowledge integration to science development (Camilo & Garrido, 2019; Cooper & Hedges, 2009), the first chapter of this thesis presents two review articles. The first is a meta-analytic review of research exploring the role of parents' socio-cognitive variables in shaping child maltreatment (Camilo, Garrido, & Calheiros, 2019a). Our main goal was to examine the effect sizes of the associations between the several stages of the SIP model and child abuse and neglect as well as to explore the potential moderators of these associations. The second study is a systematic review of the implicit measures that have been used in the context of child maltreatment research (Camilo, Garrido, & Calheiros, 2016). In this study we were particularly interested in mapping the implicit measures applied to child abuse and neglect and in discussing the potential of these measures for surpassing some problems of self-report and observational methods typically used in child maltreatment research.

Attending to the important role of parental schemas in maladaptive parental practices (Johnston, Park & Miller, 2018; Sigel & McGillicuddy-DeLisi, 2002), in the second chapter we present two articles that empirically examine mothers' preexisting schemata (Stage 0) associated with child abuse and neglect. The first article presents two studies (N_1 = 70; N_2 = 71) that characterize the semantic organization of the mental representations of mothering and compares the representations held by mothers referred to CPS and non-referred mothers (Camilo, Garrido, Ferreira, & Calheiros, 2019). In the first study, we obtained unconstrained reports of maternal attributes. In the second study, we used a sorting task of those maternal attributes that were analyzed with a multidimensional scaling technique. These studies provided information about the structure and content of maternal schemata, represented in a bottom-up way, and produced stimulus materials for the implicit task included in the subsequent study of this chapter. To further examine the influence of parental schemas, namely attitudes, on the way parents perceive and act

towards their children (Rodriguez et al., 2016), the second paper presented in this chapter was designed to examine the role of explicit and implicit parental attitudes in child abuse and neglect (Camilo, Garrido, & Calheiros, 2019b). To this end mothers (N = 201; half with children referred to CPS and the other half with no referral) completed a measure of explicit parental attitudes and a speed-accuracy task related to parenting. Abuse and neglect were measured with self-report and hetero-report instruments, and mothers' intellectual functioning and socioeconomic status were also considered in the models.

The SIP model suggests that abusive and neglectful parents present deficits, distortions, biases, and errors in their perceptions of children's signals and states (Stage 1) (e.g., McCarthy et al., 2013). The third chapter provides an examination of parents' perceptions of children's signals underlying child abuse and neglect, namely their ability to recognize children's emotions. The first article in that chapter (Prada, Garrido, Camilo, & Rodrigues, 2018) is a validation study of stimuli depicting children's facial expressions. Specifically, we selected a sub-set of photographs from the Child Affective Facial Expression set (CAFE; LoBue & Thrasher, 2015) that were rated across eight subjective dimensions (e.g., attractiveness, familiarity) or regarding the specific facial expression (e.g., intensity, genuineness), as well as a forced-choice emotion recognition task. These photographs were subsequently used as stimulus materials in the emotion recognition tasks included in the second paper of this chapter (Camilo, Garrido, & Calheiros, 2019c). The studies presented in this second paper were specifically designed to examine mothers' (N = 166) ability to recognize children's emotions as a function of their self and hetero-reported abuse and neglect scores. To this end, two different tasks were developed: an implicit valence classification task, evaluating mothers' accuracy and response latencies in classifying the valence of children's emotional expressions as positive or negative, and a categorization task, to assess mothers' ability in labeling children's basic emotions. Abuse and neglect were measured with self-report and hetero-report instruments, and the moderating role of mothers' intellectual functioning and socioeconomic status was also explored.

In the last chapter we present the general discussion. Specifically, this section highlights the main findings across studies, acknowledges and discusses the major limitations of the presented research, and provides some suggestions for future research. This section ends with the discussion of the potential applied contributions, specifying important components of the SIP model that should be addressed in prevention and intervention with maltreating or at-risk parents.

3. REFERENCES

American Professional Society on the Abuse of Children (1995). *Practice guidelines – Psychosocial evaluation of suspected psychological maltreatment in children and adolescents*. Chicago, IL: American Professional Society on the Abuse of Children.

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. doi:10.1016/j.chiabu.2011.05.010

Aspland, H., & Gardner, F. (2003). Observational measures of parent-child interaction: An introductory review. *Child and Adolescent Mental Health, 8*, 136–143. doi:10.1111/1475-3588.00061

Azar, S. T. (2002). Parenting and child maltreatment. In M. H. Bornstein (Ed.), *Handbook of parenting*, Vol. 4. (pp. 361−388). Mahwah, NJ: Lawrence Erlbaum.

Azar, S. T., & Read, K. N. (2009). Parental cognitive disabilities and Child Protection Services: The need for human capacity building. *The Journal of Sociology & Social Welfare, 36*, 127–151.

Azar, S. T., McGuier, D. J., Miller, E. A., Hernandez-Mekonnen, R., & Johnson, D. R. (2017). Child neglect and maternal cross-relational social cognitive and neurocognitive disturbances. *Journal of Family Psychology, 31*, 8–18. doi: 10.1037/fam0000268

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 doing intervention and prevention work. *Journal of Applied Developmental Psychology, 29*, 295−304. doi: 10.1016/j.appdev.2008.04.009

Azar, S. T., Robinson, D. R., Hekimian, E., Twentyman, C. T. (1984). Unrealistic expectations and problem-solving ability in maltreating and comparison mothers. *Journal of Consulting and Clinical Psychology, 52*, 4, 687−691. doi: 10.1037/0022-006X.52.4.687

Azar, S. T., Stevenson, M. T., & Johnson, D. R. (2012). Intellectual disabilities and neglectful parenting: Preliminary findings on the role of cognition in parenting risk. *Journal of Mental Health Research in Intellectual Disabilities, 5*, 94−129. doi: 10.1080/19315864.2011.615460

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. doi: 10.1037/0022-006X.53.3.335

Belsky, J., & Jaffee, S. (2006). The multiple determinants of parenting. In D. Cicchetti & D. Cohen (Eds.), *Developmental psychopathology: Risk, disorder and adaptation* (2nd ed., Vol. 3., pp. 38–85). New York: Wiley.

Belsky, J. (1984). The determinants of parenting: A process model. *Child Development, 55*, 83–96. doi:10.2307/1129836

Bennett, D. S., Sullivan, M. W., & Lewis, M. (2006). Relations of parental report and observation of parenting to maltreatment history. *Child maltreatment, 11*, 63–75. doi:10.1177/1077559505283589

Bywaters, P., Bunting, L., Davidson, G., Hanratty, J., Mason, W., McCartan, C., & Steils, N. (2016). *The relationship between poverty, child abuse and neglect: An evidence review*. York, UK: Joseph Rowntree Foundation.

Calheiros, M. M., Monteiro, M. B., Patrício, J. N., & Carmona, M. (2016). Defining child maltreatment among lay people and community professionals: Exploring consensus in ratings of severity. *Journal of Child and Family Studies, 25*, 2292–2305. doi:10.1007/s10826-016-0385-x

Camilo, C., & Garrido, M. V. (2013). Desenho e avaliação de programas de desenvolvimento de competências parentais para pais negligentes: Uma revisão e reflexão [Design and evaluation of intervention programs for neglectful parents: A review and reflection]. *Análise Psicológica, 31*, 245–268. doi:10.14417/ap.697

Camilo, C., & Garrido, M. V. (2019). A revisão sistemática de literatura em psicologia: Desafios e orientações [Systematic review in Psychology: Challenges and guidelines]. *Análise Psicológica*. *Analise Psicológica, 37*, 535–552. doi:10.14417/ap.1546

Camilo, C., Garrido, M. V., & Calheiros, M. M. (2016). Implicit measures of child abuse and neglect: A systematic review. *Aggression and Violent Behavior, 29*, 43–54. doi: 10.1016/j.avb.2016.06.002

Camilo, C., Garrido, M. V., & Calheiros, M. M (2019a). *The social information processing model in child abuse and neglect: A meta-analytic review*. Manuscript submitted for publication.

Camilo, C., Garrido, M. V., & Calheiros, M. M (2019b). *Parental attitudes in child maltreatment*. Manuscript submitted for publication.

Camilo, C., Garrido, M. V., & Calheiros, M. M (2019c). *Recognizing children's emotions in child abuse and neglect.* Manuscript submitted for publication.

Camilo, C., Garrido, M. V., Ferreira, M. B., & Calheiros, M. M. (2019). How does mothering look like: A multidimensional approach to maternal cognitive representations. *Journal of Family Issues, 40*, 2528–2552. doi:10.1177/0192513X19860171

Caselles, C. E., & Milner, J. S. (2000). Evaluations of child transgressions, disciplinary choices, and expected child compliance in a no-cry and a crying infant condition in physically abusive and comparison mothers. *Child Abuse & Neglect, 24*, 477–491. doi: 10.1016/S0145-2134(00)00115-0

Cicchetti, D., & Manly, J. (2001). Editorial: Operationalizing child maltreatment: Developmental processes and outcomes. *Development and Psychopathology, 13*, 755–757. doi:10.1017/S0954579401004011

Cicchetti, D. & Valentino, K. (2006). An ecological-transactional perspective on child maltreatment: Failure of the average expectable environment and its influence on child development. In D. Cicchetti & D. Cohen (Eds.), *Developmental psychopathology: Risk, disorder and adaptation* (2nd ed., Vol. 3., pp. 129–201). New York: Wiley. doi:10.1002/9780470939406.ch4

Collins, W. A., Maccoby, E. E., Steinberg, L., Hetherington, E. M., & Bornstein, M. H. (2000). Contemporary research on parenting. The case for nature and nurture. *American Psychologist, 55*, 218–32. doi:10.1037/0003-066X.55.2.218

Comissão Nacional de Promoção dos Direitos e Proteção das Crianças e Jovens (2019). *Relatório anual de avaliação da atividade das CPCJ do ano de 2018* [Annual Activity of CPCJ Report 2018]. Lisboa: Comissão Nacional de Promoção dos Direitos e Proteção das Crianças e Jovens. Retrieved from https://www.cnpdpcj.gov.pt/cpcj/relatorios-de-avaliacao-da-atividade-estatistica.aspx

Conder, J., Mirfin-Veitch, B., Sanders, J., & Munford R. (2011). Planned pregnancy, planned parenting: enabling choice for adults with a learning disability. *British Journal of Learning Disabilities, 39*, 105–112. doi:10.1111/j.1468-3156.2010.00625.x

Cooper, H. & Hedges, L. V. (2009). Research synthesis as a scientific process. In H. Cooper, L. V. Hedges, & J. C. Valentine (Eds.). *The handbook of research synthesis and meta-analysis* (2nd ed., pp. 3–16). New York, NY: The Russell Sage Foundation.

Crittenden, P. (1993). An information-processing perspective on the behavior of neglectful parents. *Criminal Justice and Behavior, 20,* 27–48. doi:10.1177/0093854893020001004

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. doi: 10.1016/j.chiabu.2007.11.002

de Haan, W. D., van Berkel, S. R., van der Asdonk, S., Finkenauer, C., Forder, C. J., van IJzendoorn, M. H., … Alink, L. R. A. (2019). Out-of-home placement decisions: How individual characteristics of professionals are reflected in deciding about child protection cases. *Developmental Child Welfare*. doi:10.1177/2516103219887974

Deater-Deckard, K., Wang, Z., Chen, N., & Bell, M. A. (2012). Maternal executive function, harsh parenting, and child conduct problems. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 53*, 1084–1091. doi:10.1111/j.1469-7610.2012.02582.x

Debowska, A., Willmott, D., Boduszek, D., & Jones, A. D. (2017). What do we know about child abuse and neglect patterns of co-occurrence? A systematic review of profiling studies and recommendations for future research. *Child Abuse & Neglect, 70,* 100–111. doi:10.1016/j.chiabu.2017.06.014

Drost, E. A. (2011). Validity and reliability in social science research. *Education Research and Perspectives, 38*, 105–123.

Dubowitz, H., Newton, R. R., Litrownik, A. J., Lewis, T., Briggs, E. C., Thompson, R., … Feerick, M. M. (2005). Examination of a conceptual model of child neglect. *Child Maltreatment, 10,* 173–189. doi:10.1177/1077559505275014

English, D. J., Thompson, R., Graham, J. C., & Briggs, E. C. (2005). Toward a definition of neglect in young children. *Child Maltreatment, 10*, 190–206. doi:10.1177/1077559505275178

Enosh, G., & Bayer-Topilsky, T. (2015). Reasoning and bias: Heuristics in safety assessment and placement decisions for children at risk. *The British Journal of Social Work, 45,* 1771–1787. doi:10.1093/bjsw/bct213

Eyberg, S. M., Nelson, M. M., Duke, M., & Boggs, S. R. (2005). *Manual for the dyadic parent-child interaction coding system* (3rd ed.). Retrieved from http://pcit.phhp.ufl.edu/Measures.htm

Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology, 54,* 297–327. doi:10.1146/annurev.psych.54.101601.145225

Finegood, E. D., Raver, C. C., DeJoseph, M. L., Blair, C. (2017). Parenting in poverty: Attention bias and anxiety interact to predict parents' perceptions of daily parenting hassles. *Journal of Family Psychology, 31,* 51–60. doi: 10.1037/fam0000291

Finkelhor, D., Shattuck, A., Turner, H. A., & Hamby, S. L. (2014). The lifetime prevalence of child sexual abuse and sexual assault assessed in late adolescence. *Journal of Adolescent Health, 55,* 329–333. doi: 10.1016/j.jadohealth.2013.12.026

Forehand, R., & McMahon, R. J. (1981). *Helping the noncompliant child: A clinician's guide to parent training*. New York: Guilford Press.

Gabrielli, J., & Jackson, Y. (2019). Innovative methodological and statistical approaches to the study of child maltreatment: Introduction. *Child Abuse & Neglect, 87,* 1–4. doi:10.1016/j.chiabu.2018.12.001

Gilbert, R., Widom, C. S., Browne, K., Fergusson, D., Webb, E., & Janson, S. (2009). Burden and consequences of child maltreatment in high-income countries. *Lancet, 373,* 68–81. doi:10.1016/S0140-6736(08)61706-7

Gilbert, N., Parton, N., & Skivenes, M. (Eds) (2011). *Child protection systems: International trends and orientations*. New York: Oxford University Press.

Gray, J. (2017). Implications of children's services policy on child abuse and neglect in England. In L. Dixon, D. F. Perkins, C. Hamilton-Giachritsis, & L. A. Craig, *The Wiley handbook of*

what works in child maltreatment: An evidence-based approach to assessment and intervention in child protection (pp. 113–130). West Sussex, UK: John Wiley & Sons.

Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review, 102,* 4–27. doi:10.1037/0033-295x.102.1.4

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. doi:10.1037/0033-295x.109.1.3

Gubbels, J., van der Put, C., & Assink, M. (2019). The effectiveness of parent training programs for child maltreatment and their components: A meta-analysis. *International Journal of Environmental Research and Public Health, 16*. 2404. doi:10.3390/ijerph16132404

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. doi:10.1177/01454455900143003

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. doi:10.1016/j.chiabu.2014.07.004

Jackson, Y., McGuire, A., Tunno, A. M., & Makanui, K. (2019). A reasonably large review of operationalization in child maltreatment research: Assessment approaches and sources of information in youth samples. *Child Abuse & Neglect, 87*, 5–17. doi:10.1016/j.chiabu.2018.09.016

Johnston, C., Belschner, L., Park, J. L., Stewart, K., Noyes, A., & Schaller, M. (2017). Mothers' implicit and explicit attitudes and attributions in relation to self-reported parenting behavior. *Parenting, 17,* 51–72. doi:10.1080/15295192.2016.1184954

Johnston, C., Park, J. L., & Miller, N. V. (2018). Parental cognitions: Relations to parenting and child behavior. In M. R. Sanders & A. Morawska (Eds.), *Handbook of parenting and child development across the lifespan* (pp. 395–414). Switzerland: Springer International Publishing. doi:10.1007/978-3-319-94598-9_17

Kantor, G. K., Holt, M., & Straus, M. A. (2003). *The parent-report Multidimensional Neglectful Behavior Scale.* Unpublished manuscript, Family Research Laboratory, University of New Hampshire, Durham, NH.

Kaufman, J., Jones, B., Stieglitz, E., Vitulano, L., & Mannarino. A. P. (1994). The use of multiple informants to assess children's maltreatment experiences. *Journal of Family Violence, 9*, 227–248. doi:10.1007/BF01531949

Kempe, C. H., Silverman, F. N., Steele, B. F., Droegemueller, W., & Silver, H. K. (1962). The battered-child syndrome. *JAMA, 181*, 17–24. doi:10.1001/jama.1962.03050270019004

Kim, K., Mennen, F., & Trickett, P. K. (2017). Patterns and correlates of co-occurrence among multiple types of child maltreatment. *Child & Family Social Work, 22*, 492– 502. doi:10.1111/cfs.12268

Kim, H., Wildeman, C., Jonson-Reid, M., & Drake, B. (2017). Lifetime prevalence of investigating child maltreatment among US children. *American Journal of Public Health, 107*, 274–280. doi:10.2105/AJPH.2016.303545

Kolko, D. J., Iselin, A. M., & Gully, K. J. (2011). Evaluation of the sustainability and clinical outcome of alternatives for families: A cognitive-behavioral therapy (AF-CBT) in a child protection center. *Child Abuse & Neglect, 35*, 105–116. doi:10.1016/j.chiabu.2010.09.004

Larrance, D.T., & Twentyman, C.T. (1983). Maternal attributions and child abuse. *Journal of Abnormal Psychology, 92*, 449–457. doi:10.1037/0021-843X.92.4.449

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. doi: 10.1016/j.chiabu.2005.11.009

LoBue, V., & Thrasher, C. (2015). The Child Affective Facial Expression (CAFE) set: Validity and reliability from untrained adults. *Frontiers in Psychology, 5*:1532. doi:10.3389/fpsyg.2014.01532

Lundahl, B. W., Nimer, J., & Parsons, B. (2006). Preventing child abuse: A meta-analysis of parent training programs. *Research on Social Work Practice, 16*, 251–262. doi:10.1177/1049731505284391

Maguire, S. A., Williams, B., Naughton, A. M., Cowley, L. E., Tempest, V., Mann, M. K., ... & Kemp, A. M. (2015). A systematic review of the emotional, behavioural and cognitive features exhibited by school-aged children experiencing neglect or emotional abuse. *Child Care Health & Development, 41*, 641–653. doi:10.1111/cch.12227

Mah, J. W. T., & Johnston, C. (2008). Parental social cognitions: Considerations in the acceptability of and engagement in behavioral parent training. *Clinical Child and Family Psychology Review, 11*, 218–236. doi:10.1007/s10567-008-0038-8

Mani, A., Mullainathan, S., Shafir, E., Zhao, J. (2013). Poverty impede cognitive function. *Science, 341,* 976–980. doi:10.1126/science.1238041

McCarthy, R., 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. doi:10.1016/j.chiabu.2013.05.003

McConnell, D., Feldman, M., Aunos, M., & Prasad, N. (2011). Parental cognitive impairment and child maltreatment in Canada. *Child Abuse & Neglect, 35*, 621–32. doi:10.1016/j.chiabu.2011.04.005.

McCoy. M. L., & Keen, S. M. (2014). *Child abuse and neglect* (2ed.). New York, NY: Psychology Press.

Mennen, F. E., Kim, K., Sang, J., & Trickett, P. K. (2010). Child neglect: Definition and identification of youth's experiences in official reports of maltreatment. *Child Abuse & Neglect, 34*, 647–658. doi:10.1016/j.chiabu.2010.02.007

Mikton, C., & Butchart, A. (2009). Child maltreatment prevention: A systematic review of reviews. *Bulletin of the World Health Organization, 87*, 353–361. doi:10.2471/blt.08.057075

Miller-Perrin, C. L., & Perrin, R. D. (2013). *Child maltreatment: An introduction* (2ed.). Thousand Oaks, CA: SAGE Publications.

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

Milner, J. S. (1993). Social information processing and physical child abuse. *Clinical Psychology Review, 13*, 275-294. doi: 10.1016/0272-7358(93)90024-G

Milner, J. (2003). Social information processing in high-risk and physically abusive parents. *Child Abuse & Neglect, 27*, 7–20. doi:10.1016/s0145-2134(02)00506-9

Mulder, T. M., Kuiper, K. C., van der Put, C. E., Stams, G. J. M., & Assink, M. (2018). Risk factors for child neglect: A meta-analytic review. *Child Abuse & Neglect*, *77*,198–210. doi:10.1016/j.chiabu.2018.01.006

Munro, E. (2011). *The Munro Review of Child Protection: Final Report – A child-centred system*. UK: Department for Education. Retrieved from https://www.gov.uk/government/publications/munro-review-of-child-protection-final-report-a-child-centred-system

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, and a framework for research* (pp. 233–253). Baltimore, MD: Paul H. Brookes.

Prada, M., Garrido, M. V., Camilo, C., & Rodrigues, D. L. (2018). Subjective ratings and emotional recognition of children's facial expressions from the CAFE set. *PLoS ONE 13(12)*: e0209644. doi:10.1371/journal.pone.0209644

Radford, L., Glaser, D., & MacMillan, H. L. (2009). Recognizing and responding to child maltreatment. *The Lancet, 373*, 167–180. doi:10.1016/S0140-6736(08)61707-9

Raman, S. and Hodes, D. (2012), Cultural issues in child maltreatment. *Journal of Paediatrics and Child Health, 48,* 30–37. doi:10.1111/j.1440-1754.2011.02184.x

Reijman, S., Alink, L. R. A., Compier-de Block, L. H. C. G., Werner, C. D., Maras, A., Rijnberk, C. … Bakermans-Kranenburg, M. J. (2014). Autonomic reactivity to infant crying in maltreating mothers. *Child Maltreatment, 19*, 101–112. doi:10.1177/1077559514538115

Rodrigo, M. J., León, I., Quiñones, I., Lage, A., Byrne, S., & Bobes, M. A. (2011). Brain and personality bases of insensitivity to infant cues in neglectful mothers: An event-related potential study. *Development and Psychopathology*, *23*, 163–176. doi:10.1017/S0954579410000714

Rodriguez, C. M. (2018). Predicting parent-child aggression risk: Cognitive factors and their interaction with anger. *Journal of Interpersonal Violence, 33*, 359–378. doi:10.1177/0886260516629386

Rodriguez, C. M., Russa, M. B., & Harmon, N. (2011). Assessing abuse risk beyond self-report: analog task of acceptability of parent-child aggression. *Child Abuse & Neglect, 35*, 199–209. doi:10.1016/j.chiabu.2010.12.004.

Rodriguez, C. M., Smith, T. L., & Silvia, P. J. (2016). Multimethod prediction of physical parent-child aggression risk in expectant mothers and fathers with social information processing theory. *Child Abuse & Neglect, 51*, 106-119. doi: 10.1016/j.chiabu.2015.10.028

Sanders, M. R., & Turner, K. M. (2018). The importance of parenting in influencing the lives of children. In M. R. Sanders & A. Morawska (Eds.), *Handbook of parenting and child development across the lifespan* (pp. 3–26). Cham, Switzerland: Springer.

Schmidt, A. F., Banse, R., & Imhoff, R. (2015). Indirect Measures in Forensic Contexts. In T. M. Ortner & F. J. R. van de Vijver (Eds.). *Behavior-based assessment in Psychology: Going beyond self-report in the personality, affective, motivation, and social domains* (pp. 173–194). Göttingen: Hogrefe.

Shah, A., Mullainathan, S., & Shafir, E. (2012). Some consequences of having too little. *Science, 338*, 682-685. doi:10.1126/science.1222426

Shonkoff, J. P., Garner, A. S., Siegel, B. S., Dobbins, M. I., Earls, M. F., McGuinn, L., & Wood, D. L. (2012). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics, 129*, e232–e246. doi:10.1542/peds.2011-2663

Sigel, I. E., & McGillicuddy-De Lisi, A. V. (2002). Parent beliefs are cognitions: The dynamic belief systems model. In M. H. Bornstein (Ed.), *Handbook of parenting: Being and becoming a parent*, vol. 3 (pp. 485-508). Mahwah, NJ: Lawrence Erlbaum.

Stith, M. S., Liu, T. L., Davies, C., Boykin, E. L., Alder, M. C., Harris, J. F., ... Dees, J. E. M. E. G. (2009). Risk factors in child maltreatment: A meta-analytic review of the literature. *Aggression and Violent Behavior, 14*, 13–29. doi:10.1016/j.avb.2006.03.006

Stoltenborgh, M., Bakermans-Kranenburg, M. J., Alink, L. R. A., & van IJzendoorn, M. H. (2015). The prevalence of child maltreatment across the globe: Review of a series of meta-analyses. *Child Abuse Review, 24*, 37–50. doi:10.1002/car.2353

Stowman, S. A., & Donohue, B. (2005). Assessing child neglect: A review of standardized measures. *Aggression and Violent Behavior, 10*, 491–512. doi:10.1016/j.avb.2004.08.001

Straus, M. A., Hamby, S. L., Finkelhor, D., Moore, D. W., & Runyan, D. (1998). Identification of child maltreatment with the parent-child Conflict Tactics Scales: Development and psychometric data for a national sample of American parents. *Child Abuse & Neglect, 22*, 249–270. doi:10.1016/s0145-2134(97)00174-9

Taraban, L., & Shaw, D. S. (2018). Parenting in context: Revisiting Belsky's classic process of parenting model in early childhood. *Developmental Review, 48*, 55–81. doi:10.1016/j.dr.2018.03.006

Toth, S., Sturge-Apple, M., Rogosch, F., & Cicchetti, D. (2015). Mechanisms of change: Testing how preventative interventions impact psychological and physiological stress functioning in mothers in neglectful families. *Development and Psychopathology, 27*, 1661–1674. doi:10.1017/S0954579415001017

U.S. Department of Health & Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau. (2019). *Child Maltreatment 2017*. Retrieved from https://www.acf.hhs.gov/cb/research-data-technology/statistics-research/child-maltreatment.

van der Put, C. E., Assink, M., Gubbels, J., & Boekhout van Solinge, N. F. (2018). Identifying effective components of child maltreatment interventions: A meta-analysis. *Clinical Child and Family Psychology Review, 21*, 171–202. doi:10.1007/s10567-017-0250-5

Warmingham, J. M., Handley, E. D., Rogosch, F. A., Manly, J. T., & Cicchetti, D. (2018). Identifying maltreatment subgroups with patterns of maltreatment subtype and chronicity: A latent class analysis approach. *Child Abuse & Neglect, 87*, 28–39. doi:10.1016/j.chiabu.2018.08.013

Wilson, S. R., Rack, J. J., Shi, X., & Norris, A. M. (2008). Comparing physically abusive, neglectful, and non-maltreating parents during interactions with their children: A meta-

analysis of observational studies. *Child Abuse & Neglect, 32*, 897–911. doi:10.1016/j.chiabu.2008.01.003

Wolfe, D. A., & McIsaac, C. (2011). Distinguishing between poor/dysfunctional parenting and child emotional maltreatment. *Child Abuse & Neglect, 35*, 802–813. doi:10.1016/j.chiabu.2010.12.009

World Health Organization (1999). *Report of the consultation on child abuse prevention*. Geneva, Switzerland: World Health Organization. Retrieved from https://apps.who.int/iris/handle/10665/65900

World Health Organization (2002). *World report on violence and health*. Geneva, Switzerland: World Health Organization. Retrieved from https://www.who.int/violence_injury_prevention/violence/world_report/en/

CHAPTER I.

RESEARCH ON PARENTS' COGNITIVE INFORMATION PROCESSING IN CHILD ABUSE AND NEGLECT

The SIP model applied to child abuse and neglect (Crittenden, 1993; Milner, 1993, 2003) has been documented in a body of research acknowledging different socio-cognitive parental variables that influence parental caregiving behaviors. Studies have been exploring parents' preexisting schemata, prior to the processing of new information (e.g., Azar, McGuier, Miller, Hernandez-Mekonnen, & Johnson, 2017), as well as the three cognitive stages of information processing proposed in the model – parents' perceptions (e.g., Asla, de Paul, & Perez-Albeniz, 2011) and interpretations (e.g., Azar, Stevenson, & Johnson, 2012) of child signals, and selection of a parental response (e.g., Rodriguez, Smith, & Silvia, 2016). However, the difficulties associated with the definition of "cognitions", the heterogeneity of the measures used, and sometimes the mixed results obtained make it challenging to discern the magnitude of the effects, and especially how they occur in the different stages. This scenario supported the need to summarize the research about the parental cognitions associated with child abuse and neglect. Thus, in first paper we conducted a meta-analysis based on the cognitive-stages of the SIP in order to identify the specific association of each stage with child maltreatment. Supplementary material for this study - included studies and main characteristics, flow diagram, coding scheme, classification of SIP cognitive stages, and references included in the meta-analyses – is presented in Appendix A.

Regarding the design and the methods, research conducted on the SIP model of child abuse and neglect has been anchored on the theoretical frameworks of social cognition and on its more experimental paradigms and methodologies. In the approach to cognition, this framework has emphasized the consideration of dual process models, suggesting that cognitive processing operates at implicit and explicit levels (e.g., Evans, 2008). These models have been employed in the research on maladaptive parental cognitions, attempting to access the implicit and unconscious processes behind parental abusive and neglectful behaviors. In addition, as noted earlier, explicit self-report measures are more prone to reporting bias, particularly in contexts of maltreatment. In the second paper of this chapter, we present a systematic review in order to identify, systematize and discuss the implicit measures applied to the study of child abuse and neglect and to discuss such studies in light of the criteria and recommendations for the use of implicit measures identified in the literature (e.g., De Houwer, 2006).

Systematic literature reviews and meta-analyses are a valuable method for clarifying large bodies of information on a particular topic, summarizing accumulated research, and assessing the

robustness of their findings (Cooper & Hedges, 2009). Thus, given the importance that systematic literature reviews and meta-analyses have in the accumulation and dissemination of knowledge, this chapter aims to provide a comprehensive review of empirical evidence on the topic through structured methodologies.

References:

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. doi:10.1016/j.chiabu.2011.05.010

Azar, S. T., McGuier, D. J., Miller, E. A., Hernandez-Mekonnen, R., & Johnson, D. R. (2017). Child neglect and maternal cross-relational social cognitive and neurocognitive disturbances. *Journal of Family Psychology, 31*, 8–18. doi:10.1037/fam0000268

Azar, S. T., Stevenson, M. T., & Johnson, D. R. (2012). Intellectual disabilities and neglectful parenting: Preliminary findings on the role of cognition in parenting risk. *Journal of Mental Health Research in Intellectual Disabilities, 5*, 94-129. doi:10.1080/19315864.2011.615460

Cooper, H. & Hedges, L. V. (2009). Research synthesis as a scientific process. In H. Cooper, L. V. Hedges, & J. C. Valentine (Eds.). *The handbook of research synthesis and meta-analysis* (2nd ed., pp. 3-16). New York, NY: The Russell Sage Foundation.

Crittenden, P. (1993). An information-processing perspective on the behavior of neglectful parents. *Criminal Justice and Behavior, 20*, 27–48. doi:10.1177/0093854893020001004

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.

Evans, J. (2008). Dual-processing accounts of reasoning, judgment, and social cognition. *Annual Review of Psychology, 59*, 255–278. doi:10.1146/annurev.psych.59.103006.093629

Milner, J. S. (1993). Social information processing and physical child abuse. *Clinical Psychology Review, 13*, 275-294. doi:10.1016/0272-7358(93)90024-G

Milner, J. (2003). Social information processing in high-risk and physically abusive parents. *Child Abuse & Neglect, 27*, 7–20. doi:10.1016/s0145-2134(02)00506-9

Rodriguez, C. M., Smith, T. L., & Silvia, P. J. (2016). Multimethod prediction of physical parent-child aggression risk in expectant mothers and fathers with social information processing theory. *Child Abuse & Neglect, 51*, 106–119. doi:10.1016/j.chiabu.2015.10.028

1. THE SOCIAL INFORMATION PROCESSING MODEL IN CHILD ABUSE AND NEGLECT: A META-ANALYTIC REVIEW [1]

Abstract

Background: Child maltreatment has been recently examined from a cognitive-behavioral perspective. The Social Information Processing (SIP) model specifies how parental cognitions can be associated with child abuse and neglect and suggests that maltreating parents do not respond to the child's needs adequately due to errors/bias in the cognitive processing of child-related information.

Objective: This study provides a meta-analytic review of research exploring the role of parents' socio-cognitive variables in shaping child maltreatment, identifying the association of each SIP stage to child maltreatment.

Method: After a four-phase systematic literature search based in PRISMA with inter-judges' agreement, 146 effect sizes were extracted from the 61 studies selected.

Results: Overall, the effect sizes of the four cognitive stages of the model were significant and presented a small to medium magnitude: preexisting cognitive schemata (r = .246, $p < .001$), perception of child signals (r = .316, $p < .001$), interpretation of child signals (r = .189, $p < .001$), and information integration and response selection (r = .215, $p < .001$). Differences between abuse and neglect were also explored, as well as other moderator variables.

Conclusions: The results of these meta-analyses support the general hypothesis that abusive and neglectful parents may incur in biases or errors in processing child-related information during parent-child interactions. Theoretically this work is likely to provide a more solid framework to understand parental cognitions underlying child maltreatment, with potential implications for prevention, evaluation and intervention with maltreating or at-risk parents.

Keywords: parental cognitions; information processing; child abuse and neglect; meta-analysis

[1] Camilo, C., Garrido, M. V., & Calheiros, M. M. (*under review*). The social information processing model in child abuse and neglect: A meta-analytic review.

Introduction

Parenting is one of the most complex and challenging human tasks (Kane, 2005), which is shaped by a set of biological processes, personality attributes, actual or perceived characteristics of the children, and contextual influences such as social situational factors, family background, socioeconomic status, and culture (Belsky & Jaffee, 2015; Bornstein, 2016; Taraban & Shaw, 2018). Nonetheless, when these sub-systems are compromised, the likelihood of maladaptive parenting in the form of child maltreatment increases (Belsky & Jaffee, 2015; Cicchetti & Valentino, 2015).

Data from child protection services (CPS) and prevalence studies have documented the high number of children who are victims of abuse and neglect (e.g., Jud, 2018). Moreover, the immediate and long-term impact of child maltreatment for the children are well known, with serious consequences for their development (Jaffee & Maikovich-Fong, 2011), for their families and communities (e.g., Radford, Corral, Bradley, & Fisher, 2013).

The multitude of variables contributing to child maltreatment has for a long time been well captured by ecological models of parenting (e.g., Cicchetti & Valentino, 2015; MacKenzie, Kotch, & Lee, 2011) emphasizing the importance of addressing the several systems that influence parental behaviors. Despite the popularity of these models, recent socio-cognitive approaches to parenting have also been emphasizing the role of cognitive information processing mechanisms in determining parental behaviors towards children (e.g., Johnston, Park, & Miller, 2018; Mah & Johnston, 2008; Sigel & McGillicuddy-DeLisi, 2002), including those related to maladaptive parenting such as child abuse and neglect (e.g., Azar, Reitz, & Goslin, 2008; Calheiros & Rodrigues, 2016; Crittenden, 1993; Crouch & Milner, 2005; Milner, 2003). According to these models, and along the parenting continuum, maladaptive parenting can occur as a product of less complex and more rigid cognitions that under certain conditions, may impact parent-child interactions (Azar, 2002). Other researchers have been specifically exploring differences between abusive or neglectful parents regarding their beliefs (e.g., McElroy & Rodriguez, 2008), attitudes (e.g., Slep & O'Leary, 2007), expectations (e.g., Azar, Stevenson, Johnson, 2012), evaluations of wrongness (e.g., De Paúl, Asla, Pérez-Albéniz, & Cádiz, 2006), or power schemas (e.g., Bugental, Lewis, Lin, Lyon, & Kopeikin, 2000).

Parental cognitions are defined as “the logic of thinking” about parenting and the parent-child relationship (Newberger & Cook, 1983) and may combine: (a) attitudes, as an individual's predisposition, reaction to, or affective evaluation of some situation (e.g., “A good mother should shelter her child from life's little difficulties”); (b) behavioral intentions, defined as inclination toward specific behavioral practices (e.g., “When I am angry with my child, I let him/her know it”); (c) descriptive beliefs, namely expectations about children, their characteristics and developmental timetables (e.g., “Most children are toilet trained by 15 months of age"); (d) instrumental beliefs, specified as ideas about how to achieve certain goals, based on their own experience with children or as a child (e.g., “Holding and caressing a baby when he/she cries is good for him/her”); (e) self-perceptions, defined as parents’ feelings about parenting and their children (e.g., “I find some of my greatest satisfactions in my child”); and (f) values, that is, abstract goals or a coherent set of attitudes toward a specific domain (e.g., “Loyalty to parents comes before anything else”) (for a detailed review see Holden & Edwards, 1989).

Research exploring parental cognitions has reported promising results in the explanation of maladaptive parental behaviors. For example, parenting goals, related to the values desired for children (such as obedience, respect for others, and independence), when centered on the parent, are more likely associated with punishment; when centered on the child, are more associated with reasoning; whereas relationship goals are more associated with negotiation, compromise or acceptance (e.g., Hastings & Grusec, 1998). When studying parental self-efficacy (i.e., beliefs about own abilities), some authors (e.g., Teti & Gelfand, 1991) reported that mothers with low self-efficacy were more cold, unemotional, and disengaged, less responsive to their child’ signals, and more hostile and angry toward the child. Other studies focusing on parental attributions (e.g., Crouch et al., 2017) reported, for example, that higher levels of hostile attributions such as attributing child misbehavior more to child’s intentionality (vs. to the environment; locus), to fixed characteristics of the child (vs. variable; stability), and to the lack children’s effort (vs. lack of will; controllability), were associated with increased likelihood of harsh parenting practices. The examination of parental power schemas (e.g., Bugental et al., 2000), that is, the perceptions of control that parents have over their own behavior and the behavior of their children, indicates that mothers with low power schemas, when faced with a difficult child, present impaired information-processing abilities, and display pessimistic thinking. Some of these cognitions are controlled,

explicit and voluntary, and others are automatic, implicit, relatively inflexible, and influenced by implicit schemas, external factors or past experiences (e.g., Rudy & Grusec, 2006).

Critically, recent meta-analyses emphasize the strength of these associations between parental cognitions and child maltreatment. For example, a meta-analytic review about the risk factors of child maltreatment (Stith et al., 2009) identified parents' perceptions about the child as an important risk factor for abuse and neglect.

Although different theoretical approaches have long explored parental cognitions as a source of parental behaviors, as, for example, the research about internal working models examined within attachment theory frameworks (Mayseless, 2006), socio-cognitive models have been gaining a prominent role in explaining maladaptive parenting. During the 1980's, the seminal work by Sigel started to conceptualize the parent-child relationship research with marked emphasis on cognitive processes and information processing (Sigel, McGillicuddy-DeLisi, & Goodnow, 1992), which inspired subsequent work following this approach.

For example, Larrance and Twentyman (1983) proposed a four-stage model of child abuse, focused on parental cognitive structures, the parent-child social interactional system, and parenting behaviors. Stage 1 involves inappropriate parental expectations for the child; in stage 2, the child cannot conform to the parental expectations due to its inappropriateness for the child's age or behavioral abilities; in stage 3, the parent interprets this inability of the child as intentional acts of disobedience; and in stage 4, the parent disciplines the child in an aggressive manner in order to produce obedience and compliance.

The cognitive-behavioral model applied to parenting advanced by Azar (e.g., Azar et al., 2008) further developed these approaches applied to child maltreatment. This model proposed the idea that parental responses are influenced by three critical cognitive elements: parental schema, executive functioning, and appraisals and attributions as products of the former, in interaction with contextual factors (such as culture, social support, neighborhood) and child and partner characteristics. In the presence of a stimulus event (childrearing situations), the parental schema is activated, acting as a filter that determines the environmental cues to which the parent attends. The parental schema can be child-relevant (goals and expectations) or self-relevant (parental self-efficacy and perceptions of dominance), may be rigid or flexible, and can be more or less complex and differentiating (Azar et al., 2008). Then parental executive functioning capacities like

problem-solving, strategy shifting, and perspective taking are triggered, and products are generated, namely appraisals and attributions. This model states that when parents' cognitive capacities are compromised, and they also have difficult children or live in difficult environments, their parental functioning is further at risk (Azar et al., 2008).

In the context of child abuse, Milner (1993, 2003) proposed a four-stage Social Information Processing (SIP) model to examine parental cognitions associated with physical maltreatment. In the same year, Crittenden (1993) extended this approach to child neglect, proposing that neglectful parents cannot adequately respond to their child's needs because of errors or biases in information processing, particularly for information related to the child.

Overall, the SIP framework suggests that parents hold pre-existing cognitive schemas, including beliefs and values that influence the way they perceive and behave towards their children, that act as a filter for the next three cognitive stages – perception and interpretation of the child's signals, response selection, and a final cognitive-behavioral stage where the response is implemented (abusive or neglectful behaviors) (Milner, 1993, 2003). According to the SIP model, preexisting schemata are information structures, prior to the processing of new information, that can be global (related to all children) or specific (related to their own children), theory-driven (based on preexisting beliefs) or context-driven (impacted by situational variables). High-risk and abusive parents are more likely to hold more inaccurate and biased preexisting cognitive schemata, such as beliefs about childrearing, child-related expectations, and self-efficacy and control expectancies (e.g., Azar, McGuier, Miller, Hernandez-Mekonnen, & Johnson, 2017; Hiraoka et al., 2014). Subsequently, the first stage of information processing consists of the perception of the child's signals, suggesting that high-risk and abusive parents show more errors and biases in attending to and encoding the child's behavior (e.g., McCarthy et al., 2013; Asla, de Paul, & Perez-Albeniz, 2011). In stage 2, parents interpret and evaluate the child's signal, and high-risk and abusive parents are more likely to display negative and biased judgments about their children, to interpret behaviors as more negative, wrong, and blameworthy, and to attribute them to internal, stable, and global child factors, motivated by hostile intent (e.g., Azar et al., 2012; Rodriguez, 2018). In the third stage of the model, parents are expected to integrate the information and select a response. High-risk and abusive parents are more likely to show more errors in the integration of child-related information, and their response selection process will be limited by their poor repertoire of parental responses (parenting skills) (e.g., Caselles & Milner, 2000; Rodriguez,

Smith, & Silvia, 2016). Finally, in the fourth response implementation and monitoring stage, high-risk and abusive parents are theorized to have less developed skills to implement adequate responses or to monitor and modify their response when necessary. The SIP stages are believed to influence each other in a bidirectional way, and are moderated by experiences of negative affect and high levels of distress (Milner, 1993, 2003). In the last decades, the SIP model or its components has been systematically used in the context of maltreatment research, examining different socio-cognitive variables, using explicit or implicit measures and more experimental or correlational designs. Recent research has also been exploring the model as a whole, and applying longitudinal methods (e.g., Rodriguez, Silvia, & Gaskin, 2019).

Despite the promising findings of the research exploring social cognition of parenting, there are still inconsistent results across studies, possibly due to the difficulties associated with the definition of different "cognitions" (Holden & Buck, 2002) or the automaticity of cognitions that require the use of more sophisticated research methods (Camilo, Garrido, & Calheiros, 2016). Nevertheless, socio-cognitive variables associated with effective parenting have been used to inform many of the existing intervention programs for maltreating parents (Azar, 2002).

In an attempt to summarize the research about the parental cognitions associated with child abuse and neglect, we conducted a set of meta-analyses based on the cognitive stages of the SIP model. Specifically, we aimed to identify the association of each SIP stage to child maltreatment. Additionally, we mapped the main characteristics of the studies, namely the sample, type of maltreatment, type of measures used to assess the socio-cognitive variables and maltreatment, country of data collection, and publication year, examining their moderation effects in the association between parental cognitions and child maltreatment.

Method

Search strategy and study selection

A systematic electronic search was conducted during November 2018, in seven databases, namely Academic Search Complete, ERIC, PsycARTICLES, PsycINFO, Psychology and Behavioral Sciences Collection, Scopus and Web of Science, restricted to articles published in academic journals and English, Portuguese and Spanish languages. The studies were identified

using all possible combinations of the following groups of search terms: (a) child abuse OR child neglect OR child maltreatment; AND (b) cognitive processes" OR "information processing" OR "sip model" OR cognitions; AND (c) parent*. Additionally, a hand search was performed on the references of the relevant papers and previous reviews of the literature on this subject (e.g., Milner, 2003).

Studies were considered for this meta-analysis if they met a set of inclusion criteria: (1) empirical and quantitative studies; (2) adult participants, with 18 years or older, parents or non-parents; (3) evaluated, as independent variables, socio-cognitive factors related to parenting and child-rearing underlying the SIP model of maladaptive parenting (according to Milner, 1993, 2003); (4) evaluated, as dependent variables, child abuse or child neglect perpetration, referred to CPS or assessed through parental reports.

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. Title and abstract screening were conducted by two independent judges in order to obtain inter-judges agreement, using the software Rayyan QCRI (Ouzzani, Hammady, Fedorowicz, & Elmagarmid, 2016). Each rater screened all the articles identified (91.4% of agreement), and all disagreements were solved by a third element. From the 1013 articles initially identified, 61 were selected and included in the meta-analysis (see Appendix B).

Coding of the studies

Based on the guidelines proposed by Lipsey and Wilson (2001), we created a form for coding the main study characteristics, their results and the specific data required to calculate the effect sizes (see Appendix C). Specifically, the following information was extracted: bibliographical information (authors, title, year of publication), sample characteristics (type of participants, type of sample, age-range of the children, sample size), study characteristics (country in which the study was conducted, design, assessment context), information about variables (type of maltreatment, measures of maltreatment, socio-cognitive variables evaluated, social information processing stage, measures of the socio-cognitive variables), main results, and the respective effect sizes. The effect sizes that were not reported in primary studies were calculated using statistical information derived from the reported statistics. Some of the variables were coded for descriptive purposes or

to be tested as potential moderators. Additionally, based on Milner's proposal (1993, 2003), the socio-cognitive variables were classified according to the five stages of the SIP model (see Appendix D).

Calculation of effect sizes

To quantify the effect of parental socio-cognitive factors in the explanation of child abuse and neglect, we calculated the Pearson product-moment correlation coefficient (r) for each association between a socio-cognitive variable (e.g., errors in emotions recognition, deficits in problem-solving skills) and a variable of child abuse and neglect (e.g., CPS records, parental practices evaluation) that could be extracted from the primary studies. Pearson's product moment correlation coefficient (r) was chosen as the effect size because almost all of the primary studies included were correlational studies, and because correlations are readily interpretable in terms of practical importance (Field, 2005; Rosenthal & DiMatteo, 2001). Moreover, correlations can be easily computed from chi-square, t, F, and d values (Hunter & Schmidt, 2004), which proved to be helpful to transform the remaining statistics reported in primary studies (e.g., means, standard deviations, and odds-ratios).

Study-specific data were transformed into correlation coefficients using the methods and formulas proposed by Lipsey and Wilson (2001), and by Borenstein, Hegdes, Higgins and Rothstein (2009). Effect sizes were calculated using the results of bivariate analyses. Multivariate results such as adjusted means or adjusted odds-ratios were not considered since they do not display a direct association between two variables. We selected this approach, since different scholars rarely use the same set of covariates. This means that combining and comparing differentially adjusted effect sizes would limit the ability to properly estimate a true overall effect (see Mulder et al., 2018).

When the correlation coefficient is chosen as effect size, multiple scholars advise transforming correlations into normally distributed Fisher's z-values prior to conducting the statistical analyses in meta-analytic research. Correlations are not normally distributed, and this may negatively affect the results of the analyses (e.g., Cooper, 2010; Lipsey & Wilson, 2001). Therefore, all correlation coefficients were transformed into Fisher's z-scores prior to conducting the analyses. After the analyses, Fisher's z-scores were transformed back to correlations in order to enhance the interpretability of the results. In the present study, effect sizes of $r > .100$ were

interpreted as small, r >.243 as medium, and r > .371 as large (Rice & Harris, 2005). The direction of each effect size (either positive or negative) matched the statistical data as reported in the primary study.

Analyses plan

The primary studies included in the current review were treated as a random sample from a larger population of studies, and therefore, in the statistical analyses, a random-effect-approach was applied (see for example Mulder et al., 2018). In estimating the parameters in the model, the restricted maximum likelihood-method was used. All the analyses were conducted in JASP (Version 0.9, JASP Team, 2018).

The majority of the included studies reported multiple socio-cognitive variables or multiple types of child maltreatment, meaning that in many cases, multiple effect sizes could be extracted from one primary study. In cases where separate effect sizes were reported for similar variables (e.g., different dimensions of the same scale), the effect sizes were averaged to produce one effect size from the same study (Lipsey & Wilson, 2001).

Publication bias, that is, the inclusion of studies that only present significant results, was assessed by means of funnel plots, Egger tests (Sterne, Becker, & Egger, 2005; Sterne and Egger, 2005), and the Fail Safe N method (Rosenthal, 1979). Egger bias scores that differ significantly from zero indicate asymmetry in the funnel plot suggesting publication bias, and this was the case for stage 0 (Bias = 3.54, $p < .001$), but not for stage 1 (Bias = 0.98, $p = .330$), stage 2 (Bias = 1.68, $p = .093$), and stage 3 (Bias = 1.57, $p = .117$). Because of the asymmetry diagnosed in stage 0, the Fail Safe N (Rosenthal, 1979) was calculated, indicating that 8,405 additional studies with null effects would be required to increase the p-value of the overall effect size to greater than .05, thus suggesting that the effect size of stage 0 is reliable.

Additionally, we examined a selective number of potential moderating variables in each cognitive stage, which according to the literature can influence the reported association between parental cognitions and child maltreatment (e.g., Hambrick, Tunno, Gabrielli, Jackson, & Belz, 2014; Lau, Valeri, McCarty, & Weisz, 2006). Prior to the moderator analyses, dummy variables were created for each category of all discrete variables and continuous variables were centered around their mean. The moderators tested include the type of sample (community-based / referred to CPS sample), type of maltreatment (abuse / neglect), and type of measure of maltreatment (CPS

records / self-report), type of measure of the socio-cognitive variables (implicit / self-report), country of data collection (USA / Europe / other), and publication year.

Results

Descriptives

The present review analyzed a total of K = 61 articles and 146 effect sizes (see Appendix A). Most studies were conducted in the USA (k = 40), followed by Europe (k = 14), and Canada (4), and single studies were conducted in Australia (k = 1) and China (k = 1). The 61 studies included were published between 1978 and 2018, although most (k = 41) were published after 2000.

The samples sizes of the included studies ranged from n = 20 to n = 1,596, and included mostly mothers (k = 34) or mothers and fathers (k = 20), and a few studies included non-parents (k = 7). Samples were coded into referred to CPS-samples (k = 32), or community-based samples (k = 29).

Regarding the type of maltreatment, the majority of studies analyzed physical and/or psychological abuse (k = 57) and a smaller number of studies explored neglect (k = 10). Child maltreatment was assessed mostly through self-report measures (k = 36) or CPS records (k = 26).

Socio-cognitive variables were coded into the four-SIP stages, with the majority of studies analyzing stage 0 variables (k = 39), followed by stage 2 variables (k = 25), and finally stage 1 (k = 19) and stage 3 (k = 19). Stage 0 variables – *parents' pre-existing schemata* – included unrealistic expectations about the child's development (k = 17), lack of empathy (k = 15), negative affect (k = 11), value of physical punishment (k = 10), external locus of control (k = 6), hyperreactivity to child-related stimuli (k = 3), and accessibility of negative schemata (k = 2). Stage 1 variables – *parents' perceptions* – included errors in encoding child's behavior (k = 14), in recognizing child's emotions (k = 6) and intolerance towards children's behavior (k = 1). Stage 2 variables – *parents' interpretations and evaluations* – included general negative attributions (k = 13), attributions of negative intent (k = 7), evaluations of wrongness (k = 7), expectations of child compliance (k = 4), attributions of controllability (k = 3), errors in interpreting children's behavior (k = 2) and attributions of internality (k = 1). Stage 3 variables – *parents' information integration and response*

selection – included lack of adequate parenting techniques (k = 14), deficits in problem-solving skills (k = 7), inadequate appraisals of the appropriateness of disciplinary choices (k = 2), and inadequate disciplinary goals (k = 1).

Meta-analyses

Stage 0. Thirty-nine studies involving 64 different effect sizes examined the relationship between caregiver preexisting cognitive schemata and child maltreatment. The meta-analysis yielded a medium and significant overall effect size (r = .246, p < .001), which indicated that parental beliefs and attitudes, as well as personal-specific schemata partly explain maladaptive parenting practices (Table 1).

The test for residual heterogeneity indicated heterogeneity of the effect sizes and the need to test for moderators, ($Q(63)$ = 300.74, p < .001; I^2 = 86.71%, 95% CI: 82.16% and 92.29%). The type of measure of maltreatment was the only variable tested in the moderator analysis (Table 2) that yielded a significant effect (p = .031), suggesting that the influence of stage 0 parental cognitions in child maltreatment presents larger effects when maltreatment is evaluated through CPS records (r = .341) than when evaluated with self-report measures (r = .209).

Table 1.

Results for the overall mean effect sizes of the SIP cognitive stages.

SIP Stage	# Studies	# ES	Fisher's *z* (SE)	95% CI	Sig. mean z (*p*)	Mean *r*
Stage 0	39	64	.251 (.032)	0.189, 0.313	***	.246
Stage 1	19	21	.327 (.043)	0.242, 0.411	***	.316
Stage 2	25	37	.191 (.030)	0.134, 0.249	***	.189
Stage 3	19	24	.218 (.049)	0.122, 0.314	***	.215

Note. # Studies = number of studies; # ES = number of effect sizes; SE = standard error; CI = confidence interval for Fisher's *z*; Sig. mean *z* = level of significance of mean effect size; Mean *r* = mean effect size (Pearson's correlation).
*** p < .001

Stage 1. Nineteen studies involving 21 different effect sizes examined the relationship between the perception of child signals and maltreatment. The meta-analysis yielded a medium

and significant overall effect size (r = .316, p < .001), which indicated that parental attentional processes partly explain maltreating parenting (Table 1).

The test for residual heterogeneity indicated heterogeneity of the effect sizes and the need to test for moderators (Q(20) = 51.29, p < .001; I^2 = 59.57%, 95% CI: 28.87% and 83.87%), but none of the variables tested in the moderator analysis (Table 2) yielded a significant effect.

Stage 2. Twenty-five studies involving 37 different effect sizes examined the relationship between the second cognitive stage of caregiving information processing – interpretation of child signals and maltreatment. The meta-analysis yielded a small but significant overall effect size (r = .189, p < .001), which indicated that parental interpretations and evaluations about the child and his/her behavior partly explain maltreating practices (Table 1).

The test for residual heterogeneity indicates heterogeneity of the effects sizes and the need to test for moderators (Q(36) = 113.35, p < .001; I^2 = 63.67%, 95% CI: 38.99% and 76.17%), but none of the variables tested in the moderator analysis (Table 2) yielded a significant effect.

Stage 3. Nineteen studies involving 24 different effect sizes examined the relationship between the third stage of caregiver's information processing – information integration and response selection and maltreatment. The meta-analysis yielded a small but significant overall effect size (r = .215, p < .001), which indicated that parental information integration and repertoire of responses partly explain maladaptive parenting practices (Table 1).

The test for residual heterogeneity indicated heterogeneity of the effects sizes and the need to test for moderators (Q(23) = 86.26, p < .001; I^2 = 77.02%, 95% CI: 58.89% and 88.76%). Three of the variables tested in the moderator analysis (Table 2) yielded a significant effect. Sample type showed a significant effect (p = .034), indicating that the influence of the variables in this stage of the SIP model in child maltreatment present larger effects in referred to CPS-samples (r = .310) than in community-based samples (r = .123). Type of measure of maltreatment also showed a significant effect (p = .023), indicating that the influence of parental information integration and response selection in child maltreatment present larger effects when maltreatment is evaluated through CPS records (r = .300) than when through self-report measures (r = .103). Finally, the publication year was also a significant moderator suggesting that the more recent the studies, the smaller the effect sizes are (p = .047).

Table 2.

Results for categorical and continuous moderators (bivariate models).

SIP cognitive stages	Moderators	# Studies	# ES	Intercept (95% CI) / mean *z* (95% CI)	Mean *r*	*β* (95% CI)	*F* (df1, df2)[a]	*p*[b]
Stage 0.	*Sample type*						1.521 (1, 62)	.217
	Community-based (RC)	18	33	0.216 (0.132, 0.299)	.213			
	Referred to CPS	21	31	0.294 (0.201, 0.387)	.286	0.079 (-0.046, 0.204)		
	Type of maltreatment						0.460 (1, 62)	.498
	Abuse (RC)	35	54	0.260 (0.192, 0.328)	.254			
	Neglect	8	10	0.201 (0.043, 0.359)	.198	-0.060 (-0.231, 0.112)		
	Measure of maltreatment						4.635 (1, 61)	.031*
	CPS records (RC)	16	22	0.355 (0.247, 0.464)	.341			
	Self-report	24	41	0.212 (0.139, 0.285)	.209	-0.144 (-0.274, -0.013)		
	Measure of cognitions						0.206 (1,62)	.650
	Implicit (RC)	6	8	0.213 (0.035, 0.390)	.210			
	Self-report	37	56	0.257 (0.190, 0.324)	.251	0.044 (-0.146, 0.234)		
	Country of data collection						0.706 (2, 61)	.702
	Europe (RC)	9	11	0.260 (0.106, 0.414)	.254			
	USA	27	46	0.238 (0.164, 0.312)	.234	-0.022 (-0.193, 0.149)		
	Others	5	7	0.324 (0.135, 0.513)	.313	0.064 (-0.180, 0.308)		
	Publication year	39	64	0.255 (0.193, 0.318)	-	0.004 (-0.010, 0.001)	2.712 (1,62)	.100
Stage 1.	*Sample type*						0.333 (1, 19)	.564
	Community-based (RC)	7	7	0.357 (0.223, 0.492)	.343			
	Referred to CPS	12	14	0.306 (0.197, 0.416)	.297	-0.051 (-0.224, 0.122)		
	Type of maltreatment						0.012 (1, 19)	.912
	Abuse (RC)	17	18	0.328 (0.241, 0.415)	.317			
	Neglect	1	1	0.300 (-0.179, 0.780)	.291	-0.027 (-0.515, 0.460)		
	Measure of maltreatment						0.016 (1, 19)	.900
	CPS records (RC)	9	10	0.320 (0.185, 0.455)	.310			
	Self-report	10	11	0.331 (0.220, 0.443)	.319	0.011 (-0.164, 0.187)		
	Measure of cognitions						1.446 (1, 19)	.229

	Implicit (RC)	8	8	0.263 (0.129, 0.396)	.257			
	Self-report	12	13	0.368 (0.260, 0.476)	.352	0.105 (-0.066, 0.277)		
	Country of data collection						0.969 (2, 18)	.616
	Europe (RC)	3	3	0.362(0.165, 0.558)	.347			
	USA	12	13	0.346 (0.232, 0.461)	.333	-0.015 (-0.243, 0.212)		
	Others	4	5	0.244 (0.055, 0.433)	.239	-0.118 (-0.391, 0.155)		
	Publication year	19	21	0.329 (0.241, 0.417)	-	-0.001 (-0.009, 0.006)	0.127 (1, 19)	.722
Stage 2.	*Sample type*						0.330 (1, 35)	.566
	Community-based (RC)	12	21	0.205 (0.131, 0.280)	.202			
	Referred to CPS	13	16	0.170 (0.076, 0.264)	.168	-0.035 (-0.155, 0.085)		
	Type of maltreatment						0.409 (1, 35)	.522
	Abuse (RC)	23	32	0.186 (0.125, 0.247)	.184			
	Neglect	3	3	0.257 (0.049, 0.465)	.251	0.071 (-0.146, 0.287)		
	Measure of maltreatment						0.232 (1, 34)	.630
	CPS records (RC)	11	14	0.171 (0.067, 0.275)	.169			
	Self-report	14	22	0.202 (0.129, 0.276)	.199	0.031 (-0.096, 0.158)		
	Measure of cognitions						0.271 (1, 35)	.603
	Implicit (RC)	4	5	0.153 (-0.004, 0.309)	.152			
	Self-report	22	32	0.198 (0.135, 0.260)	.195	0.045 (-0.124, 0.213)		
	Country of data collection						2.285 (2, 32)	.319
	Europe (RC)	4	5	0.297 (0.135, 0.459)	.289			
	USA	18	26	0.180 (0.112, 0.248)	.178	-0.117 (-0.293, 0.059)		
	Others	4	4	0.125 (-0.049, 0.300)	.124	-0.172 (-0.410, 0.066)		
	Publication year	25	37	0.192 (0.132, 0.253)	-	-0.000 (-0.007, 0.006)	0.004 (1, 35)	.948
Stage 3.	*Sample type*						4.512 (1, 22)	.034*
	Community-based (RC)	9	12	0.124 (0.001, 0.248)	.123			
	Referred to CPS	9	12	0.320 (0.188, 0.452)	.310	0.196 (0.015, 0.377)		
	Type of maltreatment						0.692 (1, 22)	.406
	Abuse (RC)	16	20	0.200 (0.094, 0.306)	.197			
	Neglect	4	4	0.313 (0.069, 0.558)	.303	0.113 (-0.154, 0.380)		
	Measure of maltreatment						5.169 (1, 22)	.023*
	CPS records (RC)	19	14	0.310 (0.189, 0.431)	.300			

Self-report	8	10	0.103 (-0.029, 0.235)	.103	-0.208 (-0.386, -0.029)		
Measure of cognitions						0.512 (1, 21)	.474
Implicit (RC)	2	2	0.277 (0.026, 0.527)	.270			
Self-report	15	21	0.179 (0.085, 0.273)	.103	-0.098 (-0.365, 0.170)		
Country of data collection						1.803 (2, 21)	.406
Europe (RC)	3	3	0.354 (0.101, 0.608)	.340			
USA	13	18	0.211 (0.098, 0.325)	.208	-0.143 (-0.421, 0.135)		
Others	2	3	0.110 (-0.148, 0.368)	.110	-0.244 (-0.606, 0.117)		
Publication year	18	24	0.230 (0.137, 0.322)	-	-0.009 (-0.018, 0.000)	3.928 (1, 22)	.047*

Note. # Studies = number of studies; # ES = number of effect sizes; Mean *r* = mean effect size (*r*); CI = confidence interval; β = estimated regression coefficient; RC = reference category.
*p < .05; **p < .01; ***p < .001.
[a] Omnibus test of all regression coefficients in the model.
[b] p-value of the omnibus test.

Abuse and neglect comparisons. Although no significant moderation effects were found for the type of maltreatment (possibly due to the differences between the number of effect sizes involved), we were interested in examining if the effect sizes through the four-cognitive SIP stages were different for abuse and for neglect. Specifically, in stage 0, the association of parental pre-existing cognitive schemas was larger for abuse (r = .254) than for neglect (r = .198). The same was observed in stage 1, in which the association with parental perceptions was larger for abuse (r = .317) than for neglect (r = .291). In the subsequent stages, the effects were larger for neglect. Specifically, in stage 2, parental interpretations had a larger effect in neglect (r = .251) than in abuse (r = .184). Similarly, in stage 3, the association with selection of parental responses was larger for neglect (r = .303) than for abuse (r = .197).

Discussion

From a cognitive-behavioral perspective, parents undergo a set of socio-cognitive processes that influence their parental responses (e.g., Sigel & McGillicuddy-DeLisi, 2002). The SIP model applied to child maltreatment suggests that abusive and neglectful parents are unable to understand the signals or states of the child, interpret these signals correctly, and select and implement adequate responses (Crittenden, 1993; Milner, 1993, 2003). Several authors have already empirically explored this framework and provided evidence that parental cognitions have an important role in shaping abusive and neglectful behaviors (e.g., Crouch et al., 2010; Perez-Albeniz & de Paul, 2005; Rodriguez et al., 2016). To further examine the extent to which specific components of the SIP model explain child abuse and child neglect, we reviewed 61 primary studies (and their effect sizes) that examined the association between socio-cognitive parental variables from each cognitive stage of the SIP model and child abuse and neglect.

The results of our meta-analyses support the general hypothesis that abusive and neglectful parents may incur biases or errors in child-related information processing during parent-child interactions. Overall, the associations of socio-cognitive parental variables with maladaptive practices reached a medium magnitude (according to Rice & Harris, 2005).

Despite non-significant differences, the specific contributions of each SIP stage to child abuse or child neglect suggest that negative schemata about childrearing (stage 0) and biased perceptions about children (stage 1) seem to be more associated with abuse, while errors in

children's behavior interpretations (stage 2) and lack of adequate selection of parental responses (stage 3) are more likely related with child neglect. Previous studies (e.g., Gabrielli, Jackson, Tunno, & Hambrick, 2017) suggest that abuse and neglect differ in terms of the salience of the response, because abuse constitutes an aggressive event versus neglect represents an omission of behavior. Thus, abusive parents should be more likely to have salient and readily accessible aggression-related information structures (characteristic of stage 0) activated by aversive events (Hiraoka et al., 2014; Rodriguez et al., 2017) that block their attention to positive cues (Crouch et al., 2010) in stage 1. On the other hand, neglectful parents may interpret children's signals (stage 2) in a restricted and less complex manner (Hildyard & Wolfe, 2007), and have a limited repertoire of parenting abilities and response choices (Azar, Stevenson, & Johnson, 2012), required in stage 3. However, the scarcity of studies on neglect compared to those on abuse is remarkable, confirming the asymmetry already acknowledged in the literature (e.g., Warmingham, Handley, Rogosch, Manly, & Cicchetti, 2019).

Critically, and despite the overall significant effects of information processing biases in child maltreatment, this association is not necessarily direct and is shaped by a set of moderators. In the current paper we examined the type of sample, type of measures of maltreatment and socio-cognitive variables, country of data collection, and publication year, that according to the literature can influence the reported association (e.g., Hambrick et al., 2014; Lau et al., 2006). As for the measures of maltreatment, studies with CPS-records revealed larger effects than those using self-reports in two of the meta-analyses (stages 0 and 3). These results converge with literature emphasizing the limitations of using self-report measures when evaluating child maltreatment. Specifically, parents' reports can be biased due to a lack of conscious awareness of feelings, cognitions and behaviors towards the child, which is required in retrospective reporting (e.g. Fazio & Olson, 2003; Greenwald et al., 2002). Additionally, parents' unrealistic expectations, perceptual biases, misattributions about children (Hansen & MacMillan, 1990; Camilo, Garrido, Ferreira, & Calheiros, 2019; Lau et al., 2006) and memory distortions (e.g., Jackson, McGuire, Tunno, & Makanui, 2019) may lead them to misrepresent family life situations. Moreover, in order to avoid social judgments and even legal interventions (Portwood, 2006), parents' reports about maladaptive caregiving are extremely susceptible to social desirability.

Regarding the sample type, the association of biases in response selection (stage 3) with child abuse and neglect revealed to be stronger in referred to CPS-samples than in community-

based samples. This finding converges with the data about the cases referred to CPS showing higher rates of chronic maltreatment and of co-occurrence of different types of maltreatment, in comparison with those in community samples (Kim, Mennen, & Trickett, 2016), a pattern that may reflect the higher repertoire of inadequate responses that lead to actual maltreating practices.

The analyses of the publication year revealed that the reported association of parents' response selection (stage 3) with child abuse and neglect has faded throughout the years. The growing public discussion about the importance of appropriate parental responses to benefit children's development (e.g., Afifi et al., 2017), and the consequent increased parental awareness about socially accepted behaviors towards children, may be influencing parents' reports about their actual disciplinary choices in more recent years. Moreover, intervention programs with abusive and neglectful parents have been increasing in the last decades (e.g., Vlahovicova, Melendez-Torres, Leijten, Knerr, & Gardner, 2017), which might have contributed to actually mitigate this association.

Despite the interesting results of this meta-analytic review, we have identified a set of limitations in the primary studies. First, many of the included studies were conducted with no reference or recognition of the SIP framework and using different terms for the same variables. Nevertheless, we attempted to surpass this limitation through a thorough categorization of the variables based on the theoretical descriptions of the model (Milner, 1993, 2003). Second, there is high variability in the child abuse and neglect definition and assessment. For example, CPS records may have inherent biases derived from professionals' perceptions, different legal systems of each country, or lack of distinction between reported and substantiated cases. Moreover, self-report measures of maltreatment were very heterogeneous because some evaluated parental practices (e.g., the Parent- Child Conflict Tactics Scale; Straus, Hamby, Finkelhor, Moore, & Runyan, 1998), and others assessed risk (e.g., the Child Abuse Potential Inventory; Milner, 1986). Third, few studies explored child neglect, which is consistently reported as the most prevalent type of maltreatment (e.g., Warmingham et al., 2019). Further, not all primary studies report having controlled for socio-demographic variables. For example, many of the studies did not refer to socioeconomic status, which can constitute an important confound because poverty has also been associated with cognitive information processing deficits (Mani, Mullainathan, Shafir, & Zhao, 2013; Shah, Mullainathan, & Shafir, 2012). Finally, and despite the recognizable difficulty in

accessing and evaluating these particular samples, few studies have used experimental designs, and even fewer have conducted longitudinal research.

Likewise, we have identified some limitations of the current meta-analyses. Specifically, the reported work did not include non-published studies (e.g., Camilo & Garrido, 2019), although the diagnostic analysis for publication bias indicated that our results are reliable. In addition, a significant number of studies (k = 31) were not included because they presented only multivariate data. It would also be important to conduct multilevel meta-analyses in order to control the variance within each study because we included multiple effect sizes from the same samples, whenever it was not possible to average the effect sizes, due to different moderators. Finally, although the analytical distinction of SIP components is crucial to clarify the model, these components are interdependent and mutually influenced (Milner, 1993, 2003), and might be addressed as such in future research.

This meta-analytic review brings important theoretical and methodological contributions in summarizing the evidence about socio-cognitive processes underlying child abuse and neglect. This is likely to reflect the advances in both social cognitive psychology and social developmental psychology in the parenting domain. Specifically, by systematically addressing the different socio-cognitive elements of the social information processing model, this work is likely to provide a more solid framework to understand parental cognitions underlying child maltreatment. Moreover, the moderators examined can also be informative, particularly the measurement approaches to both maltreatment and parental cognitions, which are core elements in parenting research (e.g., Bugental & Happaney, 2002). Further, the current study made the scarceness of longitudinal and experimental studies apparent, with limited measures that tap implicit, unconscious, and automatic cognitive processes.

Regarding the implications for intervention, this review constitutes an advance in clarifying the most important components of the SIP model that should be addressed in prevention and intervention with maltreating or at-risk parents. For example, parental pre-existing schemata and perceptions about children's signals seem to be important components to integrate into intervention programs with parents. This can easily be translated into programs targeting parents' beliefs and attitudes about childrearing, increasing positive parental expectations about their capabilities, their meta-cognitive awareness, and working their attentional focus management,

reducing the automaticity of their cognitions (Crouch & Milner, 2005). Moreover, this work directly informs different types of therapeutic interventions such as cognitive restructuring, problem-solving training, re-attribution training, cognitive-behavioral therapy, family therapy and attachment-based interventions (Azar & Wolfe, 2006; Camilo & Garrido, 2013; Kolko, 1996).

Socio-cognitive approaches to maladaptive parenting constitute an important complement to the bio-ecological frameworks by focusing on parental cognitions that, under certain environmental conditions, may lead to maltreating parental behaviors. This meta-analytic review confirms that parental cognitions have an important role in the explanation of child abuse and neglect. The present work is likely to open new research avenues. These may include more experimental designs and the use of implicit measures (Camilo et al., 2016). Additionally, the examination of mediation effects between the components of the model, with the interaction of ecological factors (e.g., socioeconomic status, social support, child-related stress) and individual variables (e.g., psychopathology, cognitive functioning) (e.g., Azar et al., 2012, Milner, 2000; Rodriguez et al., 2017) are also likely to contribute to a better understanding to prevent and intervene in child maltreatment.

References

Afifi, T. O., Ford, D., Gershoff, E. T., Merrick, M., Grogan-Kaylor, A., Ports, K. A., …Bennet, R. P. (2017). Spanking and adult mental health impairment: The case for the designation of spanking as an adverse childhood experience. *Child Abuse & Neglect, 71*, 24–31. doi:10.1016/j.chiabu.2017.01.014

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. doi:10.1016/j.chiabu.2011.05.010

Azar, S. T. (2002). Parenting and child maltreatment. In M. H. Bornstein (Ed.), *Handbook of parenting: Social conditions and applied parenting* (Vol. 4., pp. 361−388). Mahwah, NJ: Lawrence Erlbaum.

Azar, S. T., McGuier, D. J., Miller, E. A., Hernandez-Mekonnen, R., & Johnson, D. R. (2017). Child neglect and maternal cross-relational social cognitive and neurocognitive disturbances. *Journal of Family Psychology, 31*, 8−18. doi:10.1037/fam0000268

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 doing intervention and prevention work. *Journal of Applied Developmental Psychology, 29*, 295−304. doi:10.1016/j.appdev.2008.04.009

Azar, S. T., Stevenson, M. T., & Johnson, D. R. (2012). Intellectual disabilities and neglectful parenting: Preliminary findings on the role of cognition in parenting risk. *Journal of Mental Health Research in Intellectual Disabilities, 5*, 94−129. doi:10.1080/19315864.2011.615460

Azar, S. T., & Wolfe, D. (2006). Child physical abuse and neglect. In E. J. Mash & R. A. Barkley (Eds.), *Treatment of childhood disorders* (3rd ed., pp. 595−646). New York, NY: Guilford Press.

Belsky, J., & Jaffee, S. R. (2015). The multiple determinants of parenting. In D. Cicchetti, & D. J. Cohen (Eds.). *Developmental psychopathology: Risk, disorder, and adaptation* (2nd ed., pp. 38–85). Hoboken, NJ: John Wiley & Sons Inc. doi:10.1002/9780470939406.ch2

Borenstein, M., Hegdes, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. Cornwall, UK: John Wiley & Sons.

Bornstein, M. H. (2016). Determinants of parenting. In D. Cicchetti, *Developmental psychopathology* (3rd ed., Vol. 4, pp. 1–91). Hoboken, NJ: John Wiley & Sons Inc. doi:10.1002/9781119125556.devpsy405

Bugental, D. B. & Happaney, K. (2002). Parental attributions. In M. H. Bornstein (Ed.), *Handbook of parenting: Being and becoming a parent* (Vol. 3, pp. 509−535). Mahwah, NJ: Lawrence Erlbaum.

Bugental, D. B., Lewis, J. C., Lin, E., Lyon, J., & Kopeikin, H. (2000). In charge but not in control: The management of authority-based relationships by those with low perceived power. *Developmental Psychology, 35*, 1367–78. doi:10.1037/0012-1649.35.6.1367

Calheiros, M. M., & Rodrigues, L. (2016). Parent-child interactions as a source of parent cognition in the context of child maltreatment. In J. Vala, S. Waldzus, & M. M. Calheiros (Eds.), *The*

social developmental construction of violence and intergroup conflict (pp. 145−169). Cham, Switzerland: Springer.

Camilo, C. & Garrido, M. V. (2013). Desenho e avaliação de programas de desenvolvimento de competências parentais para pais negligentes: Uma revisão e reflexão [Design and evaluation of intervention programs for neglectful parents: A review and reflection]. *Análise Psicológica*, *31*, 245–268. doi:10.14417/S0870-8231201300030003

Camilo, C. & Garrido, M. V. (2019). A revisão sistemática de literatura em psicologia: Desafios e orientações [Systematic literature review in Psychology: Challenges and guidelines]. *Análise Psicológica*. doi:10.14417/ap.1546

Camilo, C., Garrido, M. V., & Calheiros, M. M. (2016). Implicit measures of child abuse and neglect: A systematic review. *Aggression and Violent Behavior, 29*, 43–54. doi:10.1016/j.avb.2016.06.002

Camilo, C., Garrido, M. V., Ferreira, M. B., & Calheiros, M. M. (2019). How does mothering look like: A multidimensional approach to maternal cognitive representations. *Journal of Family Issues, 40*, 2528–2552. doi:10.1177/0192513X19860171

Cicchetti, D., & Valentino, K. (2015). An ecological-transactional perspective on child maltreatment: Failure of the average expectable environment and its influence on child development. In D. Cicchetti, & D. J. Cohen (Eds.). *Developmental psychopathology: Risk, disorder, and adaptation* (2nd ed., pp. 129–201). Hoboken, NJ: John Wiley & Sons Inc. doi:10.1002/9780470939406.ch4

Cooper, H. (2010). *Research synthesis and meta-analysis*. Thousand Oaks, CA: Sage Publications.

Crittenden, P. (1993). An information-processing perspective on the behavior of neglectful parents. *Criminal Justice and Behavior, 20*, 27–48. doi:10.1177/0093854893020001004

Crouch, J. L., Irwin, L., Milner, J. S., Skowronski, J. J., Rutledge, E., & Davila, A. L. (2017). Do hostile attributions and negative affect explain the association between authoritarian beliefs and harsh parenting? *Child Abuse & Neglect, 67*, 13–21. doi:10.1016/j.chiabu.2017.02.019

Crouch, J. L., & Milner, J. S. (2005). The social information processing model of child physical abuse: A conceptual basis for prevention and intervention strategies. In K. Kendall-Tackett

& S. Giacomoni (Eds.), *Child victimization: Maltreatment, bullying and dating violence, prevention and intervention* (pp. 1–19). Kingston, NJ: Civic Research Institute.

Crouch, J. L., Milner, J. S., Skowronski, J. J., Farc, M. M., Irwin, L., & Neese, A. (2010). Automatic encoding of ambiguous child behavior in high and low risk for child physical abuse parents. *Journal of Family Violence, 25*, 73–80. doi:10.1007/s10896-009-9271-2

De Paúl, J., Asla, N., Pérez-Albéniz, A., & De Cádiz, B. T. G. (2006). Impact of stress and mitigating information on evaluations, attributions, affect, disciplinary choices, and expectations of compliance in mothers at high and low risk for child physical abuse. *Journal of Interpersonal Violence, 21*, 1018–1045. doi:10.1177/0886260506290411

Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology, 54*, 297–327. doi:10.1146/annurev.psych.54.101601.145225

Field, A. (2005). *Discovering statistics using SPSS* (2nd ed.). London, United Kingdom: Sage Publications.

Gabrielli, J., Jackson, Y., Tunno, A. M., & Hambrick, E. P. (2017). The blind men and the elephant: Identification of a latent maltreatment construct for youth in foster care. *Child Abuse & Neglect, 67, 98–108*. doi:10.1016/j.chiabu.2017.02.020

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. doi:10.1037//0033-295X.109.1.3

Hambrick, E. P., Tunno, A. M., Gabrielli, J., Jackson, Y., & Belz, C. (2014). Using multiple informants to assess child maltreatment: Concordance between case file and youth self-report. *Journal of Aggression, Maltreatment, and Trauma, 23*, 751–771. doi:10.1080/10926771.2014.933463

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. doi:10.1177/01454455900143003

Hastings, P., & Grusec, J. E. (1998). Parenting goals as organizers of responses to parent-child disagreement. *Developmental Psychology, 34*, 465–79. doi:10.1037/0012-1649.34.3.465

Hildyard, K., & Wolfe, D. (2007). Cognitive processes associated with child neglect. *Child Abuse & Neglect, 31*, 895–907. doi:10.1016/j.chiabu.2007.02.007

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. doi:10.1016/j.chiabu.2014.07.004

Holden, G. W., & Edwards, L. A. (1989). Parental attitudes toward child rearing: Instruments, issues, and implications. *Psychological Bulletin, 106*, 29–58. doi:10.1037/0033-2909.106.1.29

Holden, G. W., & Buck, M. J. (2002). Parental attitudes toward childrearing. In M. H. Bornstein (Ed.), *Handbook of parenting: Being and becoming a parent* (Vol. 3., pp. 537−562). Mahwah, NJ: Lawrence Erlbaum.

Hunter, J. E., & Schmidt, F. L. (2004). *Methods of meta-analysis: correcting error and bias in research findings* (2nd ed.). Thousand Oaks, CA: Sage.

Jackson, Y., McGuire, A., Tunno, A. M., & Makanui, P. K. (2019). A reasonably large review of operationalization in child maltreatment research: Assessment approaches and sources of information in youth samples. *Child Abuse & Neglect, 87*, 5–17. doi:10.1016/j.chiabu.2018.09.016

Kim, K., Mennen, F. E., & Trickett, P. K. (2016). Patterns and correlates of co-occurrence among multiple types of child maltreatment. *Child & Family Social Work, 22*, 492–502. doi:10.1111/cfs.12268

Jaffee, S. R., & Maikovich-Fong, A. K. (2011). Effects of chronic maltreatment and maltreatment timing on children's behavior and cognitive abilities. *Journal of Child Psychology and Psychiatry, 52,* 184−194. doi:10.1111/j.1469-7610.2010.02304.x

JASP Team (2019). *JASP* (Version 0.10.2) [Computer software].

Johnston, C., Park, J. L., & Miller, N. V. (2018). Parental cognitions: Relations to parenting and child behavior. In M. R. Sanders & A. Morawska, *Handbook of parenting and child development across the lifespan* (pp. 395−414). Cham, Switzerland: Springer.

Jud, A. (2018). Current research on child maltreatment epidemiology. *Child and adolescent psychiatry and mental health, 12* [Editorial]. doi:10.1186/s13034-018-0228-1

Kane, M. (2005). *Contemporary issues in parenting*. New York: Nova Science Publishers.

Kolko, D. J. (1996). Individual cognitive behavioral treatment and family therapy for physically abused children and their offending parents: A comparison of clinical outcomes. *Child Maltreatment, 1*, 322–342. doi:10.1177/1077559596001004004

Larrance, D.T., & Twentyman, C.T. (1983). Maternal attributions and child abuse. *Journal of Abnormal Psychology, 92*, 449–457. doi:10.1037/0021-843X.92.4.449

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. doi:10.1016/j.chiabu.2005.11.009

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. doi:10.1371/journal.pmed.1000100

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. Thousand Oaks, CA: Sage.

Mah, J.W.T. & Johnston, C. (2008). Parental social cognitions: Considerations in the acceptability of and engagement in behavioral parent training. *Clinical Child and Family Psychology Review, 11*, 218–236. doi:10.1007/s10567-008-0038-8

Mani, A., Mullainathan, S., Shafir, E., & Zhao, J. (2013). Poverty impede cognitive function. Science, 341, 976–980. doi:10.1126/science.1238041

Mayseless, O. (2006). Studying parenting representations as a window to parents' internal working model of caregiving. In O. Mayseless (Ed.), *Parenting representations: Theory, research, and clinical implications* (pp. 3–40). New York, NY: Cambridge University Press. doi:10.1017/CBO9780511499869

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. doi:10.1016/j.chiabu.2013.05.003

McElroy, E. M., & Rodriguez, C. M. (2008). Mothers of children with externalizing behavior problems: Cognitive risk factors for abuse potential and discipline style and practices. *Child Abuse & Neglect, 32*, 774–784. doi:10.1016/j.chiabu.2008.01.002

Milner, J. S. (1986). *The child abuse potential inventory: Manual* (2nd Edition). Webster, NC: Psytec.

Milner, J. S. (1993). Social information processing and physical child abuse. *Clinical Psychology Review, 13*, 275–294. doi:10.1016/0272-7358(93)90024-G

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. doi:10.1016/s0145-2134(02)00506-9

MacKenzie, M. J., Kotch, J. B., & Lee, L. (2011). Toward a cumulative ecological risk model for the etiology of child maltreatment. *Children and Youth Services Review, 33*, 1638–1647. doi:10.1016/j.childyouth.2011.04.018

Mulder, T. M., Kuiper, K. C., van der Put, C. E., Stams, G. J. M., & Assink, M. (2018). Risk factors for child neglect: A meta-analytic review. *Child Abuse & Neglect, 77*, 198–210. doi:10.1016/j.chiabu.2018.01.006

Newberger, C. M., & Cook, S. J. (1983). Parental awareness and child abuse and neglect: A cognitive-developmental analysis of urban and rural samples. *American Journal of Orthopsychiatry, 53*, 512–524. doi:10.1111/j.1939-0025.1983.tb03395.x

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, and a framework for research* (pp. 233–253). Baltimore, MD: Paul H. Brookes.

Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan: A web and mobile app for systematic reviews. *Systematic Reviews, 5*: 210. doi:10.1186/s13643-016-0384-4

Radford, L., Corral, S., Bradley, C., & Fisher, H. L. (2013). The prevalence and impact of child maltreatment and other types of victimization in the UK: Findings from a population survey of caregivers, children and young people and young adults. *Child Abuse & Neglect, 37*, 801–813. doi:10.1016/j.chiabu.2013.02.004

Rice, M. E., & Harris, G. T. (2005). Comparing effect sizes in follow-up studies: ROC area, Cohen's d, and r. *Law and Human Behavior, 29*, 615–620. doi:10.1007/s10979-005-6832-7

Rodriguez, C. M. (2018). Predicting parent-child aggression risk: Cognitive factors and their interaction with anger. *Journal of Interpersonal Violence, 33*, 359–378. doi:10.1177/0886260516629386

Rodriguez, C. M., Smith, T. L., & Silvia, P. J. (2016). Multimethod prediction of physical parent-child aggression risk in expectant mothers and fathers with social information processing theory. *Child Abuse & Neglect, 51*, 106–119. doi:10.1016/j.chiabu.2015.10.028

Rodriguez, C. M., Silvia, P. J., & Gaskin, R. E. (2019). Predicting maternal and paternal parent-child aggression risk: Longitudinal multimethod investigation using social information processing theory. *Psychology of Violence, 9*, 370–382. doi:10.1037/vio0000115

Rosenthal, R. (1979). The file drawer problem and tolerance for null results. *Psychological Bulletin, 86*, 638–641. doi:10.1037/0033-2909.86.3.638

Rosenthal, R., & DiMatteo, M. R. (2001). Meta-analysis: Recent developments in quantitative methods for literature reviews. *Annual Review of Psychology, 52*, 59–82. doi:10.1146/annurev.psych.52.1.59

Rudy, D., & Grusec, J. E. (2006). Social cognitive approaches to parenting representations. In O. Mayseless (Ed.), *Parenting representations: Theory, research, and clinical implications* (pp. 79–106). New York, NY: Cambridge University Press. doi:10.1017/CBO9780511499869

Shah, A., Mullainathan, S., & Shafir, E. (2012). Some consequences of having too little. *Science, 338*, 682–685. doi:10.1126/science.1222426

Sigel, I. E., & McGillicuddy-DeLisi, A. V. (2002). Parent beliefs are cognitions: The dynamic belief systems model. In M. H. Bornstein (Ed.), *Handbook of parenting: Being and becoming a parent* (Vol. 3, pp. 485–508). Mahwah, NJ: Lawrence Erlbaum.

Sigel, I. E., McGillicuddy-DeLisi, A. V., & Goodnow, J. J. (Eds.) (1992). *Parental belief system: The psychological consequences for children*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Slep, A. M. S., & O'Leary, S. G. (2007). Multivariate models of mothers' and fathers' aggression toward their children. *Journal of Consulting and Clinical Psychology, 75*, 739–751. doi:10.1037/0022-006X.75.5.739

Sterne, J. A. C., Becker, B. J., & Egger, M. (2005). The funnel plot. In H. R. Rothstein, A. J. Sutton, & M. Borenstein (Eds.), *Publication bias in meta-analysis: Prevention, assessment and adjustments* (pp. 75–98). Chichester, UK: John Wiley & Sons.

Sterne, J. A. C., & Egger, M. (2005). Regression methods to detect publication and other bias in meta-analysis. In H. R. Rothstein, A. J. Sutton, & M. Borenstein (Eds.). *Publication bias in meta-analysis: Prevention, assessment and adjustments* (pp. 99–110). Chichester, UK: John Wiley & Sons.

Stith, M. S., Liu, T. L., Davies, C., Boykin, E. L., Alder, M. C., Harris, J. F., ... Dees, J. E. M. E. G. (2009). Risk factors in child maltreatment: A meta-analytic review of the literature. *Aggression and Violent Behavior, 14*, 13–29. doi:10.1016/j.avb.2006.03.006

Straus, M. A., Hamby, S. L., Finkelhor, D., Moore, D. W., & Runyan, D. (1998). Identification of child maltreatment with the Parent-Child Conflict Tactics Scales: Development and psychometric data for a national sample of American parents. *Child Abuse & Neglect, 22*, 249–270. doi:10.1016/s0145-2134(97)00174-9

Taraban, L., & Shaw, D. S. (2018). Parenting in context: Revisiting Belsky's classic process of parenting model in early childhood. *Developmental Review, 48*, 55–81. doi:10.1016/j.dr.2018.03.006

Teti, D. M., & Gelfand, D. M. (1991). Behavioral competence among mothers of infants in the first year: The mediational role of maternal self-efficacy. *Child Development, 62*, 918–29. doi:10.2307/1131143

Vlahovicova, K., Melendez-Torres, G. J., Leijten, P., Knerr, W., & Gardner, F. (2017). Parenting programs for the prevention of child physical abuse recurrence: A systematic review and meta-analysis. *Clinical Child and Family Psychology Review, 20,* 351–365. doi:10.1007/s10567-017-0232-7

Warmingham, J. M., Handley, E. D., Rogosch, F. A., Manly, J. T., & Cicchetti, D. (2019). Identifying maltreatment subgroups with patterns of maltreatment subtype and chronicity: A latent class analysis approach. *Child Abuse & Neglect, 87*, 28–39. doi:10.1016/j.chiabu.2018.08.013.

2. IMPLICIT MEASURES OF CHILD ABUSE AND NEGLECT: A SYSTEMATIC REVIEW [2]

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.

[2] Camilo, C., Garrido, M. V., & Calheiros, M. M. (2016). Implicit measures of child abuse and neglect: A systematic review. *Aggression and Violent Behavior, 29*, 43–54. doi:10.1016/j.avb.2016.06.002

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).

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 may incur 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" (McGillicudy-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).

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 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 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 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 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 in all the other studies. Data extraction was performed using a qualitative synthesis 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.

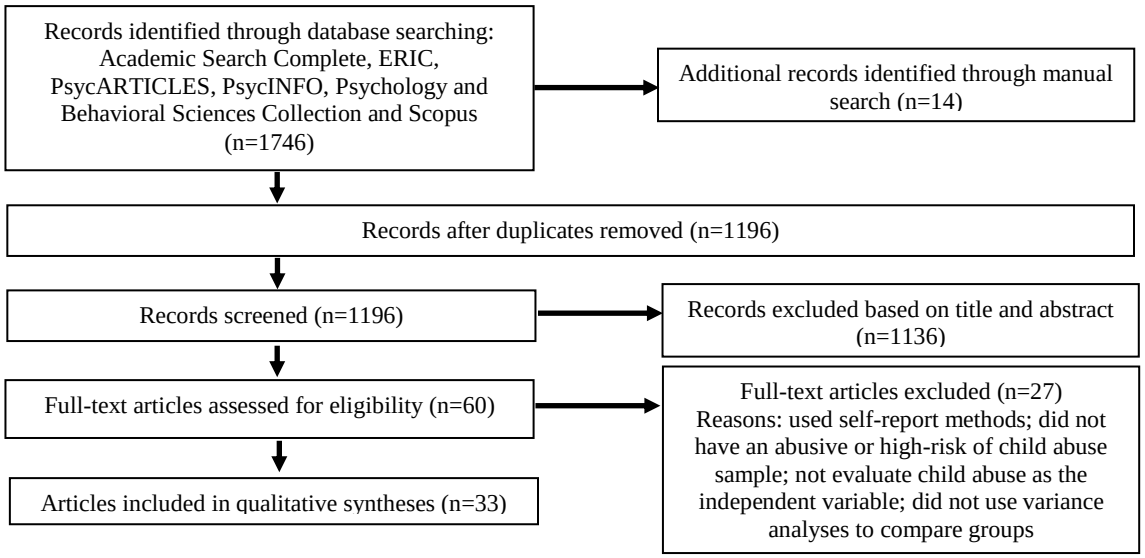


Figure 1. Results of the search strategy based on the PRISMA statement (Liberati et al., 2009).

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 40 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.

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 these 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.

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 inconsistent findings could be related to the use of full-frontal facial expressions as stimuli, instead of the different angles of 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, 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 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's (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 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 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 a 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 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 with child physical abuse risk.

Table 1.

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

Authors/Year	Hypothesis	Sample	Implicit measure	Results
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,	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	High-risk individuals have pre-existing positive and negative child-related schemata that were equally accessible; low-risk individuals readily access to

	automatically activated by ambiguous child stimuli		followed by positive and negative words	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

Cognitive dimension of parental representations

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, & Jedrziewski, 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.

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. 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 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 Jedrziewski (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.

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.

Table 2.

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

Authors/Year	Hypothesis	Sample	Implicit measure	Results
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 evaluated 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	Study 1: 90 students (32 high, 28 moderate, 30 low-risk); Study 2: 95 parents (35 high, 20 moderate,	Evaluative priming procedure: words were preceded by photographs of child or adult	No differences between high and low-risk individuals

	children compared with moderate and low-risk parents	40 low-risk). All evaluated with CAPI	faces with positive, neutral, or negative expressions	
Rodriguez, Cook, & Jedrziewski, 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

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.

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 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 blast 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.

Table 3.

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

Authors/Year	Hypothesis	Sample	Implicit measure	Results
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 of empathy and less inhibition of aggression in the presence of a victim's pain cues	40 high-risk and 40 low-risk undergraduate female students (evaluated with CAPI)	Computer simulations: presentation of the behavior of a fictitious 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	High-risk participants (non-parents) utilized higher levels of punitive 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

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 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 higher autonomic reactivity to negative child related stimulus (e.g., Reijamn 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) 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, & Jedrziewski, 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

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. However, 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

*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 doing intervention and prevention work. *Journal of Applied Developmental Psychology, 29,* 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,* 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* (2nd 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. McGuillicuddy-DeLisi, & J. Goodnow (Eds.), *Parental belief systems: The psychological and affective consequences for children* (pp. 219–248). New York, NY: Laurence Erlbaum Associates.

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*.

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.

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, Portugal: 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.

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,* 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.

*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.

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.

McGillicudy-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.

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.

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., & Jedrziewski, 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.

*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.

Trocmé, 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*, 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*, 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.

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,* 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.

*References marked with an asterisk were included in the review.

CHAPTER II.

MOTHERS' PREEXISTING SCHEMATA EXPLAINING MALADAPTIVE PARENTING

In the SIP model applied to maladaptive parenting, pre-existing cognitive schemas are considered a key factor (Milner, 1993) in cognitive information processing. These schemas include ideas, beliefs, values and attitudes about child development and childrearing (Sigel & McGillicuddy-De Lisi, 2002). Specifically, cognitions are defined as knowledge accepted as true by individuals (Sigel, 1985), and when activated, act as a filter for the environment information to which parents must respond (e.g., Azar et al., 2008). Thus, these pre-existing schemata tend to influence the parents' perceptions of child's signals and behaviors, and to determine the subsequent stages of information processing (Bugental & Goodnow, 1997; Milner, 1993).

Several authors (e.g., Daro, 1993; Giovannoni, 1989) have already pointed out that research into the nature of parenting should consider the families' values without imposing theoretically driven constraints. However, to the best of our knowledge neither the studies regarding social perceptions of mothering nor those examining mothers as a source of these perceptions had ever been systematically examined using data driven methods. The first paper of this chapter presents two studies exploring in a bottom-up way, how mothers in general and mothers with children referred to CPS agencies, perceive, evaluate and define parenthood and (mal)adjusted parenting, using multidimensional scaling techniques. Additionally, this study provided stimulus material to the implicit task included in the subsequent study reported in this chapter.

Furthermore, most of the research conducted on parental cognitions has relied only on self-report measures (e.g., Haskett, Scott, Willoughby, Ahern, & Nears, 2006; Slep & O'Leary, 2007), not considering the implicit and more *automatic* level of cognitive processing. Nevertheless, some research has already been done on child maltreatment based in the dual-process models of cognition. These studies have assessed parental preexisting schemata such as accessibility of negative schemata during aggressive interactions (e.g., Crouch et al., 2012), or beliefs in the value of corporal punishment (e.g., Rodriguez, Smith, & Silvia, 2016), but mostly, physical abuse. Considering the consistency of years of social psychology research on attitudes, and the importance of dual process models, the second paper of this chapter examines the association of explicit and implicit parental attitudes, and child abuse and child neglect. Given the restrictions of the measurement in child maltreatment, abuse and neglect were measured using multiple sources of information (e.g., Ciccheti & Manly, 2001; Kaufman et al., 1994), specifically mothers' self-report and professionals report (hetero). Moreover, mothers' intellectual functioning and socioeconomic status were introduced in the models due to their

potential influence on parents' cognitive activities. Finally, were conducted four previous validation studies of the following scales: *Maltreatment Severity Questionnaire* (Calheiros, Silva, & Magalhães, 2019), *Conflict Tactics Scale - Parent to Child* (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998), *Multidimensional Neglectful Behavior Scale – Parent Report* (Kantor, Holt, & Straus, 2003), and *Adult-Adolescent Parenting Inventory–2.1 Form A* (Bavolek & Keene, 2010). The final solutions from the confirmatory factor analyses, with the factor loadings and the correlations between factors are displayed in the Appendix B.

References:

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 doing intervention and prevention work. *Journal of Applied Developmental Psychology, 29*, 295−304. doi: 10.1016/j.appdev.2008.04.009

Bavolek, S. J., & Keene, R. G. (2010). *Adult-Adolescent Parenting Inventory AAPI-2.1: Administration and development handbook*. Park City, UT: Family Development Resources, Inc.

Bugental, D. B, & Goodnow, J. J. (1997). Socialization processes. In W. Damon (Ed.), *Handbook of Child Psychology*, (vol. 3; pp. 389−462). New York: Wiley.

Calheiros, M. M., Silva, C. S., & Magalhães, E. (2019). Child Maltreatment Severity Questionnaire (MSQ) for professionals: Development, validity, and reliability evidence. *Assessment*. doi:10.1177/1073191119890030

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. doi: 10.1016/j.chiabu.2012.04.004

Daro, D. (1993). Child maltreatment research: Implications for program design. In D. Cicchetti & S. Toth (Eds.), *Child abuse, child development, and social policy* (pp. 331–367). Norwood, NJ: Ablex.

Giovannoni, J. (1989). Definitional issues in child maltreatment. In D. Cicchetti & V. Carlson (Eds.), *Child maltreatment: Theory and research on the causes and consequences of child abuse and neglect* (pp. 3–37). New York, NY: Cambridge University Press.

Haskett, M. E., Scott, S. S., Willoughby, M., Ahern, L., & Nears, K. (2006). The Parent Opinion Questionnaire and child vignettes for use with abusive parents: Assessment of psychometric properties. *Journal of Family Violence, 21,* 137–151. doi:10.1007/s10896-005-9010-2

Kantor, G. K., Holt, M., & Straus, M. A. (2003). *The parent-report Multidimensional Neglectful Behavior Scale.* Unpublished manuscript, Family Research Laboratory, University of New Hampshire, Durham, NH.

Milner, J. S. (1993). Social information processing and physical child abuse. *Clinical Psychology Review, 13,* 275–294. doi: 10.1016/0272-7358(93)90024-G

Rodriguez, C. M., Smith, T. L., & Silvia, P. J. (2016). Multimethod prediction of physical parent-child aggression risk in expectant mothers and fathers with social information processing theory. *Child Abuse & Neglect, 51*, 106–119. doi:10.1016/j.chiabu.2015.10.028

Sigel, I. E., & McGillicuddy-DeLisi, A. V. (2002). Parent beliefs are cognitions: The dynamic belief systems model. In M. H. Bornstein (Ed.), *Handbook of parenting: Being and becoming a parent, Vol. 3* (pp. 485–508). Mahwah, NJ: Lawrence Erlbaum.

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.

Slep, A. M. S., & O'Leary, S. G. (2007). Multivariate models of mothers' and fathers' aggression toward their children. *Journal of Consulting and Clinical Psychology, 75,* 739–751. doi: 10.1037/0022-006X.75.5.739

Straus, M. A., Hamby, S. L., Finkelhor, D., Moore, D. W., & Runyan, D. (1998). Identification of child maltreatment with the parent-child Conflict Tactics Scales: Development and psychometric data for a national sample of American parents. *Child Abuse & Neglect, 22,* 249–270. doi:10.1016/s0145-2134(97)00174-9

1. How Does Mothering Look Like: A Multidimensional Approach to Maternal Cognitive Representations [3]

Abstract

From a cognitive information processing perspective, parents' cognitive schemas strongly influence the way they perceive and act towards their children.

In order to explore how maternal cognitive representations about parenting are organized in a multi-dimensional space, mothers referred to child protection services and mothers with no such referral completed a free description task of maternal attributes and a sorting task of those attributes according to their probability of co-occurrence in the same mother.

Overall, the results suggest that maladaptive parenting seems to be associated with less positive parental schemata, higher schemata rigidity and higher external attributions regarding parenting.

Using MDS to represent the structure and content of maternal schemata constitutes an innovative contribution to the parenting domain with potential applications. These conceptual maps representing maternal schemata that shape parental responses in childrearing situations can be used as theoretical frameworks to develop empirically based guidelines for intervention work with maltreating parents.

Keywords: maternal representations; maladaptive parenting; multidimensional scaling; parent-child relations; parental cognitions.

[3] Camilo, C., Garrido, M. V., Ferreira, M. B., & Calheiros, M. M. (2019). How does mothering look like: A multidimensional approach to maternal cognitive representations. *Journal of Family Issues*, *40*, 2528–2552. doi:10.1177/0192513X19860171

Introduction

Cognitive science applied to parenting emphasizes the importance of parental knowledge structures (i.e., perceptions, expectations, beliefs and ideas about parenting and children) in guiding adequate parental responses. This approach has allowed for a better understanding of the origins of risk in parenting (e.g., Azar, Reitz, & Goslin, 2008; Crittenden, 1993; Milner, 1993, 2003). Indeed, the content and structure of maternal schemata is known to influence mothers' interpretation of child signals as well as their responses in childrearing situations (e.g., McCarthy et al., 2013). This is to say that the way mothers represent mothering can influence their maternal practices and ultimately child abuse and neglect.

Cognitive representations are defined as knowledge stored in memory regarding situations, people and social groups. These representations influence people's feelings and behaviors (e.g., Smith & Mackie, 2009). With the development of cognitive science, cognitions in general and mental representations in particular began to be regarded as empirically researchable concepts whose existence is independent from particular theoretical approaches (e.g., Garrido & Garcia-Marques, 2003; Garrido, Azevedo, & Palma, 2011). Cognitive representations include concepts as attitudes (Allport, 1935), person impressions (Asch, 1946), stereotypes (Allport, 1954), as well as perceptions and attributions (Jones & Davis, 1965). In the parenting domain, these mental representations include for example, efficacy cognitions related to children and parent-child interactions, and with family life in general (Sigel & McGillicuddy-De Lisi, 2002). This line of research also specifies the cognitive factors underling adaptive and maladaptive parenting, as "Mothers with flexible, complex, and appropriately differentiated schemata are better equipped to perceive the nuances of mother–child interaction and avoid biases in cue processing, leading to more efficient and competent parenting" (Azar et al., 2008, p.298).

Without questioning the importance of ecological perspectives (e.g., Belsky, 1993) in the explanation of parenting, and particularly of abuse and neglect (Dubowitz, Black, Starr, & Zuravin, 1993), the socio-cognitive approach to parenting here adopted aims at complementing these perspectives by emphasizing the role of information processing mechanisms in explaining parental cognitions namely those related to abusive and neglectful parenting (Azar et al., 2008; Milner, 2003). Several studies have been exploring this theoretical model in order to identify the associations between parental schemata and maladaptive parenting. Specifically, physical abuse has been associated with a) unrealistic expectations about child development (e.g., Slep & O'Leary, 2007); b) more negative evaluations of child misbehaviors (e.g., De

Paúl, Asla, Pérez-Albéniz, & Cádiz, 2006); c) higher belief in the value of corporal punishment (Crouch & Behl, 2001); d) self-attributions to external locus of control (McElroy & Rodriguez, 2008); e) inadequate parenting attitudes (e.g., Rodriguez, Smith, & Silvia, 2016); f) higher accessibility of negative schemata attributes (e.g., Hiraoka et al., 2014); and g) less empathy (e.g., Rodriguez & Tucker, 2015). Studies conducted with neglectful parents are scarcer than those conducted with physically abusive parents but have already shown that neglectful parents demonstrate higher unrealistic expectations (Azar, Stevenson, & Johnson, 2012; Azar, Robinson, Hekimian, & Twentyman, 1984) and lower empathic concern (Rodrigo et al., 2011).

Although several authors (e.g., Giovannoni, 1989) pointed out that the study of parenting, especially abuse and neglect, should take into account parents' values that frame family life and education without imposing theoretically driven constraints, research about parental cognitions has not yet looked at the fundamental dimensions individuals *spontaneously* use when making sense of the different aspects (e.g., attributes, activities, emotions) involved in parenting. By *spontaneously used dimensions* we mean the ones that come to mind in the absence of theoretical constraints imposed by the research methods. In fact, most research conducted on parenting and maltreatment has relied on instruments (e.g., rating scales or questionnaires; Milner, Robertson, & Rogers, 1990) that may have constrained participants' responses to the theoretically derived dimensions underlying the development of those instruments in the first place. This research has been quite successful in finding theory supporting evidence but it may have neglected other potentially relevant dimensions people might naturally use. For example, in the domain of abusive parenting it has often been debated whether or not the concept of maltreatment constitutes an imposition of the values of the researchers, professionals, and favored classes on less privileged social classes or minority groups rather than a reflection of social reality (e.g., Giovannoni, 1989). In sum, previous research about parenting and abusive parenting has rarely explored, in a bottom-up way, how parents in general and abusive and neglectful parents in particular perceive, evaluate and define parenthood and (mal)adjusted parenting.

The social cognition approach to cognitive representations, namely implicit theories of personality (ITP; Bruner & Tagiuri, 1954) - widely shared mental representations about how different personality traits tend to occur in the same individual - may constitute a fruitful avenue to explore maternal schemas. Decades of research on ITP have converged on the identification of two main evaluative dimensions: a social and an intellectual dimension, each of them with positive and negative poles (Abele, Cuddy, Judd & Yzerbyt, 2008; but see also Koch, Imhoff,

Dotsch, Unkelbach, & Alves, 2016), following a principle of evaluative consistency (people tend to infer positive attributes in the presence of other positive attributes, and to infer negative attributes in the presence of other negative attributes). Rosenberg, Nelson and Vivekananthan (1968) were pioneers in the description of personality impressions using multidimensional scaling. In their seminal study, participants began by sorting 64 personality traits into different groups. Having as grouping criterion the traits perceived as co-occurring in the same individual, the authors used multidimensional scaling to extract, in a bottom-up way, the fundamental dimensions underlying the relationships between the personality traits. The two aforementioned main evaluative dimensions emerged: a social dimension, which includes traits such as *happy*, *sociable*, and *sincere*, versus *unpopular*, *unsociable* and *cold*, and an intellectual dimension, which includes traits such as *persistent*, *determined*, and *skillful*, versus *frivolous*, *unintelligent* and *fool* (Rosenberg et al., 1968). Over the last decades many studies have replicated the bi-dimensional structure of ITP's proposed by Rosenberg and collaborators (1968) and validated the social-intellectual dimensions across different countries (e.g., Ferreira et al., 2011; Fiske, Cuddy, & Glick, 2007) and population groups (e.g., children, elderly, disabled people, gender, nationalities; for a review see Abele et al., 2008).

Remarkably, neither the social perception of mothering nor mothers as a source of these perceptions have ever been systematically examined from a multidimensional perspective with similar data driven methods. However, the study of mothers' mental representations about mothering is crucial, since these representations influence how they perceive and interact with their children and may reveal important determinants of parenting and child maltreatment. Multidimensional scaling constitutes a suitable way to explore which dimensions typically underlie such representations and to reveal whether there are differences in these dimensions between maltreating and non-maltreating parents.

This paper presents two studies that examine the differences between the representations of mothering in mothers referred to child protection services and mothers with no referral to these services. Study 1 was conducted to obtain a set of attributes, behaviors and feelings associated with parenting, that mothers spontaneously evoke in a free description task, in order to explore the contents of mothers' cognitions about mothering, their perceived valence and their perceived likelihood of occurrence, comparing mothers with children referred to child protection services and mothers with no reference to these services. Study 2 was designed to examine how the attributes generated in Study 1 were represented in a multidimensional

structure (e.g., Rosenberg et al., 1968), as well as whether these representations differed among referred and non-referred mothers.

Despite the exploratory nature of the current studies, we expected differences between mothers referred to child protection services and non-referred mothers, in particular regarding: a) the valence of the attributes, with referred mothers presenting a more negative representation of motherhood (e.g., higher generation of negative attributes, evaluation of the attributes as more negative, evaluation of negative attributes as more likely); b) the complexity of the representations' structure, with referred mothers presenting less complex representations than non-referred mothers; and c) the contents of the dimensions represented in the multidimensional structure.

Study 1

Method

Participants. Seventy mothers participated in the study (M_{age} = 34.9, *SD* = 6.4). Thirty-five had children referred to child protection services (referred group) and the remaining 25 were not referred to these services (non-referred group). On average, mothers had two children (*SD* = 1.2). Despite our efforts to balance the sociodemographic characteristics of both groups, referred mothers had lower income (81.8% had an income lower than 500€ per month, compared with 25% of the non-referred group) and lower educational level (94.3% did not go further than high school while in the non-referred group 48.6% proceeded to university).

Instrument. The instrument consisted of a short questionnaire with three sequential tasks.

Free generation of words associated with the maternal role. The first part of the questionnaire requested a) a first list of 10 words (attributes, characteristics, interests or other words) associated with the role of a mother; and subsequently b) a second list of 10 positive words and 10 negative words (order counterbalanced) associated with the role of a mother. The request for a second list of words of different valence (10 positive and 10 negative) was made to assure that both positive and negative words would be mentioned.

***Evaluation of valence*.** The second part asked the participants to evaluate the valence of each word listed (from the first and the second lists) on a scale ranging from -2 (very negative) to +2 (very positive)(e.g., Haddock, Zanna, & Esses, 1993).

***Assessment of the probability of occurrence*.** In the last section participants were asked to indicate the percentage of mothers who, in their opinion, could be characterized by each of the words generated on a scale ranging from 0 to 100 (Haddock et al., 1993).

Procedure. The study was approved by the university Research Ethics Board. After obtaining the permissions from the institutions, data from the referred mothers were collected in an agency of child protection services and data from the non-referred group of mothers was collected in a private institution of social assistance[4].

After being informed about the study and its goals, mothers were invited to complete the task in individual sessions. First, they were told that they would be asked to complete a questionnaire examining ideas and opinions associated with mothering, with no correct or incorrect answers. Then, they were informed about the ethical procedures, received guarantee of the confidentiality of their data and that data analysis would be conducted on aggregate data and not on their individual responses. Whenever they accepted to participate, mothers signed the informed consent. After collecting the socio-demographic information, the questionnaire was applied. Before participants began responding they were provided (in addition to the instructions) with some (non-related) examples to make it easier to understand what was being asked (e.g., the words associated with a football player could be athletic, strenuous, sportsman, run, money, cars).

Participants were asked to respond as quickly as possible and according to their intuition. In the end, they were thanked for their collaboration. All individual sessions were conducted by a researcher with experience in working in the child protection system.

Results

The first list of words generated included 275 parenting-related attributes, and the second list included additional 283 positive and 276 negative parenting-related attributes. On average, participants provided 8.4 attributes in the first list, and 7.3 positive and 6.5 negative attributes in the second list. These numbers indicate that participants understood the task and had no difficulty in complying with the instructions.

[4] As maltreatment and neglect are often associated with risk factors such as poverty, low educational level, high number of children, among others (e.g., Evans & English, 2002), data from the non-referred group of mothers was collected in a private institution of social solidarity where, given the nature of the provided social support, users were more likely to have demographic characteristics similar to those of referred mothers.

According to linguistic criteria, similar words (including singular and plural, feminine and masculine, different verb tenses and different grammatical forms) were aggregated. The attribute form with the highest frequency was used to name each aggregate of similar words in data analysis; in the case of attributes with the same frequency, the singular and feminine attribute were selected (for a similar strategy see Calheiros, Garrido, Lopes, & Patrício, 2015; Garrido, Patrício, Calheiros, & Lopes, 2016; Lopes, Calheiros, Patrício, & Garrido, 2017). Following this procedure we obtained 217 parenting-related attributes in the first list, and additional 210 positive and 220 negative parenting-related attributes in the second list. The frequency, average valence and average likelihood of occurrence were calculated for each attribute.

Data was analyzed with *IBM SPSS 24*. Dependent measures for comparative analyses included the mean number of attributes generated by each participant in the first list, and the mean number of positive and negative attributes generated in the second list, as well as the mean ratings of valence and likelihood of occurrence of the attributes generated in the two lists.

Number of attributes. The number of attributes generated in the first list (M = 8.31, SD = 1.99) was higher than the number of positive (M = 7.14, SD = 2.42), $t(69) = 4.624$, $p < .001$, d = 0.53, and negative attributes generated in the second list (M = 6.50, SD = 2.38), $t(69)$ = 6.119, $p <$. 001, d = 0.83. This was not surprising as the positive and negative attributes were requested after the first list of attributes. The overall number of attributes generated in the first and second lists did not differ between referred and non-referred mothers, all $t < 1$.

Overall, regarding the second list, mothers reported significantly more positive (M = 7.14, SD = 2.42) than negative attributes (M = 6.50, SD = 2.38), $t(69) = 2.354$, $p = .021$; d = 0.27. However, while the non-referred group reported more positive (M = 7.34, SD = 2.59) than negative attributes (M = 6.49, SD = 2.22), $t(34) = 2.214$, $p = .034$; d = 0.35, in the referred group of mothers this difference was not significant (M = 6.49, SD = 2.25; for positive and M = 6.51, SD = 2.56 for negative attributes), $t(34) = 1.106$, $p = .276$. This result suggests that referred mothers tend to attribute less overall positivity to mothering than non-referred mothers, as both referred and non-referred mothers are "equally" negative in the attributes listed but referred mothers are less positive than non-referred mothers.

Valence. The mean valence of the first list of attributes (M = 1.63, SD = 0.41) was significantly above the scale midpoint, $t(69) = 32.986$, $p < .001$. This pattern was observed for both referred (M = 1.64, SD = 0.37), $t(34) = 26.179$, $p < .001$, and non-referred mothers (M =

1.62, *SD* = 0.46), *t*(34) = 20.948, *p* < .001), which indicates that when asked to think about "the role of a mother", mothers tend to classify the generated attributes as more positive than negative.

As a manipulation check, we looked at the valence ratings of the positive and negative attributes of the second list. As expected, the valence of the positive attributes from the second list (*M* = 1.82, *SD* = 0.24) was rated significantly above the scale midpoint, *t*(69) = 64.449, *p* < .001, both by the referred group (*M* = 1.81, *SD* = 0.28), *t*(34) = 38.199, *p* < .001, and the non-referred group (*M* = 1.84, *SD* = 0.19), *t*(34)=58.349, *p* < .001. The negative attributes from the second list (*M* = −1.66, *SD* = 0.47) were rated significantly below the scale midpoint, *t*(68) = −29.555, *p* < .001, both by the referred (*M* = -1.66, *SD* = 0.49), *t*(33) = −19.904, *p* < .001, and the non-referred mothers (*M* = -1.66, *SD* = 0.45), *t*(34) = −21.649, *p* <.001. These results confirm that participants understood the task and complied with the instructions. No differences were found between referred and non-referred mothers regarding the valence ratings of the attributes from all lists, all *t* < 1.

Probability of occurrence. Results showed that the percentage of mothers who could be characterized by the first list of attributes (*M* = 69.26, *SD* = 15.49) was significantly above the scale midpoint (50%), *t*(68) = 10.333, *p* < .001, by both the referred (*M* = 67.66, *DP* = 17.18), *t*(33) = 5.995, *p* < .001, and the non-referred group, (*M* = 70.82, *DP* = 13.72), *t*(34) = 8.979, *p* < .001. The percentage of mothers who could be characterized by positive attributes (*M* = 71.30, *DP* = 14.44) was significantly rated above the scale midpoint, *t*(68) = 12.250, *p* < .001, and by both the referred (*M* = 69.13, *DP* = 15.85), *t*(33) = 7.039, *p* < .001, and the non-referred group (*M* = 73.40, *DP* = 12.81), *t*(34) = 10.809, *p* < .001. Nevertheless, the percentage of mothers who could be characterized by negative attributes was not significantly different from the scale midpoint (*M* = 47.08, *SD* = 21.64), for both the referred (*M* = 51.04, *SD* = 20.55), and the non-referred group (*M* = 43.35, *SD* = 22.27), all *p* > .086. Moreover, the perceived percentage of mothers described by positive attributes (*M* = 71.02, *DP* = 14.36) was significantly higher than the percentage of mothers described by negative attributes (*M* = 47.08, *DP* = 21.64), *t*(67) = 6.697, *p* < .001; *d* = 1.30, both for the referred group, *t*(32) = 3.435, *p* = .002; *d* = 0.96, and the non-referred group, *t*(34) = 6.168, *p* < .001; *d* = 1.65. No significant differences emerged between referred and non-referred mothers regarding the probability of occurrence of the attributes, all *p* > .143.

Study 2

Method

Participants. A different sample of 71 mothers participated in the study (*M* = 35.9 years, *SD* = 7.6). Thirty-six with children referred to child protection services (referred group) and the remaining 35 without children referred to these services (non-referred group). On average, mothers had two children (*SD* = 1.2). Despite our best efforts to balance the sociodemographic characteristics of both groups, referred mothers had lower income (69.7% had an income lower than 500€ per month, compared with 33.3% of the non-referred group) and lower educational level (94.4% did not go further than high school while in the non-referred group 54.3% proceeded to university).

Instrument. The instrument consisted of a list of attributes selected from Study 1. First, words generated by both groups of mothers were aggregated. Second, these attributes were ordered by frequency of occurrence (number of times that the attribute was reported). Finally, we calculated Katz and Braly indexes (Katz & Braly, 1933) for positive and negative attributes to reach a final number of words. The Katz and Braly Index usually applied in the stereotypes literature serves to estimate the consensus regarding the attributes / traits assigned to a given group. This index is obtained by computing the number of attributes required to reach 50% of the total cumulative frequency of the attributes used to describe the category or group. Thus, the smaller the number of attributes needed to describe the category, the clearer the stereotype (i.e., the higher the consensus among the participants regarding the group characterization). With these procedures, 24 positive and 34 negative attributes were selected. Third, some of the selected attributes were transformed into adjectives (e.g., *love* into *loving*), and three words that were not traits, adjectives or feelings were dropped (*kisses*, *caress* and *walks*) and replaced by three other attributes with similar frequency and referred by both groups (*worry*, *present* and *smiling*).

As pointed out in the "multiple selves" literature (Roberts & Donahue, 1994), there are personal characteristics that go beyond a specific social role (e.g., mother's role). In order to promote a higher variability in the multidimensional structure we searched for additional attributes that did not appear in Study 1 and that previous research on ITPs has consistently shown to be the best representatives of the semantic dimensions that typically emerge regarding the general self. Specifically, we wanted to make sure that the following dimensions (and their most representative attributes) were included: competence (*competent*, *incompetent*, *confident*,

halting, *capable*, *incapable*, *skillful* and *unskillful*) and sociability (*friendly*, *unfriendly*, *warm*, *cold*, *good-natured*, *bad-natured*, *sincere* and *false*; Cuddy, Fiske, & Glick, 2008; Cuddy et al., 2009), trustworthiness (*attractive*, *unattractive*, *reliable*, *dishonest*, *sensitive*, *insensitive*, *responsible* and *irresponsible*) and dominance (*dominant*, *submissive*, *physically strong*, *physically weak*, *threatening*, *gentle*, *aggressive* and *tender*; e.g., Oosterhof & Todorov, 2008), status (*employed*, *unemployed*, *rich*, *poor*, *well-educated*, *less-educated*, *successful* and *unsuccessful*; e.g., Cuddy et al., 2008, 2009), and finally two attributes of general valence (*pleasant* and *unpleasant*). From this set of attributes, more than half completely (e.g., *responsible*, *cold*) or partially (e.g., *bad-natured/bad; friendly/friend)* overlapped with those listed in the first study. After the selection of the additional attributes, the final instrument included 89 attributes (44 positive and 45 negative), as well as a sociodemographic questionnaire. The attributes were printed in cards of 21cm x 5cm.

Each participant was given the standard instructions of the grouping task used in ITP studies using multidimensional scaling (e.g., Rosenberg et al., 1968):

In this study we are interested in knowing the characteristics that, in your opinion, best describe different types of mothers. We will provide you a set of words that represent personality traits, feelings and behaviors from a diverse set of mothers. Your task is to group these words together to form several categories. In other words, you should put together the attributes that characterize the same mother on the same stack and put items that rarely occur in the same mother in different stacks. One way to accomplish this task is to think of several types of mothers you know (friends, family, neighbors, public figures, etc.) who are quite different from each other. Each group of words will then correspond to the profile of each of these mothers. You can use the categories you want but try not to use more than 10. You can also use an additional category "Miscellaneous" to include those features that do not seem to fit into any of the profiles you've created, but this category should only be used as a last resource.

Procedure. After obtaining the approval of the university Research Ethics Board and the permission from the institutions, data were collected in an agency of child protection services (referred mothers) and in a private institution of social solidarity (non-referred mothers). Ethical procedures were strictly followed. The task was conducted in individual sessions by a researcher with experience in the child protection system. Participants were informed that they would participate in a study examining ideas associated with mothering, and that there were no correct or incorrect answers. After reading and signing the informed consent, socio-

demographic information was collected and the task was applied. In the end, participants were thanked, debriefed and received a 5€ gift card.

Results

According to MDS methodology (e.g., Schiffman, Reynolds, & Young, 1981), the data collected were first introduced in a matrix of 89 lines by 89 columns for each participant. The co-occurrence of each pair of traits was introduced in each cell of the matrix - 0 (no co-occurrence) or 1 (co-occurrence). In a second stage, the individual matrices of each participant were grouped into two separate matrices (for referred mothers and for non-referred mothers). In both matrices, high values in a pair of attributes meant that several participants had placed that pair together in the same cluster, and low levels meant the reverse. The attributes included in the "miscellaneous" group were not considered for the analyses. Finally, similarities between attributes were analyzed with Multidimensional Scaling (Kruskal, 1964) for each group of the sample using the *Proxscal* algorithm implemented in *SPSS Statistics* (v.20, IBM SPSS, Chicago, IL).

The selection of the minimum number of dimensions required to parsimoniously reproduce the similarities between the attributes was evaluated according to the Scree Plot criterion of the graphs of the transformed proximities versus distances (Maroco, 2011). The final quality of the model was evaluated by *STRESS-I* and *DAF* (*Dispersion Accounted For*) using the reference values defined in Maroco (2011). Note that *stress* is a measure of mediocrity of the solution, and the higher the stress, the worse the quality of the retained solution; *DAF* refers to the dispersion of proximities and should be interpreted as R^2 in a linear regression (Maroco, 2011).

The outcome of this procedure constitutes a measure of proximity that reflects the proportion of times that the attributes are put together by the participants, that is, their frequency of co-occurrence. Attributes seen as similar or related are located close to each other. In other words, a group or social category that is perceived as having one of the attributes is likely to be perceived as having the other as well. Attributes seen as different are positioned far from each other, that is, it is unlikely that these attributes are perceived as co-occurring in the same category.

Referred mothers. According to the quality criteria of the solution, two dimensions were retained. These were able to reproduce appropriately the observed perceptions of referred

mothers (*STRESS-I* = 0.150; *DAF* = 0.977). Figure 1 shows the two-dimensional configuration based on the perceived similarities among the attributes about parenting by the referred mothers. By analyzing the positions of the attributes, two broad dimensions emerged: *Responsiveness* and *Status*.

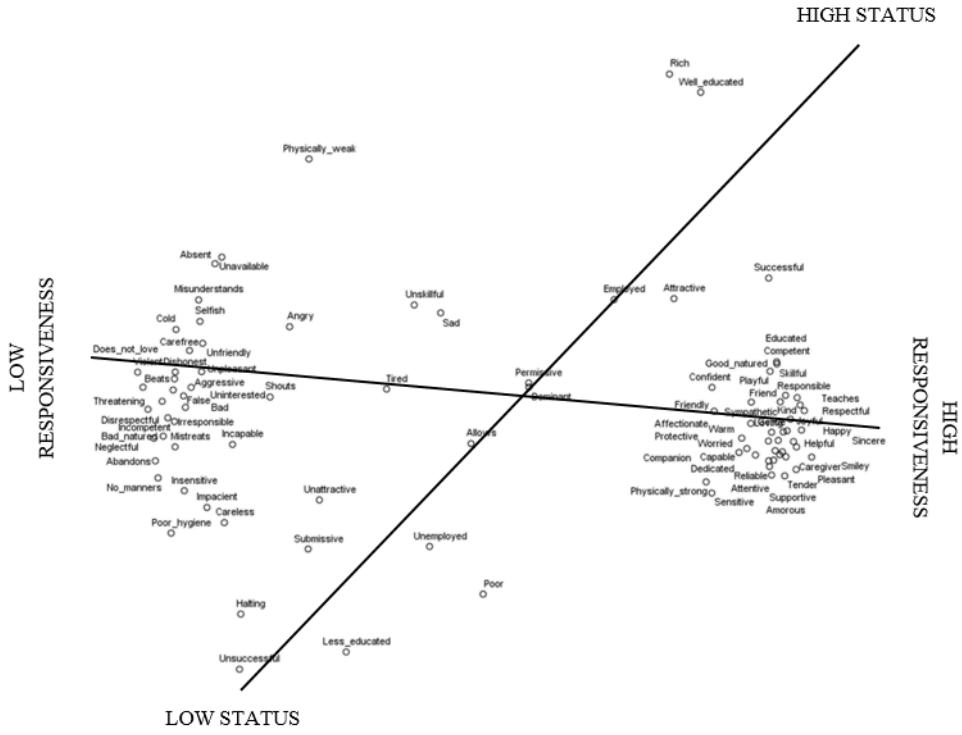


Figure 1. Two-dimensional configuration of 89 traits showing best-fitting axes of "Valence" and "Status" in the group of referred mothers.

The most important dimension was *Responsiveness*, and is plotted on the right and left areas, with the right hand side characterized by positive attributes such as *friendly*, *affectionate*, *warm*, *respectful*, *responsible*, *sincere* and *helpful*, and the left hand side by negative attributes such as *unfriendly*, *carefree*, *dishonest*, *aggressive*, *violent*, *uninterested* and *cold*. This dimension includes characteristics of sociability, trustworthiness and competence. The other dimension, represented in the upper and lower areas, is *Status,* with the upper pole representing attributes of high status (e.g., *rich, well-educated* and *successful*) and the lower pole representing attributes of low status (e.g., *poor, less-educated* and *unsuccessful*).

Regarding *Responsiveness*, it is worth noticing that the positive cluster of this dimension reveals higher density than its negative cluster. This higher density of positive information in mental representations is a well-known phenomenon and is usually taken as evidence that positive information is more similar or less distinctive in meaning than negative information in impression formation (Unkelbach, Fiedler, Bayer, Stegmüller, & Danner, 2008).

In addition, the two dimensions are not fully orthogonal, as "high responsiveness" is closer to "high status" and "low responsiveness" to "low status". This suggests the existence of a halo-effect where good (i.e., responsiveness attributes) tends to go with good (i.e., high status) and bad (i.e., unresponsiveness attributes) with bad (low status; see Rosenberg et al., 1968).

Non-referred mothers. Regarding the results of the non-referred group, the two dimensions retained reproduced appropriately the observed perceptions of these mothers (*STRESS-I* = 0.198; *DAF* = 0.961). Figure 2 shows the two-dimensional configuration of non-referred mothers. By analyzing the positions of the attributes, one of the dimensions seems to overlap the pattern observed for the referred group, namely the *Responsiveness* dimension, while the second dimension presents a different configuration of attributes.

Specifically, the *Responsiveness* dimension includes attributes such as *attentive*, *tender*, *sincere*, *protective*, *sensitive*, *caregiver* and *playful* on the positive pole, and *unpleasant*, *uninterested*, *neglectful*, *selfish*, *irresponsible*, *cold* and *disrespectful* on the negative pole. This dimension is represented in the horizontal axis, with the positive attributes of a mother represented on the left hand side and the negative attributes placed on the right hand side. Moreover the negative pole of attributes suggests different forms of being a mother, with attributes of a "passive" mother clustered together (e.g., *neglectful*, *uninterested*, *incompetent*, *incapable*, *absent*), while attributes of an "aggressive" mother tend to form another cluster (e.g., *violent*, *threatening*, *aggressive*, *mistreats*, *impatient*). In the vertical axis another dimension emerged, characterized with attributes such as *dominant*, *physically strong* or *physically weak* and *submissive*. We named this dimension *Control*. "High control" attributes cluster together at the bottom and "low control" attributes at the top.

As in the referred mothers, the non-referred group also displayed higher density of positive information. Moreover, the two dimensions were not fully orthogonal, "high responsiveness" is closer to "high control" and "low responsiveness" is closer to "low control", suggesting once more the existence of a halo-effect.

Figure 2. Two-dimensional configuration of 89 traits showing best-fitting axes of "Valence" and "Dominance" of non-referred mothers.

Discussion

In an attempt to characterize the semantic organization of the mental representations of mothering and to compare the representations held by referred mothers and mothers with no reference to child protection services, we conducted two studies that revealed specific contents and dimensions of their representations about the parental function.

Results of Study 1 showed that, in general, mothers tend to associate the parental role to positive things, reporting more positive than negative attributes and characterizing mothers as more likely to have positive than negative attributes. However, while mothers with no reference to child protection services generated more positive than negative attributes, referred mothers generated the same number of positive and negative attributes. The lower cognitive accessibility of positive attributes in the referred group of mothers suggests that, overall, these mothers perceive mothering in a less positive and eventually more ambiguous way. This result

is consistent with past studies demonstrating that abusive parents reported more negative feelings related to their parenting role, such as anger, unhappiness and rigidity (Milner & Wimberley, 1980; Spinetta, 1978). However, parents' initial negative feelings and rigid preconceptions concerning parenthood are not the only way to account for this result. Another possible explanation stems from the influence of parents' childrearing experiences in shaping parental cognitions as the parent-child interaction unfolds. While global beliefs (e.g., expectations about developmental milestones) may be particularly resilient to change as they are not tied to specific interactions or contexts of child rearing (e.g., Boggiano, Barret, Weiher, McClelland, & Lusk, 1987; Hess, Kashiwagi, Azuma, Price, & Dickson, 1980; McGillicuddy-DeLisi, 1982), more specific beliefs, such as parents' perceived competence and effectiveness, are likely to be more susceptible to feedback from parent-child interactions (Goodnow, 1985). Since the children's characteristics and the parent-child relationship are important sources of parental cognitions (e.g., Grusec, Hastings, & Mammone, 1994; Sperling & Mowder, 2006), mothers involved with child protection services are more likely to have undergone negative experiences in their parental role and, subsequently, to have developed more negative ideas and perceptions about parenthood. Moreover, results of Study 1 showed that the task was well-understood by the mothers, the number of attributes generated was appropriate, the valence difference between negative and positive attributes was as expected, and the likelihood ratings were high, suggesting that the generated attributes were suitable for the multidimensional analysis conducted in Study 2.

Study 2 used multidimensional scaling and showed that cognitive representations of mothering were organized in two main dimensions. For both groups of mothers, a *Responsiveness* dimension emerged, composed of attributes that are theoretically grounded in the dimensions of sociability, trustworthiness and competence of a mother. The second dimension differed between the groups, namely a dimension with attributes of *Status* emerged for the referred group, and a dimension of *Control* for the non-referred group.

The first and most important dimension that emerged in both groups - *Responsiveness* – is characterized by attributes of sociability, trustworthiness and competence in their positive and negative poles (social/unsocial; trustworthy/untrustworthy; competent/incompetent). This dimension leads us to Baumrind's concept of responsiveness: "Responsiveness refers to emotional support, warmth, and actions that intentionally foster individuality and are acquiescent to the child's needs and demand" (Baumrind, Larzelere, & Owens, 2010, p.162). Overall, positive information in this dimension seemed to be less distinctive in meaning than

negative information for both groups. In line with Unkelbach et al. (2008)'s density hypothesis, positive information has a processing advantage because is more similar to other positive information compared to the overall similarity of negative information. However, it seems that for non-referred mothers (compared to referred mothers), the negative pole of *Responsiveness* dimension is more complex and descriptive, representing various forms of negative parenting suggesting that they are more informed about parenting and they are more aware of different parental responses, even if they do not use them. Their semantic map suggests the contrast between passive mothers, characterized with attributes related to indifference and detachment, which are characteristics of parental neglect, and aggressive mothers characterized with aggressive-oriented attributes usually related with physical abuse. Referred mothers seem to think about inadequate parenting in a less complex manner, as suggested by the higher density of negative attributes in their semantic map, when compared to the non-referred mothers' semantic representation of motherhood. These somehow more simplistic schemata in referred mothers has already been suggested by previous research, showing that abusive parents have less control techniques, revealing simple standards of punishment (Bugental, 2004), and schemata rigidity (Azar et al., 2008; Cole & Reitz, 2005).

The greater complexity of the perceptions about maladaptive parenting held by non-referred mothers may be, at least partially, the result of their higher educational and socioeconomic level. Such possibility is consistent with the emergence of more multifaceted knowledge structures. It is known that low levels of education of parents have been associated with child neglect (e.g., Casady & Lee, 2002; Coohey, 2007), which can lead us to think that this lower complexity of parental schemata is related with a general lack of cognitive functioning, and not specific to parenting cognitions. However, and despite the fact that the differences in schema complexity are associated with sociodemographic variables (e.g., Calheiros & Rodrigues, 2016; Narciso et al., 2018; Sameroff & Fiese, 1992), previous studies about the definitions of child abuse and neglect have shown that mothers are homogeneous in their conceptions about the basic elements of caregiving independently of their educational and socioeconomic level (Polansky, 1981).

Regarding the second dimension, a *Status* dimension (with high and low-status poles) was observed for the referred mothers; whereas for the non-referred mothers, the attributes characterizing the second dimension pertain mainly to a *Control* dimension, with low-control and high-control poles. Specifically, while attributes like *rich/ poor*, *well/ less-educated* and *successful/ unsuccessful* are central of the status dimension for referred mothers, these same

attributes lose importance in the explanation of the second dimension of non-referred mothers. For these mothers, the "core" attributes of the second dimension are *physically strong/ weak* and *submissive*/*dominant*. Despite the differences observed in the bi-dimensional semantic spaces, in both groups of mothers the two dimensions were not fully independent of each other, indicating the existence of a halo effect. Both high-status and high-control attributes were closer to "high-responsiveness" attributes and low-status and low-control attributes were closer to "low-responsiveness" attributes. Interestingly, and in line with previous research (e.g., Oliva, Moreno, Palacios, & Saldaña, 1995), this suggests that, for referred mothers, contextual and exogenous attributes (like *poor/ rich* or *well/ less educated*) are associated with parenting, while for non-referred mothers parental adjustment is more related to individual and endogenous characteristics (*submissive*/*dominant*). Furthermore, the cognitive representations observed for the group of referred-mothers indicates a need for self-protection and preservation of self-esteem. Indeed, mothers referred to the child protection system are likely to have experienced negative outcomes and to perceive lower self-efficacy in their parental role. Therefore, they may be more likely to attribute their caregiving failure to external factors that do not directly depend on them. Such interpretation is in line with a) the self-serving bias or the tendency for people to use externalization strategies to justify poor performance (e.g., Myers, 2015); and b) research evidence on the parenting domain showing that mothers with low perceived control over caregiving are more likely to show abusive and coercive parental practices (Bugental, Blue, & Cruzcosa, 1989).

Finally, it is worth noticing that the bi-dimensional mapping obtained by Rosenberg and collaborators (1968), as well as the more recent results reported by Ferreira and collaborators (2011) in a Portuguese sample of university students, was not replicated in the representation of mothering obtained with the current samples of Portuguese mothers. Instead of the classic social-intellectual dimensions, the results of our study presented a broader dimension of valence (*Responsiveness*) that conflates both dimensions of warmth and competence (e.g., Cuddy et al., 2008, 2008). This dimension is in line with Baumrind's (1968) conceptualization of authoritative parental style, which combines affection and attentive responsiveness to children's needs, imposition of clear requirements for responsible behaviors, as well as kindness, affection and understanding.

Overall, the dimensions derived from our study, using an unconstrained method, seem to be in line with other theory-driven proposals, such as the two-dimensional framework proposed by Maccoby and Martin (1983), that defined parenting in an orthogonal structure of

responsiveness and demandingness. Specifically, the *Responsiveness* dimension, referring to high/low parental sensitivity and adaptation to the child's signals, states, and needs (Maccoby & Martin, 1983). And the second dimension (*Status* for the referred and *Control* for the non-referred group), in line with the demandingness dimension, with referred mothers emphasizing external self-attributions of control (low control) and non-referred mothers focusing on internal self-attributions of control (high control).

In short, the results of the studies indicate that mothers referred to child protection services attribute less positivity to mothering, which is consistent with previous studies about parental representations (Crouch et al., 2010; Rodriguez, Cook, & Jedrziewski, 2012), and revealed a less complex constellation of negative aspects of parenting. This pattern is congruent with previous research that has associated schemata rigidity to inadequate parental practices (Azar et al., 2008; Cole & Reitz, 2005). Furthermore, these mothers showed a tendency to associate parental adjustment with external and contextual factors, which is likely to be related with low perceived control over caregiving (Bugental et al., 1989).

Important limitations of the current research stem from the one-shot nature of data collection as well as the exploratory and correlational methods used to carry on data analysis. Given the complexity of the relationships between family cognitions, emotions, and behaviors, future research could use longitudinal designs and experimental paradigms (e.g., Bugental & Johnston, 2000; Holden & Edwards, 1989) to confirm, complement and go beyond the presented findings. Additionally, in terms of socio-demographic characteristics, there were significant differences between the groups, with non-referred mothers showing higher educational level and higher income than referred mothers, which could contribute to explain the differences observed across groups. Although a more balanced sample could help disentangling these issues in the future, the differences observed between groups may mirror the reality, to the extent that low educational (e.g., Casady & Lee, 2002; Coohey, 2007) and socioeconomic levels (e.g., Kang, 2013; Klein, 2011; Magnuson & Duncan, 2002) have been associated with child abuse and neglect cases. Furthermore, while referred mothers had children referred in the child protection system, there was no control for this variable in the non-referred group. In future research, the same indicators of abuse and neglect should be evaluated across all mothers. Finally, although data collection in Study 1 was based on a completely bottom-up procedure where participants spontaneously generated attributes (descriptive of mothering) in an unconstrained way, MDS carried out in Study 2 also included attributes taken from the literature (i.e., the best representatives of different ITP's). However,

our approach is still largely unconstrained when compared with typically used top-down instruments like self-report questionnaires or rating scales. First participants were not directly questioned on different theoretically driven attributes; they just had to put in the same piles the attributes they felt that went together. Second, attributes that were not perceived as relevant could be put in the miscellaneous category (thus not affecting the emerging ITP's of mothering). Finally, the use of self-report methods might limit the access to parental representations since these metrics depend upon a conscious awareness of feelings, cognitions and behaviors and are influenced by social desirability (e.g., Fazio & Olson, 2003). Social desirability effects are likely to be particularly impactful in child protection contexts since parents want to avoid public negative judgments or even legal intervention (Portwood, 2006). Moreover, maltreating parents may have unrealistic expectations, and judgment biases (e.g., misattribution of children's behavior) about their interactions with their children (Hansen & MacMillan, 1990; Lau, Valeri, McCarthy, & Weisz, 2006), which may influence the reports.

The current studies represent a first contribution of MDS to the parenting domain, both theoretically and empirically. At a theoretical level, the comprehension of the content and structure of maternal schemata assumes substantial importance as these cognitions shape parental responses in childrearing situations (e.g., McCarthy et al., 2013). At a more practical level, this research sets the stage to future development of empirically based guidelines for intervention work based on parental schemata (for a review see Azar, Nix, & Makin-Byrd, 2005). Specifically, a better understanding of mothers' implicit theories about mothering may help developing better intervention strategies for cognitive restructuring, problem-solving training, and re-attribution training (e.g., Azar & Wolfe, 2006; Kolko, 1996). The same may be true for the development of attachment-focused interventions (Marvin, Cooper, Hoffman, & Powell, 2002), parent training (Camilo & Garrido, 2013; Webster-Stratton, 1981), and societal level prevention such as mass media campaigns (Sanders, 1996). Last but not least, these results may inform the development of intervention programs that consider implicit family and education conceptions supported by different social groups and recognize implicit values, ideas and beliefs of parents that influence their disciplinary choices (Camilo, Garrido, & Calheiros, 2016; Garbarino, Cohn, & Ebota, 1982; Mann, 1990).

References

Abele, A. E., Cuddy, A. J. C., Judd, C. M., & Yzerbyt, V. Y. (2008). Fundamental dimensions of social judgment. *European Journal of Social Psychology, 38,* 1063–1065.

Allport, G. W. (1945). *The nature of prejudice*. Reading, UK: Addison-Wesley.

Allport, G. W. (1935). Attitudes. In C. Murchison (Ed.). *Handbook of social psychology*. Worcester, MA: Clark University Press.

Asch, S. E. (1946). Forming impressions of personality. *Journal of Abnormal and Social Psychology, 41,* 258–290.

Azar, S. T., Nix, R. L., & Makin-Byrd, K. N. (2005). Parenting schemas and the process of change. *Journal of Marital and Family Therapy, 31*, 45–58.

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

Azar, S. T., Robinson, D. R., Hekimian, E., & Twentyman, C. T. (1984). Unrealistic expectations and problem-solving ability in maltreating and comparison mothers. *Journal of Consulting and Clinical Psychology, 52,* 687–691.

Azar, S. T., Stevenson, M. T., & Johnson, D. R. (2012). Intellectual disabilities and neglectful parenting: Preliminary findings on the role of cognition in parenting risk. *Journal of Mental Health Research in Intellectual Disabilities, 5,* 94–129.

Azar, S. T. & Wolfe, D. (2006). Child physical abuse and neglect. In E. J. Mash & R. A. Barkley (Eds.), *Treatment of childhood disorders* (3rd ed., pp.595-646). New York: Guilford Press.

Baumrind, D. (1968). Authoritarian vs. authoritative parental control. *Adolescence, 3,* 255–272.

Baumrind, D., Larzelere, R. E., & Owens, E. B. (2010). Effects of preschool parents' power assertive patterns and practices on adolescent development. *Parenting: Science and Practice, 10,* 157–201.

Belsky, J. (1993). Etiology of child maltreatment: A developmental-ecological analysis. *Psychological Bulletin, 114,* 413–434.

Boggiano, A. K., Barret, M., Weiher, A. W., McClelland, G. H., & Lusk, C. M. (1987). Use of the maximum-operant principle to motivate children's intrinsic interest. *Journal of Personality and Social Psychology, 53,* 866–879.

Bruner, J. S., & Tagiuri, R. (1954). The perception of people. In G. Lindzey (Ed.), *Handbook of social psychology* (Vol. 2, pp. 634–654). Cambridge, MA: Addison-Wesley.

Bugental, D. B. (2004). Thriving in the face of early adversity. *Journal of Social Issues, 60,* 219–235.

Bugental, D. B., Blue, J., & Cruzcosa, M. (1989). Perceived control over caregiving outcomes: Implications for child abuse. *Developmental Psychology, 25,* 532–539.

Bugental, D. B. & Johnston, C. (2000). Parental and Child Cognitions in the Context of the Family. *Annual Review of Psychology, 51,* 315–344.

Calheiros, M. M., Garrido, M. V., Lopes, D., & Patrício, J. N. (2015). Social images of residential care: How children, youth and residential care institutions are portrayed?. *Children and Youth Services Review, 55,* 159–169.

Calheiros, M. M. & Rodrigues, L. (2016). Parent-child interactions as a source of parent cognition in the context of child maltreatment. In J. Vala, S. Waldzus & M. M. Calheiros (Eds.), *The social developmental construction of violence and intergroup conflict* (pp. 145–169). Cham, CH: Springer International Publishing.

Camilo, C., & Garrido, M. V. (2013). Desenho e avaliação de programas de desenvolvimento de competências parentais para pais negligentes: Uma revisão e reflexão [Design and evaluation of intervention programs for neglectful parents: A review and reflection]. *Análise Psicológica, 31,* 245–268

Camilo, C., Garrido, M. V., & Calheiros, M. M. (2016). Implicit measures of child abuse and neglect: A systematic review. *Aggression and Violent Behavior, 29,* 43–54.

Casady, M. A., & Lee, R. E. (2002). Environments of physically neglected children. *Psychological Reports, 91,* 711–721

Cole, P. M., & Reitz, E. B. (2005, April). Conceptual complexity of maternal beliefs about their toddlers. In J. C. Dunsmore (Ed.), *Multicultural examination of parents' beliefs about children: Meanings, mechanisms, and methods*. Symposium presented at the Biennial Meeting of the Society for Research in Child Development, Atlanta, GA.

Coohey, C. (2007). Social networks, informal child care, and inadequate supervision by mothers. *Child Welfare, 86*, 53–66.

Crittenden, P. M. (1993). An information-processing perspective on the behavior of neglectful parents. *Criminal Justice and Behavior, 20*, 27–48.

Crouch, J. L., & Behl, L. E. (2001). Relationships among parental beliefs in corporal punishment, reported stress, and physical child abuse potential. *Child Abuse & Neglect, 25*, 413–419.

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

Cuddy, A. J. C., Fiske, S. T., & Glick, P. (2008). Warmth and competence as universal dimensions of social perception: The stereotype content model and the BIAS Map. In M. P. Zanna (Ed.), *Advances in Experimental Social Psychology* (Vol. 40, pp. 61–149). San Diego, CA: Academic Press.

Cuddy, A. J. C., Fiske, S. T., Kwan, V. S. Y., Glick, P., Demoulin, S., Leyens, J. P., ... & Ziegler, R. (2009). Stereotype content model across cultures: Towards universal similarities and some differences. *British Journal of Social Psychology, 48,* 1–33.

De Paúl, J., Asla, N., Pérez-Albéniz, A., & Cádiz, B. (2006). Impact of stress and mitigating information on evaluations, attributions, affect, disciplinary choices, and expectations of compliance in mothers at high and low risk for child physical abuse. *Journal of Interpersonal Violence, 21*, 1018–1045.

Dubowitz, H., Black, M., Starr, R. H., & Zuravin, S. (1993). A conceptual definition of child neglect. *Criminal Justice and Behavior, 20*, 8–26.

Evans, G. W., & English, K. (2002). The environment of poverty: Multiple stressor exposure, psychophysiological stress, and socioemotional adjustment. *Child Development, 73*, 1238–1248.

Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology, 54*, 297–327.

Ferreira, M. B., Garcia-Marques, L., Toscano, H., Carvalho, J., & Hagá, S. (2011). Para uma revisão da abordagem multidimensional das impressões de personalidade: O culto, o irresponsável, o compreensivo e o arrogante [For a review of the multidimensional

approach of personality impressions: The cult, the irresponsible, the comprehensive and arrogant]. *Análise Psicológica, 29*, 315–333.

Fiske, S. T., Cuddy, A. J. C., & Glick, P. (2007). Universal dimensions of social cognition: Warmth and competence. *Trends in Cognitive Sciences, 11*, 77–83.

Garbarino, J., Cohn, A., & Ebota, A. (1982). *The significance of cultural and ethnic factors in preventing child abuse: An exploration of research findings.* Chicago, IL: National Committee for Prevention of Child Abuse.

Garrido, M. V., Azevedo, C., & Palma, T. (2011). Cognição social: Fundamentos, formulações actuais e perspectivas futuras [Social cognition: Foundations, current formulations and future perspectives]. *Psicologia, 25*, 113–157.

Garrido, M. V., & Garcia-Marques, L. (2003). Em busca da distinção perdida: Acessibilidade versus disponibilidade mnésicas em cognição social [Searching for the lost distinction: Memory accessibility versus memory availability in social cognition]. *Análise Psicológica, 3*, 323–339.

Garrido, M. V., Patrício, J. N., Calheiros, M. M., & Lopes, D. (2016). Comparing the social images of youth in and out of residential care. *Journal of Community & Applied Social Psychology, 26*, 439–455.

Giovannoni, J. (1989). Definitional issues in child maltreatment. In D. Cicchetti & V. Carlson (Eds.), *Child maltreatment: Theory and research on the causes and consequences of child abuse and neglect* (pp. 3–37). New York, NY: Cambridge University Press.

Goodnow, J. J. (1985). Change and variation in ideas about childhood and parenting. In E. Sigel (Ed.), *Parental belief systems: The psychological consequences for children* (pp. 235–270). Hillsdale, N.J.: Erlbaum.

Grusec, J. E., Hastings, P., & Mammone, N. (1994). Parenting cognitions and relationship schemas. *New Directions for Child and Adolescent Development, 1994*, 5–19.

Haddock, G., Zanna, M. P., & Esses, V. M. (1994). The (limited) role of trait-laden stereotypes in predicting attitudes toward Native peoples. *British Journal of Social Psychology, 33*, 83–106.

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.

Hess, R. D., Kashiwagi, K., Azuma, H., Price, C. G., & Dickson, W. P. (1980). Maternal expectations for mastery of developmental tasks in Japan and the United States. *International Journal of Psychology, 15,* 259–271.

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.

Holden, G. W., & Edwards, L. A. (1989). Parental attitudes toward child rearing: Instruments, issues, and implications. *Psychological Bulletin, 106,* 29–58.

Jones, E. E., & Davis, K. E. (1965). From acts to dispositions: The attributions process in social psychology. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 2, pp. 219–266). New York, NY: Academic Press.

Kang, J. (2013). Instrumental social support, material hardship, personal control and neglectful parenting. *Children and Youth Services Review, 35,* 1366–1373.

Katz, D., & Braly, K. (1933). Racial stereotypes of one hundred college students. *Journal of Abnormal and Social Psychology, 28,* 280–290.

Klein, S. (2011). The availability of neighborhood early care and education resources and the maltreatment of young children. *Child Maltreatment, 16,* 300–311.

Koch, A., Imhoff, R., Dotsch, R., Unkelbach, C., & Alves, H. (2016). The ABC of stereotypes about groups: Agency/ socio-economic success, conservative-progressive beliefs, and communion. *Journal of Personality and Social Psychology, 110,* 675–709.

Kolko, D. J. (1996). Individual cognitive behavioral treatment and family therapy for physically abused children and their offending parents: A comparison of clinical outcomes. *Child Maltreatment, 1,* 322–342.

Kruskal, J. B. (1964). Multidimensional scaling by optimizing goodness of fit to a nonmetric hypothesis. *Psychometrika 29,* 1–27.

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

Lopes, D., Calheiros, M. M., Patrício, J. N., & Garrido, M. V. (2017) Development and validation of a Social Images Evaluation Questionnaire for youth in residential care. *PLoS ONE 12(6)*: e0179890.

Maccoby, E. E., & Martin, J. A. (1983). Socialization in the context of the family: Parent-child interaction. In P. Mussen (Ed.), *Handbook of Child Psychology* (Vol.4, pp. 1–110). New York: Wiley

Magnuson, K. A., & Duncan, G. (2002). Parents in poverty. In Bornstein (Ed.), *Handbook of parenting* (pp. 95– 121). Mahwah, NJ: Lawrence Erlbaum.

Mann, J. (1990). Drawing on cultural strengths to empower families. *Protecting Children, 7*, 3–5.

Marôco, J. (2011). *Análise estatística com o SPSS Statistics* (5ª ed.). Pêro Pinheiro: ReportNumber.

Marvin, R., Cooper, G., Hoffman, K., & Powell, B. (2002). The Circle of Security project: Attachment-based intervention with caregiver-pre-school child dyads. *Attachment & Human Development, 4*, 107–124.

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.

McElroy, E. M., & Rodriguez, C. M. (2008). Mothers of children with externalizing behavior problems: Cognitive risk factors for abuse potential and discipline style and practices. *Child Abuse & Neglect, 32*, 774–784.

McGaw, S., Shaw, T., & Beckley, K. (2007). Prevalence of psychopathology across a service population of parents with intellectual disabilities and their children. *Journal of Policy and Practice in Intellectual Disabilities, 4*, 11–22.

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

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

Milner, J. S., Robertson, K. R., & Rogers, D. L. (1990). Childhood history of abuse and adult child abuse potential. *Journal of Family Violence, 5*, 15–34.

Milner, J. S., & Wimberley, R. C. (1980). Prediction and explanation of child abuse. *Journal of Clinical Psychology, 36,* 875–884.

Myers, D.G. (2015). *Exploring Social Psychology* (7th ed.). New York: McGraw Hill Education.

Narciso, I., Relvas, A. P., Ferreira, L. C., Vieira-Santos, S., Fernandes, M., Santa-Bárbara, S., & Machado, I. (2018). Mapping the "good mother" – Meanings and experiences in economically and socially disadvantaged contexts. *Children and Youth Services Review, 93,* 418–427.

Oliva, A., Moreno, M. C., Palacios, J., & Saldaña, D. (1995). Ideas sobre la infancia y predisposición hacia el maltrato infantil [Ideas about childhood and predisposition towards child abuse]. *Infancia y Aprendizaje, 71,* 111–124.

Oosterhof, N. N. & Todorov, A. (2008). The functional basis of face evaluation. *Proceedings of the National Academy of Science of the United States of America, 105,* 11087–11092.

Polansky, N. (1981). *Damaged Parents*. Chicago, IL: The University of Chicago.

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.

Roberts, B. W., & Donahue, E. M. (1994). One personality, multiple selves: Integrating personality and social roles. *Journal of Personality, 62,* 199–218.

Rodrigo, M. J., León, I., Quiñones, I., Lage, A., Byrne, S., & Bobes, M. A. (2011). Brain and personality bases of insensitivity to infant cues in neglectful mothers: An event-related potential study. *Development and Psychopathology, 23,* 163–176.

Rodriguez, C. M., Cook, A. E., & Jedrziewski, 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.

Rodriguez, C. M., Smith, T. L., & Silvia, P. J. (2016). Multimethod prediction of physical parent-child aggression risk in expectant mothers and fathers with social information processing theory. *Child Abuse & Neglect, 51,* 106–119.

Rodriguez, C. M., & Tucker, M. C. (2015). Predicting maternal physical child abuse risk beyond distress and social support: Additive role of cognitive processes. *Journal of Child and Family Studies, 24*, 1780–1790.

Rosenberg, S., Nelson, C., & Vivekananthan, P. S. (1968). A multidimensional approach to the structure of personality impressions. *Journal of Personality and Social Psychology, 9*, 283–294.

Sameroff, A. J., & Fiese, B. H. (1992). Family representations of development. In I. E. Sigel, A. V. McGillicuddy-DeLisi, & J. J. Goodnow (Eds.), *Parental belief systems: The psychological consequences for children* (pp. 347–369). Hillsdale, NJ, US: Lawrence Erlbaum Associates, Inc.

Sanders, M. R. (1996). New directions in behavioral family intervention with children. In T. H. Ollendick & R. J. Prinz (Eds.), *Advances in Clinical Child Psychology* (Vol. 18). Boston, MA: Springer.

Schiffman, S. S., Reynolds, M. L. & Young, E W. (1981). *Introduction to multidimensional scaling: Theory, methods and applications*. New York, NY: Academic Press.

Sigel, I. E., & McGillicuddy-De Lisi, A. V (2002). Parent beliefs are cognitions: The dynamic belief systems model. In M. H. Bornstein (Ed.), *Handbook of parenting: Being and becoming a parent* (Vol. 3, pp. 485–508). Mahwah, NJ: Lawrence Erlbaum.

Slep, A. M. S., & O'Leary, S. G. (2007). Multivariate models of mothers' and fathers' aggression toward their children. *Journal of Consulting and Clinical Psychology, 75*, 739–751.

Smith, E. R. & Mackie, D. M. (2009). *Social psychology* (3rd ed.). New York, NY: Psychology Press.

Sperling, S., & Mowder, B. A. (2006). Parenting perceptions: Comparing parents of typical and special needs preschoolers. *Psychology in the Schools, 43*,695–700.

Spinetta, J. J. (1978). Parental personality factors in child abuse. *Journal of Consulting and Clinical Psychology, 46*, 1409–1414.

Unkelbach, C., Fiedler, K., Bayer, M., Stegmüller, M., & Danner, D. (2008). Why positive information is processed faster: The density hypothesis. *Journal of Personality and Social Psychology, 95*, 36–49.

Webster-Stratton, C. (1981). Modification of mothers' behaviors and attitudes through videotape modeling group discussion program. *Behavior Therapy, 12*, 634–642.

2. PARENTAL ATTITUDES IN CHILD MALTREATMENT [5]

Abstract

An information-processing approach to maladaptive parenting suggests that high-risk and maltreating parents are likely to hold inaccurate and biased preexisting cognitive schemata about child development and child rearing. Importantly, these schemas that may include values, beliefs, expectations and attitudes are known to influence the way parents perceive and subsequently act towards their children.

However, the few studies that specifically looked at attitudes only considered global maltreatment, not distinguishing abuse from neglect. Moreover, few have considered dual-process models of cognition, relying mostly on the explicit level of parental attitudes that can be prone to various biases. Based on the SIP model of child abuse and neglect, the current study examines the association of parents preexisting cognitive schemata, namely explicit and implicit parental attitudes, and child abuse and neglect.

A convenience sample of 201 mothers (half with at least one child referred to Child Protection Services) completed a measure of explicit parental attitudes (*AAPI*–2.1) and a speed-accuracy task related to parenting (*Implicit Parental Attitudes task*). Abuse and neglect were measured with self-report (CTS-PC and PR-MNBS) and professional-report instruments (Child *Maltreatment Severity Questionnaire; MSQ*).

Overall, the results support the hypothesis that maladaptive parenting is related with more biased preexisting cognitive schemas, namely attitudes related to parenting, but mostly for neglect and particularly when hetero-reported. Moreover, the results observed with both the explicit and implicit measures of attitudes were convergent, with mothers presenting more inadequate explicit attitudes also exhibiting an overall lower performance in the implicit attitudes task.

This study is likely to contribute to the SIP framework of child abuse and neglect, particularly for the elucidation of the socio-cognitive factors underlying maladaptive parenting, while also providing relevant cues for prevention and intervention programs.

Keywords: maladaptive parenting; child abuse and neglect; information processing; parental attitudes; parental cognitions.

[5] Camilo, C., Garrido, M. V., & Calheiros, M. M. (*under review*). Parental attitudes and child maltreatment.

Introduction

The science of parenting has long emphasized the role of parental cognitions in shaping parent-child interactions. For example, social cognitive learning theory has focused on perceptions of self-efficacy (e.g., Jones & Prinz, 2005), attachment theory on internal working models of relationships (e.g., Mayseless, 2006), and attributional theories on controllability, intentionality, locus, and stability of parent-related events (e.g., Nix, Pinderhughes, Dodge, Bates, & Pettit, 1999).

Recent cognitive approaches to parenting suggest that parental cognitions are key elements in organizing socialization goals and caregiving behaviors (e.g., Azar, Reitz, & Goslin, 2008; Bugental & Johnston, 2000; Johnston & Ohan, 2005). According to these approaches, preexisting cognitive schemas constitute crucial elements in cognitive information processing and refer to the knowledge structures that assist people in organizing their experiences and in responding to stimulus events (e.g., Johnston, Park & Miller, 2018; Sigel & McGillicuddy-DeLisi, 2002). Several studies have identified a set of parental cognitive schemas that are linked to parental behaviors and family functioning. For example, the lack of maternal knowledge about child development and child-rearing concepts has been associated with poorer family environments (e.g., Benasich & Brooks-Gunn, 1996). Further, parental attitudes about corporal punishment related to the use of coercive discipline methods towards children (e.g., Slep & O'Leary, 1998).

These socio-cognitive approaches have also been important to understand maladaptive parenting, and specifically child abuse and neglect (e.g., Milner, 2003), providing critical cues for prevention and intervention in this domain. Child maltreatment is not only harmful for the current life of the child, but also presents adverse effects on the child's later development (Jaffee & Maikovich-Fong, 2011). Additionally, child maltreatment might also represent social and economic costs for the community (Radford, Corral, Bradley, & Fisher, 2013).

The Social Information Processing (SIP) model applied to child abuse and neglect (e.g., Azar, McGuier, Miller, Hernandez-Mekonnen, & Johnson, 2017; Milner, 2003) suggests that abusive and neglectful parents cannot adequately respond to their child's needs because of errors or biases in information processing, particularly in information related to the child and the caregiving role. According to this model, preexisting schemas, when activated, may act as a filter of the environmental information to which parents are expected to attend (e.g., Azar et al., 2008). Therefore, they are likely to influence parental perceptions and interpretations about

their child's needs and behaviors, and to determine the subsequent response selection and implementation (Milner, 1993). Within this framework, the current study specifically addresses parental preexisting cognitive schemata, namely by systematically examining the association between parental attitudes and child abuse and neglect.

This association between parental attitudes and maltreatment has received some empirical support, with research showing that high-risk and maltreating parents are more likely to hold more inaccurate and biased preexisting cognitive schemata about child development and caregiving (e.g., Crouch et al., 2012; Montes, de Paúl, & Milner, 2001). Recent meta-analytic data also supports that person-specific schemata, as well as parental beliefs and attitudes, partly explain maladaptive parenting practices such as child abuse and neglect (Camilo, Garrido, & Calheiros, 2019a). Specifically, abuse has been associated with unrealistic expectations about child development (e.g., Haskett, Scott, Willoughby, Ahern, & Nears, 2006), higher belief in the value of corporal punishment (Slep & O'Leary, 2007; Wang, Wang, & Xing, 2018), self-attributions to external locus of control (McElroy & Rodriguez, 2008), higher accessibility of negative schemata attributes (e.g., Hiraoka et al., 2014), less empathic schemata (e.g., Rodriguez & Tucker, 2015), and inadequate parenting attitudes (e.g., Rodriguez, Smith, & Silvia, 2016). For instance, Rodriguez and colleagues (2016) tested the SIP model in the context of child physical abuse. In this study, expectant mothers and fathers' attitudes favouring physical discipline predicted lack of knowledge of appropriate discipline strategies and higher expectations of child compliance, which in turn increased child physical abuse risk. Although studies conducted with neglectful parents are still scarce, research has already shown that neglectful parents demonstrate higher unrealistic expectations (Azar, Stevenson, & Johnson, 2012; Azar et al., 2017), higher external locus of control (Rodriguez & Richardson, 2007), and lower empathic concern (Rodrigo, León, Quiñones, Lage, Byrne, & Bobes, 2011). Furthermore, maladaptive parenting seems to be associated with less positivity attributed to parenting, higher schema rigidity and more simplistic thinking about parenthood (Camilo, Garrido, Ferreira, & Calheiros, 2019b), even when considering parents' general intellectual functioning (Azar et al., 2012; Fontaine & Nolin, 2012).

Parents' attitudes toward parenting are part of parents' knowledge structures (Holden & Buck, 2002). In general, attitudes reflect "(a) a relatively enduring organization of beliefs, feelings, and behavioral tendencies towards socially significant objects, groups, events or symbols, and (b) a general feeling or evaluation – positive or negative – about some person, object or issue" (Hogg & Vaughan 2017, p. 154). Specifically, parental attitudes are a product

of parents' knowledge, values, beliefs and expectations towards their children, which are informed by cultural and social representations, as well as by parents' own experiences and values (Holden & Buck, 2002; Okagaki & Bingham, 2005).

Research on parental cognitions has recently draw some attention to dual-process models, namely by acknowledging that cognitions exist at different explicit and implicit levels (e.g., Johnston, Belschner, Park, Stewart, Noyes, & Schaller, 2017). Specifically, this framework suggests that cognitions exist in two qualitatively distinct processing structures: explicit level, under high levels of conscious control, and more prone to cognitive distortions and reporting biases; and implicit level, more unconscious, impulsive, and stable (e.g., Greenwald & Banaji, 1995). At an explicit level, cognitions are typically evaluated through self-report questionnaires and interviews (Jobe, 2003). To assess cognitions at the implicit level, social and cognitive psychologists have been using experimental paradigms, involving response latencies (e.g., Bargh & Chartrand, 2014) or psychophysiological measures (e.g., Blascovich, Vanman, Mendes, & Dickerson, 2011).

Parental attitudes have been typically assessed through self-report questionnaires (e.g., Okagaki & Bingham, 2005), which have a set of advantages such as direct access to thought content or ease of administration. However, these measures only assess explicit processing of events (e.g., Sturge-Apple, Rogge, Skibo, Peltz, & Suor, 2015) and are potentially prone to perceptual biases and willful reporting distortions, to avoid negative social judgment or even legal interventions (Portwood, 2006). Nevertheless, some studies have already included implicit measures to assess parental cognitions in the parenting domain, and specifically in child abuse and neglect research (for a review see Camilo, Garrido, & Calheiros, 2016). For example, Johnston and colleagues (2017) adapted an Implicit Association Test to evaluate mothers' implicit attitudes toward children in a community sample. Their results suggest that mothers' implicit positive attitudes about their children were significantly associated with less negative parenting practices, even when controlling for explicit self-reports. Further, Sturge-Apple and colleagues (2015) used a Go/No-go Association Task to assess mothers' implicit attitudes toward their children and found these to be significant predictors of reported and observed parenting behavior. The application of dual-process models to parenting is likely to allow a better understanding of the different levels of parental cognitions, at implicit and explicit levels, and even more when parents are under CPS evaluation and/or legal intervention as in child abuse and neglect cases.

The present study was designed to examine whether parental attitudes differ in maltreating and non-maltreating parents. To this end we recruited mothers referred and non-referred to CPS, independently assessed abuse and neglect through self- and hetero-report instruments and measured their (implicit and explicit) parental attitudes. Based on the available literature, we expected that mothers with higher abuse and neglect scores would present: a) more inadequate explicit parental attitudes; b) lower performance (lower accuracy and longer response latencies) in positive-implicit associations with parenting; and c) better performance (higher accuracy and shorter response latencies) in negative-implicit associations with parenting, relative to those with lower scores. Additionally, although consistency between implicit and explicit measures of parental attitudes might be expected, the implicit measure is likely to show higher sensitivity on the association of abuse and neglect, than the explicit measure, since the latter is more dependent on self-awareness and more prone to social desirability. Moreover, we also explored the potential convergence between self- and hetero-report measures of abuse and neglect. Finally, due to the potential role of intellectual functioning (e.g., Azar et al., 2008) and poverty (e.g., Rudy & Grusec, 2006) in social information processing, we explored the effect of adding these variables into the models.

Method

Participants

A convenience sample of 201 mothers participated in this study. Their age ranged from 24 to 53 years old (M = 38.57, SD = 6.58), and they had between one and eight children (M = 2.65, SD = 1.41). Most of the mothers were White (68.2%) and did not complete high school (57.5%). Approximately half of the sample (n=101) had at least one child referred to CPS. The remaining (n=100) were recruited in schools and community services from socially vulnerable communities, to balance the socio-demographic characteristics of the sample. Mothers were eligible for participation if they had at least one child within the age range of 5–13 years old living with the family. Exclusion criteria included mothers with severe intellectual disabilities, lack of native language proficiency, and for the referred group, mothers with a substantiated record of sexual child abuse.

Measures

Professionals' report of Abuse and Neglect. These reports were obtained through the *Maltreatment Severity Questionnaire* (MSQ; Calheiros, Silva, & Magalhães, 2019), consisting of 21 items (e.g., *Physical hygiene and wellbeing*), each composed by four severity descriptors (e.g., from 1 = *They keep the child looking dirty (e.g., does not take a bath, does not wash her head or teeth, stinks, has parasites and/or fleas)* to 4 = *They let the child have health problems or injuries due to her hygienic conditions (e.g., skin diseases, infected skin injuries*). Originally, the MSQ was organized in a three-factor structure: Physical neglect, Psychological neglect, and Physical and psychological abuse. In the current study, we obtained two separate global scores of abuse and neglect, based on a second-order confirmatory factor analysis that revealed an acceptable model fit [χ^2 (129) = 387.567, $p < .001$, $\chi^2/df = 3.004$; comparative fit index (CFI) = .815; and root mean square error of approximation (RMSEA) = .101] and good internal consistency indicators for the two factors: Physical and Psychological neglect (14 items; α = .87) and Physical and Psychological abuse (4 items; α = .71). Higher scores on the MSQ dimensions indicate higher levels of maltreatment. The MSQ was completed with the information available regarding each target-child, by CPS case-workers (for the referred group of mothers) and by the child's teacher/ professional of community service (for the non-referred group).

Self-reported Abuse. The *Conflict Tactics Scale - Parent to Child* (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998) is a self-report measure that obtains reports of abuse from parents. The questionnaire with 22 items (e.g., *Spanked him/her on the bottom with your bare hand*) is originally organized in three main dimensions: Non-violent discipline, Psychological aggression, and Physical assault (Corporal punishment, Physical maltreatment, and Extreme physical maltreatment). Mothers rated statements on a 7-point scale ranging from 0 = *never happened* to 7 = *more than 20 times in the past year*. In the current study, a second-order model was tested with a dimension of Abuse (with the subscales Psychological aggression and Corporal punishment) and a dimension of Non-violent discipline, which revealed an adequate fit [χ^2 (39) = 79.198, $p < .001$, $\chi^2/df = 2.031$; comparative fit index (CFI) = .907; and root mean square error of approximation (RMSEA) = .067]. The Abuse sub-scale included 7 items (α = .72), with higher scores meaning higher abuse.

Self-reported Neglect. The *Multidimensional Neglectful Behavior Scale – Parent Report* (MNBS; Kantor, Holt, & Straus, 2003) is a self-report measure that obtains reports of neglect from parents with children aged between 5-15 years old. A face-valid version of the

MNBS (Neves & Lopes, 2013) was used, composed of 49 items (e.g., *Did not know where your child was playing when she/he was outdoors*), divided in four core dimensions: Emotional neglect, Cognitive neglect, Supervision neglect, and Physical neglect. Respondents were asked about their parental behaviors on a 4-point scale, ranging from 1 = *never* to 4 = *always*. In the current study a global score of neglect was obtained based on a second-order model revealing an adequate fit [χ^2 (346) = 573.744, $p < .001$, $\chi^2/df = 1.658$; comparative fit index (CFI) = .926; and root mean square error of approximation (RMSEA) = .057]. The internal consistency of the total scale was high ($\alpha = .83$), with higher scores meaning higher neglect.

Explicit parental attitudes. The *Adult-Adolescent Parenting Inventory–2.1 Form A* (AAPI; Bavolek & Keene, 2010) is a self-report measure of beliefs regarding child-rearing that characterizes abusive parenting. The original AAPI-2.1 (form A) includes 40 items (e.g., *Children learn respect through strict discipline*), to be responded on a 5-point scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*, that are distributed across five core dimensions: Inappropriate parental expectations, Parental lack of an empathic awareness of children's needs, Strong belief in the use and value of corporal punishment, Parent-child role reversal, and Oppressing children's power and independence. In this study, a second-order confirmatory factor analysis revealed an acceptable model fit [χ^2 (401) = 745.205, $p < .001$, $\chi^2/df = 1.858$; comparative fit index (CFI) = .856; and root mean square error of approximation (RMSEA) = .061] and good internal consistency for the total scale ($\alpha = .92$). Higher scores in AAPI dimensions suggest higher maladaptive child rearing attitudes.

Implicit parental attitudes. A speed-accuracy task was developed to indirectly measure how strongly participants associated a mother's role with positive and negative attributes. This task was adapted from well-documented implicit measures of attitudes (e.g., Dotsch & Wigboldus, 2008; Fazio & Olson, 2003; Karpinski & Steinman, 2006). Participants were asked to classify pictures associated with a mother's role (e.g., pictograms of a woman with a child, doing caregiving-activities like playing with a child with toy blocks) as well as positive and negative attributes (e.g., loving, responsible, cold, aggressive; selected from Camilo et al., 2019b). The task included two blocks. In the positive block, participants had to classify 24 stimuli (7 positive words, 7 images and 10 negative words) as "Good or Mother" (left key) or as "Bad" (right key). In the negative block, participants had to classify 24 stimuli (10 positive words, 7 negative words and 7 images) as "Good" (left key) or as "Bad or Mother" (right key). Each block was preceded by 24 practice trials, immediately followed by the 72 test trials (with the replacement of each type of stimuli three times). Within blocks, all stimuli were presented

in a random order. The stimuli remained on the screen until participants responded. In the practice trials, if participants failed to respond within 1,500 ms, a reminder to "Please respond more quickly!" appeared for 500 ms. Following each response, participants were given feedback regarding the accuracy of their response. Accuracy and response times were collected from the positive and negative blocks. High performance (high accuracy and shorter response latencies) on the block of trials where "Mother and Good" were paired would suggest more positive implicit attitudes, whereas high performance on the block of trials where "Mother and Bad" were paired would suggest stronger negative implicit attitudes.

Family socioeconomic status. Mothers were asked to report their highest completed education level, monthly family income, income source, housing and neighborhood characteristics, on separate 5-point scale. Since all variables were positively and significantly correlated (all *p*'s < .01), the scores were combined into a socioeconomic status index (SES; α = .77) (e.g., Beckerman, van Berkel, Mesman, & Alink, 2018). Lower scores indicated lower SES.

Mothers' intellectual functioning. Four subscales of the *WAIS-III* (Arithmetic, Matrix reasoning, Information, Coding; α = .62 (Wechsler, 1997) were used as an estimate of general intellectual functioning due to their previously reported high correlation with the full scale (e.g., Azar, et al., 2017).

Procedure

The data used in the current paper represents a selection of the measures collected in the context of a more comprehensive research program. All measures and procedures were approved by the Ethics Committee of the host institution (EA# 08/2016).

After obtaining the permission from the institutions, data were collected in CPS agencies (referred group) and in schools and community services (non-referred group), during two individual sessions with each mother. Participants were informed that they would participate in a study examining how mothers perceive, think, and remember information about child rearing and development, and their influence on parental practices.

In the first session, after reading and signing the informed consent, participants were asked to provide demographic information. Then they completed the implicit parental attitudes task, using E-Prime 2.0 on a laptop provided by the researcher, and completed the AAPI. In the second session, they completed the WAIS subscales, the MNBS and the CTS-PC. At the end of both sessions, participants were thanked, debriefed and compensated with a 10€ gift

card. Later, the MSQ was completed by the CPS caseworkers or by the child's teacher/ community service professional.

Data analysis strategy

SPSS 25.0 was used to conduct data-analysis. The independent variables were standardized, and analysis of normal distribution and potential outliers revealed the absence of standardized scores extremely lower than -3.29 or extremely higher than 3.29 (Tabachnick & Fidell, 2012), except for the abuse dimension of the MSQ. However, since the absolute value of skewness of this dimension was lower than 3, it was considered as non-problematic in terms of distribution (Kline, 2005).

Regarding the implicit task data reduction (e.g., Bargh & Chartrand, 2014), participants with an accuracy rate lower than 70% were excluded from analysis, resulting in the elimination of 1 participant (accuracy rate = 48.61%). Responses with latencies lower than 350 ms and higher than 2500 ms were eliminated as well as responses lower or higher than 2.5 standard deviation from the mean response latencies for the positive and negative blocks. Subsequently, participants with less than 50% of valid responses were excluded from analysis, resulting in the additional exclusion of 6 participants (rate of valid responses between 4.86% - 49.31%). In total, 7 participants (3.07%) were excluded from the analysis. Data from the practice blocks were discarded.

To explicitly test our hypothesis, the relationship between abuse / neglect and implicit / explicit attitudes was explored by means of the General Linear Model (GLM). Specifically, our independent variables were self-reported abuse and neglect, and professional-reported (hetero-reported) abuse and neglect (since no significant correlations were found between reports from the different informants; Table 1). The dependent variables were the AAPI scores (explicit attitudes), and accuracy and response latency of correct responses in the positive and negative blocks of the speed-accuracy task (implicit attitudes). Moreover, due to the high correlations of the dependent measures with participants' intellectual functioning and SES (Table 1), the effects of these two variables were subsequently controlled.

Table 1.

Summary of correlations, means, standard deviations and range for study variables (n = 161).

	1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**	**11.**	***M* (*SD*)**	**Range**
1. Positive – Acc	-											.97 (.03)	.82 – 1
2. Positive – Rt	.021	-										975.77 (248.82)	500.32 – 1703.79
3. Negative – Acc	**.198****	**-.204****	-									.91 (.11)	.53 – 1
4. Negative – Rt	-.072	**.879****	**-.187***	-								939.27 (229.39)	482.19 – 1633.26
5. AAPI.	-.034	**.431****	**-.260****	**.430****	-							2.55 (.56)	1.23 – 4.35
6. CTS. Abuse	-.123	.008	.000	.084	.136	-						2.01 (1.28)	0 – 6
7. MNBS. Neglect	-.027	.092	.099	.128	**.175***	**.313****	-					1.57 (.36)	1 – 2.82
8. MSQ. Abuse	-.048	.100	-.014	.142	.055	.075	.102	-				1.17 (.41)	1 – 3.50
9. MSQ. Neglect	-.037	**.185***	**-.252****	**.270****	**.256****	.131	.108	**.527****	-			1.41 (.59)	1 – 3.73
10. Intellectual functioning	.100	**-.618****	**.339****	**-.630****	**-.538****	.109	.019	-.069	**-.304****	-		83.88 (27.24)	20 – 155
11. SES	.045	**-.409****	**.293****	**-.404****	**-.484****	-.044	-.030	**-.224****	**-.417****	**.566****	-	2.79 (.67)	1 – 4.33

Note. Acc = accuracy; Rt = reaction time.

***** $p < .05$.

****** $p < .01$.

Results

Explicit attitudes about parenting (AAPI)

The results revealed an effect of self-reported neglect (b = .08), $t(193) = 1.98$, p = .049, η_p^2 = .020, with higher neglect associated with higher inadequate explicit parental attitudes. No significant effects were found for abuse, $t(193) = 1.21$, p = .228. When controlling for mothers' intellectual functioning and SES, the main effect of neglect remained significant (b = .08), $t(183) = 2.21$, p = .028, η_p^2 = .026, but results revealed main effects of intellectual functioning (b = -.24), $t(183) = -5.92$, $p < .001$, η_p^2 = .161, and SES (b = -.12), $t(183) = -3.07$, p = .002, η_p^2 = .049, with lower intellectual functioning and lower SES associated with higher inadequate explicit parental attitudes.

In relation to hetero-reported abuse and neglect, results revealed a main effect of neglect (b = .18), $t(191) = 3.84$, $p < .001$, η_p^2 = .072, on explicit attitudes about parenting, with higher neglect associated with higher inadequate explicit parental attitudes. Again, no significant effects were found for abuse, $t(191) = -1.35$, p = .177. When controlling for mothers' cognitive functioning and SES, the main effect of neglect was no longer significant, and results revealed main effects of intellectual functioning (b = -.22), $t(182) = -5.41$, $p < .001$, η_p^2 = .138, and SES (b = -.13), $t(182) = -3.12$, p = .002, η_p^2 = .051, with lower intellectual functioning and lower SES associated with higher inadequate explicit parental attitudes.

Overall, the results regarding explicit parental attitudes suggest that higher self- and hetero-reported neglect was associated with more inadequate parental attitudes, as predicted. No effects were found for abuse. Moreover, mothers' lower intellectual functioning and lower SES were also associated with more inadequate explicit parental attitudes.

Implicit attitudes about parenting

Positive-implicit associations. As for participants' response accuracy a main effect of stimulus type was observed, $F(2, 386) = 41.389$, $p < .001$, η_p^2 = .177, such that images (M = .992, SE = .003) obtained the highest accuracy, followed by the positive (M = .974, SE = .003) and the negative words (M = .950, SE = .004). The main effects of self-reported abuse, $F(1, 193) = 2.324$, p = .129, and neglect, $F(1, 193) = 0.124$, p = .725, were not significant and no significant interactions were found between stimulus type and abuse and neglect (all p's > .05). Adding to the model mothers' intellectual functioning and SES, the main effects of abuse and neglect remained nonsignificant (all p's > .05). No significant main effects of hetero-reported abuse, $F(1, 191) = .370$, p = .544, or neglect, $F(1, 191) = .026$, p = .871, were observed, nor

were there interactions between stimulus type and abuse and neglect (all *p*'s > .05). When adding to the model mothers' intellectual functioning and SES, the main effects of abuse and neglect remained nonsignificant (all *p*'s > .05).

For response latency, the results also revealed a main effect of stimulus type, $F(2, 376) = 202.159$, $p < .001$, $\eta_p^2 = .518$, with faster response latencies for images ($M = 833.09$, $SE = 15.22$), followed by positive ($M = 990.07$, $SE = 19.77$), and negative words ($M = 1104.46$, $SE = 23.37$). The main effects of self-reported abuse, $F(1, 188) = 0.089$, $p = .766$, and neglect $F(1, 188) = 1.681$, $p = .196$, were not significant, and no significant interactions were found between stimulus type and abuse and neglect (all *p*'s > .05). Adding to the model mothers' intellectual functioning and SES, the main effects of abuse and neglect remained not significant (all *p*'s > .05). However, a main effect of intellectual functioning was observed ($b = -147.84$), $t(178) = -8.15$, $p < .001$, $\eta_p^2 = .272$, with lower intellectual functioning scores associated with higher latencies on positive associations with parenting. A main effect of hetero-reported neglect ($b = 46.05$), $F(1, 186) = 4.666$, $p = .032$, $\eta_p^2 = .024$, was observed with higher neglect associated with higher response latencies. The main effect of abuse was not significant, $F(1, 186) = 0.000$, $p = .983$, and no significant interactions were found between stimulus type and abuse and neglect (all *p*'s > .05). Adding to the model mothers' intellectual functioning and SES, the main effect of neglect was no longer significant, but again results revealed a main effect of intellectual functioning ($b = -144.50$), $t(177) = -7.82$, $p < .001$, $\eta_p^2 = .257$, with lower intellectual functioning associated with higher latencies on positive associations with parenting.

These results indicate that implicit positive parental attitudes do not seem to vary as a function of mothers' scores in self-reported abuse and neglect. However, mothers' that were reported as neglectful by professionals responded more slowly to positive associations with parenting, as predicted. However, mothers' intellectual functioning scores seem to be an important variable in explaining the response latencies observed.

Negative-implicit associations. Regarding accuracy, a main effect of stimulus type was observed, $F(2, 386) = 20.363$, $p < .001$, $\eta_p^2 = .095$, such that positive stimuli ($M = .956$, $SE = .006$) obtained the highest accuracy, followed by the negative words ($M = .927$, $SE = .006$) and images ($M = .836$, $SE = .023$). The main effects of self-reported abuse, $F(1, 193) = 0.210$, $p = .647$, and neglect, $F(1, 193) = 2.118$, $p = .147$, were not significant. A significant interaction was found between stimulus type and neglect, $F(2, 386) = 4.013$, $p = .019$, $\eta_p^2 = .020$, and a contrast analysis showed that higher scores on neglect were marginally associated with higher

accuracy on images (b =.05), $t(193) = 1.93$, $p = .055$, $\eta_p^2 = .019$, but no significant associations were found between neglect and the accuracy in classifying positive and negative stimuli. Adding mothers' intellectual functioning and SES to the model, the main effects of abuse and neglect remained non significant (all p's > .05), but results revealed main effects of intellectual functioning (b = .03), $t(183) = 2.90$, $p = .004$, $\eta_p^2 = .044$, and SES (b =.02), $t(183) = 2.80$, p = .039, $\eta_p^2 = .023$, with lower intellectual functioning and lower SES associated with lower accuracy on negative associations with parenting. Significant main effects were found for hetero-reported abuse (b = .02), $F(1, 191) = 4.031$, $p = .046$, $\eta_p^2 = .021$, with higher abuse associated with higher accuracy, and for neglect (b = -.04), $F(1, 191) = 17.167$, $p < .001$, η_p^2 = .082, with higher scores of neglect associated with lower accuracy. Results also revealed a significant interaction between stimulus type and abuse, $F(2, 382) = 8.436$, $p < .001$, $\eta_p^2 = .042$, and contrast analysis showed that higher scores of abuse were associated with higher accuracy on images (b =.08), $t(191) = 2.77$, $p = .006$, $\eta_p^2 = .039$, but no significant association was found between abuse and positive and negative stimuli. A significant interaction between stimulus type and neglect was also observed, $F(2, 382) = 16.152$, $p < .001$, $\eta_p^2 = .078$, and contrast analysis showed that higher scores on neglect were associated with lower accuracy on images (b = -.12), $t(191) = -4.36$, $p < .001$, $\eta_p^2 = .090$, but no significant associations were found between neglect and positive and negative stimuli. Adding mothers' intellectual functioning and SES to the model, the main effect of neglect remained significant (b = -.03), $t(182) = -2.50$, $p = .013$, $\eta_p^2 = .033$, but results also revealed a main effect of intellectual functioning (b = .03), $t(182) = 2.49$, $p = .014$, $\eta_p^2 = .033$, with lower intellectual functioning associated with lower accuracy on negative associations with parenting.

For response latency, the results revealed a main effect of stimulus type, $F(2, 334) = 303.652$, $p < .001$, $\eta_p^2 = .645$, with faster categorization latencies for images (M =753.81, SE = 14.39), followed by positive (M = 938.44, SE = 18.43), and negative stimuli (M = 1053.85, SE = 21.79). The main effects of self-reported abuse, $F(1, 167) = 0.339$, $p = .561$, and neglect, $F(1, 167) = 1.940$, $p = .166$, were not significant, and no significant interactions were found between stimulus type and abuse and neglect (all p's > .05). Adding mothers' intellectual functioning and SES to the model, the main effects of abuse and neglect remained nonsignificant (all p's > .05), but results revealed a main effect of intellectual functioning (b = -143.84), $t(157) = -8.30$, $p < .001$, $\eta_p^2 = .305$, with lower intellectual functioning associated with higher latencies on the categorization of negative associations with parenting. The main effect of hetero-reported neglect was significant (b = 64.39), $F(1, 166) = 9.457$, $p = .002$, $\eta_p^2 = .054$, with higher neglect

associated with higher overall latencies. The main effect of abuse was not significant, $F(1, 166) = 0.044$, $p = .835$, $\eta_p^2 < .001$, and no significant interactions were found between stimulus type and abuse and neglect (all p's > .05). Adding to the model mothers' intellectual functioning and SES, the main effect of neglect was no longer significant, but results revealed a main effect of intellectual functioning ($b = -132.61$), $t(157) = -7.65$, $p < .001$, $\eta_p^2 = .271$, with lower intellectual functioning associated with higher latencies on negative associations with parenting.

These results revealed that hetero-reported neglect was associated with lower accuracy (even when controlling for cognitive functioning), especially when evaluating images related to mothering. Importantly, hetero-reported neglect was also associated with slower responses on negative associations with parenting. Hetero-reported abuse was associated with higher accuracy in detecting negative associations with parenting, particularly when mothers evaluated images related to mothering (but not when controlling for IQ and SES). Again, mothers' intellectual functioning scores seem to be an important variable in explaining accuracy and response latencies to negative associations with parenting.

Relationship between explicit and implicit measures of parental attitudes

Correlational analysis (Table 1) showed that, the AAPI scores were negatively correlated with accuracy ($r = -.260$, $p < .001$) and positively correlated with response latencies ($r = .430$, $p < .001$) on the negative block of the implicit measure. Importantly, and as predicted, the AAPI scores were positively correlated with response latencies in positive associations with parenting ($r = .431$, $p < .001$). Overall, these results indicate that as inadequate explicit attitudes increase, the general performance in positive and negative attitudes on implicit tasks decreases.

Discussion

The SIP model applied to child abuse and neglect suggests that preexisting cognitive schemas constitute a key element in cognitive information processing related to caregiving (Azar et al., 2008; Milner, 2003). Parental attitudes towards parenting are an integral part of these knowledge structures (Holden & Buck, 2002). However, explicit and implicit parental attitudes in maladaptive parenting remain largely understudied (e.g., Johnston et al., 2017).

The present research further examined the role of parental attitudes in child abuse and neglect. Specifically, we investigated the association between parental attitudes and abuse and neglect in mothers that were referred and non-referred to CPS, assessing abuse and neglect

through self- and hetero-report instruments and measuring parental attitudes using explicit and implicit measures.

Overall, our results support the hypothesis that maladaptive parenting is related with more biases in preexisting cognitive schemas, namely attitudes related to parenting, but mostly for neglect. Specifically, when considering professionals' reports of maltreatment, mothers that were evaluated as more neglectful reported higher inadequate explicit parental attitudes and revealed more biases when making implicit associations with parenting (lower accuracy in the negative attitudes task; slower response times in both positive and negative attitudes task). Mothers that were considered by professionals as more abusive were more accurate in the negative association task. When considering mothers' self-reports, those scoring higher on neglect revealed higher inadequate explicit attitudes.

The lower overall performance observed for more neglectful mothers is in line with previous research (e.g., Johnston et al., 2017; Smith, Dishion, Shaw, & Wilson, 2014) and supports the SIP model applied to neglect. Specifically, this model states that neglectful parents fail to respond to their child's signals because they are not able to advance in the complex pattern of mental processing that precedes the parental response (e.g., Crittenden, 1993). Moreover, the results also indicate that neglectful mothers present a similar pattern when categorizing both positive and negative stimuli related to parenting. This result is likely to reflect a more simplistic schema that is used to respond to all parenting-related stimuli, irrespective of their valence (Azar et al., 2008) and is consistent with previous research revealing the low diversity and low complexity of parental cognitions characteristic of maladaptive parenting (e.g., Camilo et al., 2019b).

The results regarding abuse suggest that more abusive mothers have fewer biases in their implicit and explicit parental attitudes when compared with neglectful mothers. These differences are in line with the idea that, whereas neglect can be a product of an early interruption in cognitive processing, abusive parents go through the cognitive processing stages, and present distortions in a latter stage that lead to an inadequate parental response (e.g., McElroy & Rodriguez, 2008; Slep & O'Leary, 2007). For example, abusive parents engage in attentional processes and are likely to perceive the child's signals. However, they often make biased interpretations of those signals (e.g., Ateah & Durrant, 2005) and choose inadequate responses (e.g., Dadds, Mullins, McAllister, & Atkinson, 2003).

Importantly, the pattern of results observed is not always consistent across the source of maltreatment reporting. This is not surprising given that the correlations between self- and hetero-reported maltreatment are non-significant. The overall pattern of non-significant results observed with self-reported abuse and neglect measures is likely the result of the well-known shortcomings of these measures (e.g., Lau, Valeri, McCarthy, & Weisz, 2006). Self-reported measures require parents to have conscious awareness of their practices, which is not always the case with maltreating parents, who may have unrealistic expectations, perceptual biases about their interactions with their children, or misattributions about their children's behavior (Hansen & MacMillan, 1990; Lau et al., 2006) that influence the reports. Moreover, there are difficulties associated with retrospective reporting, namely memory distortions (Jackson, McGuire, Tunno, & Makanui, 2019) and even deliberate report distortions in attempt to avoid social judgment and legal intervention (Portwood, 2006). In turn, hetero-reported child maltreatment appeared to be sensitive in discriminating implicit attitudes associated with maladaptive parenting.

Analyzing the convergence between the explicit and the implicit measure of attitudes, the results revealed that mothers with more inadequate explicit attitudes also presented an overall lower performance in implicit attitudes associated with parenting. Social cognition researchers have long argued that, since implicit cognition may differ from conscious and explicit cognition, differences between both measures can be expected (e.g., Greenwald & Banaji, 1995). However, and also in line with the literature (Hofmann et al., 2005), the consistency between measures observed in our results suggests that our implicit and explicit measures are conceptually related.

Importantly, when adding mothers' general intellectual functioning to the models, this variable strongly predicted response latencies, but not accuracy, in implicit associations with parenting. Indeed, this topic has been discussed in the literature, with evidence supporting a confound between general cognitive ability and reaction times (e.g., McFarland & Crouch, 2002). Specifically, processing speed is an important cognitive ability, required in reaction time tasks, which renders responses latencies as slower or faster as a function of the individual processing speed. However, the results regarding accuracy were associated with neglect, even when controlling for mothers' intellectual functioning. Research has suggested that social information processing deficits may explain the link between intellectual functioning and neglect (Azar et al., 2012). Thus, instead of analyzing the direct relationship between intellectual functioning and the SIP components, models testing the mediation role of SIP

components (like preexisting schemata) between intellectual functioning and neglect are likely to be informative.

Surprisingly, socioeconomic status did not stand out in explaining implicit parental attitudes but revealed significant effects in explicit attitudes. Indeed, the literature indicates that parents, when facing multiple sources of stress, have more difficulties in prioritizing their child's needs (e.g., Rudy & Grusec, 2006). The observed lack of SES main effects in the implicit attitudes is probably related to the highly cognitively demanding nature of the implicit task. Since both variables were simultaneously entered in the models of the implicit measures, the large effect of intellectual functioning might have concealed the effect of SES (Darlington & Hayes, 2016). Alternatively, the influence of poverty in parental cognitions is likely to become more visible during later stages of information processing - since the context of poverty seems to increase cognitive load and impedes "online" cognitive capacity, and less noticeable on the preexisting cognitive schema (e.g., Mani, Mullainathan, Shafir, & Zhao, 2013).

Despite the contributions of this study to the advancement of parental cognition research in the context of child maltreatment, important limitations should be addressed. In the implicit task, the presentation of the positive and negative blocks was not counterbalanced, thus preventing the estimation of a single value (like a *D* score) for the implicit measure. This issue could be addressed in future designs because the use of a single dependent measure of the implicit attitude allows the direct comparison between negative and positive blocks. Additionally, implicit measures are usually collected in controlled environments like research laboratories. In the current study, these measures were collected in a community setting, with distractors that could influence response latencies, even if some literature suggests no impact of the context of application in implicit tasks' performance (e.g., Shepherd, 2019). Finally, the social context and the specific target of cognition may affect the activation of implicit cognition (e.g., Gawronski & Houwer, 2014). Considering that parenting occurs in context and in response to a specific parent-child interaction, the structure of this type of implicit task might consider the use of familiar stimuli, as videos or photographs of participants' own children (e.g., Johnston et al., 2017).

Despite these limitations, the application of social cognition approaches to child maltreatment research constitutes an innovative and important strategy to access parental cognitions and behaviors related to parent-child interactions. Conceptually, our results add knowledge about socio-cognitive variables, namely attitudes which should be addressed within the context of parenting evaluations and treatments (e.g., Mah & Johnston, 2008). This is

particularly the case for child neglect, which is the most common form of child maltreatment (e.g., U.S. Department of Health & Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau, 2019).

Additionally, this study presents a valuable methodological contribution in avoiding some of the problems associated with the single use of questionnaires of self-report and observational methods. Specifically, data regarding the implicit measures of parental cognitions, and their consistency with explicit measures, further strengthens the prominent role of parental attitudes in child abuse and neglect. Thus, this research emphasizes the importance of using multiple methods of information collection in risk assessment protocols and in child maltreatment evaluation (e.g., Schmidt, Banse, & Imhoff, 2015). Future research could also benefit from integrating experimental manipulations of parents' affective and motivational states, use more ongoing and spontaneous forms of assessing cognitions (as, for example, using video-mediated recall, open-ended interview tasks, or daily diaries), and employing different methods to capture the complexity and diversity of parental cognitions (e.g., Johnston et al., 2008).

This study also addressed the importance of using multiple sources of information to evaluate child maltreatment (e.g., Lanktree et al., 2008), in order to achieve a "best estimate" of maltreatment experiences (Kaufman, Jones, Stieglitz, Vitulano, & Mannarino, 1994). According to these authors, parents are an important source of data but, due to several constrains and bias, they do not provide all the required information, which needs to be supplemented by professionals that work close to the family.

Moreover, the results explored the influence of other determinants of maladaptive parenting such as parents' intellectual functioning and socioeconomic status on parental attitudes. Intellectual functioning of mothers was noted as a variable that is strongly associated with parental schemata and, even in the explicit attitude measure, its effect was stronger than socioeconomic status. These results are aligned with emerging evidence suggesting that parents' executive functioning is critical to the development and maintenance of adequate parenting practices, especially when in poverty (for a review see Crandall, Deater-Deckard, & Riley, 2015). They also emphasize that emotion and cognitive control capacities should be addressed in intervention programs with parents in poverty, reducing stress sources and acknowledging how to cope with stress through for example, cognitive-behavioral and mindfulness training, combined with specific parenting skills interventions (Crandall et al., 2015).

Finally, knowledge of parental cognitions, like the parental attitudes associated with child maltreatment examined in the current paper, might inform parenting interventions, namely by clarifying the role of preexisting cognitive schemata in the formation and maintenance of disruptive responses. Therefore, alongside more mainstream intervention programs with parents, more specific psychological intervention strategies for cognitive restructuring, problem-solving training, and reattribution training (e.g., Azar & Wolfe, 2006; Kolko, 1996) should also be considered. Specifically, interventions in parenting schemata should take advantage of evidence-based treatment approaches as schema therapy (Young, Klosko, & Weishaar, 2003), trauma-focused cognitive behavioral therapy (Cohen & Mannarino, 2017), or combined parent-child cognitive behavioral therapy (Runyon, Deblinger, & Steer, 2010). These parenting programs addressing changes in parental cognitions have demonstrated success (e.g., Bugental, Corpuz, & Schwartz, 2012).

Using a multimethod approach to investigate parental cognitions and different sources of information in the assessment of child maltreatment, the present study examined parental preexisting cognitive schema, namely parental attitudes, underlying maladaptive parenting. This research presents a contribution to the scant research about parental cognitions, which might inform future investigation and support intervention on different types of maltreatment.

References

Ateah, C. A., & Durrant, J. E. (2005). Maternal use of physical punishment in response to child misbehavior: Implications for child abuse prevention. *Child Abuse & Neglect, 29*, 169–185. doi:10.1016/j.chiabu.2004.10.010

Azar, S. T., McGuier, D. J, Miller, E. A., Hernandez-Mekonnen, R., & Johnson, D. R. (2017). Child neglect and maternal cross-relational social cognitive and neurocognitive disturbances. *Journal of Family Psychology, 31*, 8–18. doi:10.1037/fam0000268

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 doing intervention and prevention work. *Journal of Applied Developmental Psychology, 29*, 295–304. doi:10.1016/j.appdev.2008.04.009

Azar, S. T., Stevenson, M. T., & Johnson, D. R. (2012). Intellectual disabilities and neglectful parenting: Preliminary findings on the role of cognition in parenting risk. *Journal of*

Mental Health Research in Intellectual Disabilities, 5, 94–129. doi:10.1080/19315864.2011.615460

Azar, S. T., & Wolfe, D. (2006). Child physical abuse and neglect. In E. J. Mash & R. A. Barkley (Eds.), *Treatment of childhood disorders* (3rd ed., pp. 595–646). New York, NY: Guilford Press.

Bargh, J., & Chartrand, T. (2014). The mind in the middle: A practical guide to priming and automaticity research. In H. Reis & C. Judd (Eds.), *Handbook of research methods in social and personality psychology* (2nd ed., pp. 311–344). Cambridge: Cambridge University Press. doi:10.1017/CBO9780511996481.017

Bavolek, S. J., & Keene, R. G. (2010). *Adult-Adolescent Parenting Inventory AAPI-2.1: Administration and development handbook*. Park City, UT: Family Development Resources, Inc.

Benasich, A. A., & Brooks-Gunn, J. (1996). Maternal attitudes and knowledge of child-rearing: Associations with family and child outcomes. *Child Development, 67*, 1186–1205. doi:10.2307/1131887

Beckerman, M., van Berkel, S. R., Mesman, J., & Alink, L. R. A. (2018). Negative parental attributions mediate associations between risk factors and dysfunctional parenting: A replication and extension. *Child Abuse & Neglect, 81*, 249–258. doi:10.1016/j.chiabu.2018.05.001

Blascovich, J., Vanman, E. J., Mendes, W. B., & Dickerson, S. (2011). *Social psychophysiology for social and personality psychology*. London: Sage.

Bugental, D. B., & Johnston, C. (2000). Parental and child cognitions in the context of the family. *Annual Review of Psychology, 51,* 315–344. doi:10.1146/annurev.psych.51.1.315

Bugental, D. B., Corpuz, R., & Schwartz, A. (2012). Preventing children's aggression: Outcomes of an early intervention. *Developmental Psychology, 48,* 1443–1449. doi:10.1037/a0027303

Calheiros, M. M., Silva, C. S., & Magalhães, E. (2019). Child Maltreatment Severity Questionnaire (MSQ) for professionals: Development, validity, and reliability evidence. *Assessment*. doi:10.1177/1073191119890030

Camilo, C., Garrido, M. V., & Calheiros, M. M. (2016). Implicit measures of child abuse and neglect: A systematic review. *Aggression and Violent Behavior, 29*, 43–54. doi:10.1016/j.avb.2016.06.002

Camilo, C., Garrido, M. V., & Calheiros, M. M (2019a). *The social information processing model in child abuse and neglect: A meta-analytic review*. Manuscript submitted for publication.

Camilo, C., Garrido, M. V., Ferreira, M. B., & Calheiros, M. M. (2019b). How does mothering look like: A multidimensional approach to maternal cognitive representations. *Journal of Family Issues, 40,* 2528–2552. doi:10.1177/0192513X19860171

Cohen, J. A., & Mannarino, A. P. (2017). Evidence based intervention: Trauma-focused cognitive behavioral therapy for children and families. In D. M. Teti (Ed.), *Parenting and family processes in child maltreatment and intervention* (pp. 91–105). Cham, Switzerland: Springer International Publishing.

Crandall, A., Deater-Deckard, K., & Riley, A. W. (2015). Maternal emotion and cognitive control capacities and parenting: A conceptual framework. *Developmental Review, 36,* 105–126. doi:10.1016/j.dr.2015.01.004

Crittenden, P. (1993). An information-processing perspective on the behavior of neglectful parents. *Criminal Justice and Behavior, 20,* 27–48. doi:10.1177/0093854893020001004

Dadds, M. R., Mullins, M. J., McAllister, R. A., & Atkinson, E. (2003). Attributions, affect, and behavior in abuse-risk mothers: A laboratory study. *Child Abuse & Neglect, 27*, 21–45. doi:10.1016/S0145-2134(02)00510-0

Darlington, R. B., & Hayes, A. F. (2016). *Regression analysis and linear models: Concepts, applications, and implementation*. New York, NY: The Guildford Press.

Dotsch, R., & Wigboldus, D. H. J. (2008). Virtual prejudice. *Journal of Experimental Social Psychology, 44*, 1194–1198. doi:10.1016/j.jesp.2008.03.003

Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology, 54,* 297–327. doi:10.1146/annurev.psych.54.101601.145225

Fontaine, D., & Nolin, P. (2012). Study of "hot" executive functions in a sample of parents who have been accused of physical abuse or neglect. *Journal of Aggression, Maltreatment & Trauma, 21,* 1–18. doi:10.1080/10926771.2012.632391

Gawronski, B., & Houwer, J. D. (2014). Implicit measures in social and personality psychology. In H. T. Reis, & C. M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (2nd ed.). New York: Cambridge University Press.

Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review, 102*, 4–27. doi:10.1037/0033-295x.102.1.4

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. doi:10.1177/01454455900143003

Haskett, M. E., Scott, S. S., Willoughby, M., Ahern, L., & Nears, K. (2006). The Parent Opinion Questionnaire and child vignettes for use with abusive parents: Assessment of psychometric properties. *Journal of Family Violence, 21,* 137–151. doi:10.1007/s10896-005-9010-2

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. doi:10.1016/j.chiabu.2014.07.004

Hofmann, W., Gawronski, B., Gschwendner, T., Le, H., & Schmitt, M. (2005). A meta-analysis on the correlation between the implicit association test and explicit self-report measures. *Personality and Social Psychology Bulletin, 31*, 1369–1385. doi:10.1177/0146167205275613

Hogg, M. A., & Vaughan, G. M. (2017). *Social Psychology* (8th edition). New York, NY: Pearson.

Holden, G. W., & Buck, M. J. (2002). Parental attitudes toward child rearing. In M. H. Bornstein (Ed.), *Handbook of parenting* (2nd ed., pp. 537–562). Mahwah, NJ: Erlbaum.

Jackson, Y., McGuire, A., Tunno, A. M., & Makanui, P. K. (2019). A reasonably large review of operationalization in child maltreatment research: Assessment approaches and sources of information in youth samples. *Child Abuse & Neglect, 87*, 5–17.

Jobe, J. B. (2003). Cognitive psychology and self-reports: Models and methods. *Quality of Life Research, 12*, 219–227. doi:10.1023/A:1023279029852

Johnston, C., & Ohan, J. L. (2005). The importance of parental attributions in families of children with attention-deficit/hyperactivity and disruptive behavior disorders. *Clinical Child and Family Psychology Review, 8*, 167–182. doi:10.1007/s10567-005-6663-6

Johnston, C., Belschner, L., Park, J. L., Stewart, K., Noyes, A., & Schaller, M. (2017). Mothers' implicit and explicit attitudes and attributions in relation to self-reported parenting behavior. *Parenting, 17*, 51–72. doi:10.1080/15295192.2016.1184954

Johnston, C., Park, J. L., & Miller, N. V. (2018). Parental cognitions: Relations to parenting and child behavior. In M. R. Sanders & A. Morawska (Eds.), *Handbook of parenting and child development across the lifespan* (pp. 395–414). Cham, Switzerland: Springer International Publishing. doi:10.1007/978-3-319-94598-9_17

Jones, T. L., & Prinz, R. J. (2005). Potential roles of parental self-efficacy in parent and child adjustment: A review. *Clinical Psychology Review, 25*, 341–363 doi:10.1016/j.cpr.2004.12.004

Kantor, G. K., Holt, M., & Straus, M. A. (2003). *The parent-report Multidimensional Neglectful Behavior Scale.* Unpublished manuscript, Family Research Laboratory, University of New Hampshire, Durham, NH.

Karpinski, A., & Steinman, R. B. (2006). The Single Category Implicit Association Test as a measure of implicit social cognition. *Journal of Personality and Social Psychology, 91*, 16–32. doi:10.1037/0022-3514.91.1.16

Kline, R. (2005). *Principles and practice of structural equations modeling* (2nd Ed.). London, UK: Guilford Press.

Kolko, D. J. (1996). Individual cognitive behavioral treatment and family therapy for physically abused children and their offending parents: A comparison of clinical outcomes. *Child Maltreatment, 1*, 322–342. doi:10.1177/1077559596001004004

Lanktree, C. B., Gilbert, A. M., Briere, J., Taylor, N., Chen, K., Maida, C. A., & Saltzman, W. R. (2008). Multi-informant assessment of maltreated children: Convergent and discriminant validity of the TSCC and TSCYC. *Child Abuse & Neglect, 32*, 621–625. doi:10.1016/j.chiabu.2007.10.003.

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. doi:10.1016/j.chiabu.2005.11.009

Mah, J. W. T., & Johnston, C. (2008). Parental social cognitions: Considerations in the acceptability of and engagement in behavioral parent training. *Clinical Child and Family Psychology Review, 11*, 218–236. doi:10.1007/s10567-008-0038-8

Mani, A., Mullainathan, S., Shafir, E., & Zhao, J. (2013). Poverty impede cognitive function. *Science, 341*, 976–980. doi:10.1126/science.1238041

Mayseless, O. (2006). Studying parenting representations as a window to parents' internal working model of caregiving. In O. Mayseless (Ed.), *Parenting representations: Theory, research, and clinical implications* (pp. 3–40). New York, NY: Cambridge University Press. doi:10.1017/CBO9780511499869

McElroy, E. M., & Rodriguez, C. M. (2008). Mothers of children with externalizing behavior problems: Cognitive risk factors for abuse potential and discipline style and practices. *Child Abuse & Neglect, 32*, 774–784. doi:10.1016/j.chiabu.2008.01.002

McFarland, S. G., & Crouch, Z. (2002). A cognitive skill confound on the Implicit Association Test. *Social Cognition, 20*, 483–510. doi:10.1521/soco.20.6.483.22977

Milner, J. S. (1993). Social information processing and physical child abuse. *Clinical Psychology Review, 13*, 275–294. doi:10.1016/0272-7358(93)90024-G

Milner, J. (2003). Social information processing in high-risk and physically abusive parents. *Child Abuse & Neglect, 27*, 7–20. doi:10.1016/S0145-2134(02)00506-9

Neves, A. M., & Lopes, D. (2013). A negligência parental no contexto do mau trato infantil: Um contributo para a delimitação e definição do conceito e sua medida no âmbito da prevenção primária. In M. M. Calheiros & M. V. Garrido (Eds.), *Crianças em risco e perigo: Contextos, investigação e intervenção* (Vol. 3, pp. 145–190). Lisboa: Edições Sílabo.

Nix, R. L., Pinderhughes, E. E., Dodge, K. A., Bates, J. E., Pettit, G. S., & McFadyen-Ketchum, S. A. (1999). The relation between mothers' hostile attribution tendencies and children's externalizing behavior problems: The mediating role of mothers' harsh discipline practices. *Child Development, 70*, 896– 909. doi:10.1111/1467-8624.00065

Okagaki, L., & Bingham, G. E. (2005). Parents' social cognitions and their parenting behaviors. In T. Luster & L. Okagaki (Eds.), *Parenting: An ecological perspective* (2nd ed., pp. 3–33). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

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, and a framework for research* (pp. 233–253). Baltimore, MD: Paul H. Brookes.

Rodrigo, M. J., León, I., Quiñones, I., Lage, A., Byrne, S., & Bobes, M. A. (2011). Brain and personality bases of insensitivity to infant cues in neglectful mothers: An event-related potential study. *Development and Psychopathology, 23,* 163–176. doi:10.1017/S0954579410000714

Rodriguez, C. M., & Richardson, M. J. (2007). Stress and anger as contextual factors and preexisting cognitive schemas: Predicting parental child maltreatment risk. *Child Maltreatment, 12*, 325–337. doi:10.1177/1077559507305993

Rodriguez, C. M., & Tucker, M. C. (2015). Predicting maternal physical child abuse risk beyond distress and social support: Additive role of cognitive processes. *Journal of Child and Family Studies, 24*, 1780–1790. doi:10.1007/s10826-014-9981-9

Rodriguez, C. M., Smith, T. L., & Silvia, P. J. (2016). Multimethod prediction of physical parent-child aggression risk in expectant mothers and fathers with social information processing theory. *Child Abuse & Neglect, 51*, 106–119. doi:10.1016/j.chiabu.2015.10.028

Rudy, D., & Grusec, J. E. (2006). Social cognitive approaches to parenting representations. In O. Mayseless (Ed.), *Parenting representations: Theory, research, and clinical implications* (pp. 79–106). New York, NY: Cambridge University Press. doi:10.1017/CBO9780511499869

Runyon, M. K., Deblinger, E., & Steer, R. A. (2010). Group cognitive behavioral treatment for parents and children at-risk for physical abuse: An initial study. *Child & Family Behavior Therapy, 32*, 196–218. doi:10.1080/07317107.2010.500515

Schmidt, A. F., Banse, R., & Imhoff, R. (2015). Indirect measures in forensic contexts. In T. M. Ortner & F. J. R. van de Vijver (Eds.). *Behavior-based assessment in Psychology: Going beyond self-report in the personality, affective, motivation, and social domains* (pp. 173–194). Göttingen: Hogrefe.

Shepherd, H. (2019). Methods for studying the contextual nature of implicit cognition. In W. H. Brekhus & G. Ignatow (eds.), *The Oxford handbook of cognitive sociology*. Oxford, UK: Oxford University Press. doi:10.1093/oxfordhb/9780190273385.013.20

Sigel, I. E., & McGillicuddy-DeLisi, A. V. (2002). Parent beliefs are cognitions: The dynamic belief systems model. In M. H. Bornstein (Ed.), *Handbook of parenting: Being and becoming a parent, Vol. 3* (pp. 485–508). Mahwah, NJ: Lawrence Erlbaum.

Slep, A., & O'Leary, S. G. (1998). The effects of maternal attributions on parenting: An experimental analysis. *Journal of Family Psychology, 12*, 234–243. doi:10.1037/0893-3200.12.2.234

Slep, A. M. S., & O'Leary, S. G. (2007). Multivariate models of mothers' and fathers' aggression toward their children. *Journal of Consulting and Clinical Psychology, 75*, 739–751. doi:10.1037/0022-006X.75.5.739

Smith, J. D., Dishion, T. J., Shaw, D. S., & Wilson, M. N. (2015). Negative relational schemas predict the trajectory of coercive dynamics during early childhood. *Journal of Abnormal Child Psychology, 43*, 693–703. doi:10.1007/s10802-014-9936-z

Straus, M. A., Hamby, S. L., Finkelhor, D., Moore, D. W., & Runyan, D. (1998). Identification of child maltreatment with the parent-child Conflict Tactics Scales: development and psychometric data for a national sample of American parents. *Child Abuse & Neglect, 22*, 249–270. doi:10.1016/s0145-2134(97)00174-9

Sturge-Apple, M. L., Rogge, R. D., Skibo, M. A., Peltz, J. S., & Suor, J. H. (2015). A dual-process approach to the role of mother's implicit and explicit attitudes toward their child in parenting models. *Developmental Psychology, 51*, 289–300. doi:10.1037/a0038650

Tabachnick, B. G., & Fidell, L. S. (2012). *Using multivariate statistics* (6th ed.). New York: Harper Collins.

U.S. Department of Health & Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau. (2019). *Child Maltreatment 2017*. Available from https://www.acf.hhs.gov/cb/research-data-technology/statistics-research/child-maltreatment.

Wang, F., Wang, M., & Xing, X. (2018). Attitudes mediate the intergenerational transmission of corporal punishment in China. *Child Abuse & Neglect, 76*, 34–43. doi:10.1016/j.chiabu.2017.10.003

Wechsler, D. (1997). *Wechsler Adult Intelligence Scale* (3rd ed.). San Antonio, TX: The Psychological Corporation.

Young, J. E., Klosko, J., & Weishaar, M. (2003). *Schema therapy: A practitioner's guide*. New York, NY: Guilford Press.

CHAPTER III.

PERCEPTIONS OF CHILD EMOTIONAL SIGNALS IN ABUSIVE AND NEGLECTFUL MOTHERS

Aside from parental preexisting schemata, the first stage of information processing proposed by the SIP model is the parents' detection and perception of children's signals and states – stage 1 (Milner, 2003; Crittenden, 1993). Specifically, research has suggested that high-risk and abusive parents show more errors and biases in attending and encoding the child's behavior (e.g., McCarthy et al., 2013; Asla, de Paul, & Perez-Albeniz, 2011), but less attention has been given to neglectful parents (e.g., Hildyard & Wolfe, 2007).

Proceeding sequentially with the empirical test of the SIP model applied to child abuse and neglect, and considering the importance of signal detection to the subsequent information processing, we empirically examined mothers' ability in recognizing children's emotions. To this end, we conducted a systematic validation of stimulus material, namely children facial expressions, using a Portuguese sample, since no databases of Portuguese children in middle childhood existed. Specifically, the first paper in this chapter presents the validation study of the Child Affective Facial Expression set (CAFE; LoBue & Thrasher, 2015). A subset of these validated stimuli was subsequently used to develop the emotion recognition tasks included in second paper presented in this chapter.

Emotion recognition accuracy has been considered a fundamental skill to the development of empathic responses and well-adapted behaviors to the emotional state of others (e.g., Besel & Yuille, 2010), especially important to the parental role. Parents' recognition of children's facial expressions has been a focus of interest in child maltreatment research, which has explored the association between parents' ability to recognize facial expressions and maladaptive parental practices (e.g., Hildyard & Wolfe, 2007; Wagner et al., 2015)

The second paper of this chapter was designed to experimentally examine mothers' ability to recognize children's emotions associated with self and hetero-reported abuse and neglect. Specifically, two different tasks were developed: an implicit valence classification task, evaluating mothers' accuracy and response latencies in classifying the valence of children's emotional expressions as positive or negative, and a categorization task, to assess mothers' ability to label children's basic emotions. Once more, abuse and neglect were measured using mothers' self-report and professionals' report (hetero). Moreover, the moderating role of mothers' intellectual functioning and socioeconomic status was explored. The final solutions from the confirmatory factor analyses of the scales are displayed in the Appendix B.

References:

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. doi:10.1016/j.chiabu.2011.05.010

Besel, L. D. S., & Yuille, J. C. (2010). Individual differences in empathy: The role of facial expression recognition. *Personality and Individual Differences, 49*, 107–112. doi:10.1016/j.paid.2010.03.013

Crittenden, P. (1993). An information-processing perspective on the behavior of neglectful parents. *Criminal Justice and Behavior, 20*, 27–48. doi:10.1177/0093854893020001004

Hildyard, K., & Wolfe, D. (2007). Cognitive processes associated with child neglect. *Child Abuse & Neglect, 31*, 895–907. doi:10.1016/j.chiabu.2007.02.007

LoBue, V. & Thrasher, C. (2015). The Child Affective Facial Expression (CAFE) set: Validity and reliability from untrained adults. *Frontiers in Psychology, 5*, 1532. doi:0.3389/fpsyg.2014.01532

McCarthy, R., 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. doi:10.1016/j.chiabu.2013.05.003

Milner, J. (2003). Social information processing in high-risk and physically abusive parents. *Child Abuse & Neglect, 27*, 7–20. doi:10.1016/s0145-2134(02)00506-9

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*, 154–162. doi:10.1037/a0036014

1. Subjective Ratings and Emotional Recognition of Children's Facial Expressions From the CAFE Set [6]

Abstract

Access to validated stimuli depicting children's facial expressions is useful for different research domains (e.g., developmental, cognitive or social psychology). Yet, such databases are scarce in comparison to others portraying adult models, and validation procedures are typically restricted to emotional recognition accuracy. This work presents subjective ratings for a sub-set of 283 photographs selected from the Child Affective Facial Expression set (CAFE [1]). Extending beyond the original emotion recognition accuracy norms [2], our main goal was to validate this database across eight subjective dimensions related to the model (e.g., attractiveness, familiarity) or the specific facial expression (e.g., intensity, genuineness), using a sample from a different nationality (N = 450 Portuguese participants). We also assessed emotion recognition (forced-choice task with seven options: anger, disgust, fear, happiness, sadness, surprise and neutral). Overall results show that most photographs were rated as highly clear, genuine and intense facial expressions. The models were rated as both moderately familiar and likely to belong to the in-group, obtaining high attractiveness and arousal ratings. Results also showed that, similar to the original study, the facial expressions were accurately recognized. Normative and raw data are available as supplementary material at https://osf.io/mjqfx/.

Keywords: CAFE database; facial expression; children**;** subjective ratings; emotion recognition; validation.

[6] Prada, M., Garrido, M. V., Camilo, C., & Rodrigues, D. L. (2018). Subjective ratings and emotional recognition of children's facial expressions from the CAFE set. *PLoS ONE 13(12)*: e0209644. doi:10.1371/journal. pone.0209644

Introduction

Children communicate positive and negative emotions through multiple channels, namely: vocalizations, gestures, body postures, body movements and facial expressions (for a review, see [3]). Traditionally, research has focused on the latter. Not only do facial expressions signal the children's emotional state, but they can also evoke behavioral motives (e.g., motivation to nurture) in the observers (for a review, see [4]). Importantly, parent-child interaction and parental mental health may be predicted by how accurately the children's emotional expression is perceived (for a review, see [5]).

The availability of validated children's facial expressions databases is important for several research domains. However, in contrast to databases depicting adult models, such databases are still scarce and usually are only validated for the accuracy of emotional recognition. The goal of the current work was to extend the available norms for the Child Affective Facial Expression (CAFE; [2]), a database that exclusively includes photographs depicting facial expressions of children. Besides emotion recognition, for each stimulus, we also assessed a set of eight subjective evaluative dimensions concerning the model (familiarity, attractiveness, arousal, and in-group belonging) and the expression (valence, clarity, intensity, and genuineness) being portrayed. These additional subjective ratings provide important information that further extends the usefulness of the stimuli set. Specifically, it enables the selection of stimuli through a combination of criteria (e.g., happy faces controlled for attractiveness; fear faces varying in intensity).

Static human face stimuli are the most frequently used type of material in emotion recognition and detection studies, and have been relying on both behavioral (e.g., forced-choice labeling of emotions; matching task) and non-behavioral methodologies (e.g., functional and structural MRI, EEG; for a review, see [6]).

In studies with children populations these materials are often used to investigate how (and at what age) children are able to understand and identify emotional faces (e.g., [7], for reviews, see [8,9]), or to characterize their affective reactions to emotional facial expressions (e.g., [10]). Importantly, children who are better at recognizing emotions in others also tend to be successful in several socioemotional areas (e.g., greater cooperation and assertion reported by parents, greater social competence reported by teachers, higher liking by peers, for a review, see [11]). Congruently, a wide range of child psychiatric disorders are associated to impairments in facial emotion recognition, which are likely to negatively affect family and peer

relationships (for a review, see [12]). For example, children with bipolar disorder or severe mood deregulation show deficits in labeling emotions – particularly negative emotions such as fear or anger – displayed by adult or child models [13]. This lower performance in emotion recognition tasks was also detected for abused or maltreated children (e.g., [14–16], for a review, see [17]).

Studies with children participants have frequently used facial expression databases depicting adults. For example, Barnard-Brak, Abby, Richman and Chesnut [18] have recently validated a sub-set of the NimStim [19] with a sample of very young children (2-6 years old), and showed that they can accurately label photographs of adults depicting happiness, sadness, anger and fear. Other studies used these materials to investigate whether the findings demonstrated with adult participants also generalize to children. For example, LoBue [20] also used pictures from the NimStim in a study related to emotion detection and showed that children share the attentional bias for angry faces (i.e., angry faces are detected faster than happy or neutral faces). A subsequent study using another database depicting adult models (KDEF; [21]) showed that negative facial expressions impaired children's working memory to a greater extent, when compared to neutral and positive expressions [22].

Other studies have been using databases that include stimuli depicting non-adult models that can either be presented to children or adults. The availability of these databases is important for diverse research areas. In particular, these materials allow the use of peer-aged stimuli in studies with samples of children [23]. For example, a study with young children (3-5 years old) showed that the previously described attentional bias for angry faces is stronger when pictures of child (vs. adults) models are used [24]. Another important line of research did not focus on children's responses, but rather on the behavioral [25,26] or psychophysiological responses of adults in general, or parents [27–29], to children's emotional expressions. For example, Aradhye et al. [4] used photographs of children to examine how different expressions influence the responsiveness of non-kin young adults and found that smiling children were rated as more likely to be adopted than crying children. Other studies have even examined non-normative adult samples (e.g., maltreating parents or parents with psychiatric disorders). For instance, mothers with borderline personality disorder (vs. controls) showed an overall lower performance in recognizing emotion in children - both their own and unknown children - and to misinterpret neutral expressions as sadness [30]. Likewise, neglectful mothers [31] and abusive fathers [32] tend to perceive children's emotional cues more negatively than non-maltreating parents.

Photographs of children's facial expression can also be used to investigate how variables such as the age of the model influence person [33] or emotion [34] perception. For example, in a recent study by Griffiths, Penton-Voak, Jarrold, and Munafò [35], children and adult participants categorized the facial expressions of prototypes of different age groups (created by averaging photographs of individuals of the same gender and age group). Results showed similar accuracy for both child and adult facial expression prototypes across age groups. Thus, no evidence of own-age advantage emerged in either group of participants. Nevertheless, the age of the model did interact with other variables, such as gender (for a review, see [36]). For example, Parmley and Cunningham [34] showed that adult participants were more accurate to identify angry expressions displayed by male children than by female children, whereas no sex differences were detected in the identification of angry expressions displayed by adult models.

Currently, there are plentiful validated databases of facial expressions (for a review, see [37]). These databases include dynamic (i.e., videos) and static (i.e., pictures) stimuli depicting human models of different nationalities and cultural backgrounds, expressing a wide range of facial expressions. However, most databases include only young adults as models [19,21,37–39]. A few exceptions include adult models of distinct age groups. For example, the Lifespan Database of Adult Facial Stimuli [40] includes 18 to 93 years old models, and the FACES database [41] includes 19 to 80 years old models. As a consequence of this limited availability of validated databases depicting models across the lifespan, researchers often have to develop (and pre-test) new materials. For example, Parmley and Cunningham [34] selected a set of photographs of adults from existing databases, and complemented it with an original set of children's photographs. In Table 1 we present an overview of the databases that include photographs of facial expressions of children (for dynamic stimuli databases, see for example [42,43]).

Table 1.

Overview of Children's Facial Expressions Databases.

	Stimuli			Validation Procedure	
Database	Image Set	Facial Expressions	Model Features	Sample/Country	Measures
Radbound Faces Database[a] (RFD; [44])	1176 standardized color images: 240 of children, and 936 of adults	8 expressions: happiness, sadness, disgust, anger, fear, surprise, contempt, neutral Three gaze directions (left, frontal, right)	10 child models: 6 female 39 adult models: 19 female Specific age information not included. All Caucasian Dutch	276 adults (86% female, M_{age} = 21) All undergraduate students; Netherlands	Categorization of the expression (forced-choice: 7 Emotions + Neutral + Other) Subjective ratings of the expression (5-point scales): 1. Intensity (*Weak* to *Strong*); 2. Clarity (*Unclear* to *Clear*); 3. Genuineness (*Faked* to *Genuine*); 4. Valence (*Negative* to *Positive*) Subjective ratings of the model (only for the neutral, straight-gaze images, 5-point scale): 1. Attractiveness (*Unattractive* to *Attractive*)
NIMH Child Emotional Faces Picture Set (NIMH-ChEFS; [45])	534 standardized color images	5 expressions: happiness, sadness, anger, fear, neutral Two gaze conditions (direct, averted)	60 models (child actors): 10 – 17 years old; 55 models Caucasian (categorization based on appearance)	20 adults (65% female, M_{age} = 38) All faculty / staff; USA	Categorization of the expression (forced-choice: 4 Emotions + Neutral + Other) Subjective rating of the expression (slider): 1. Intensity (*Mild* to *Strong*); 2. Representativeness (*Poorly* to *Very Well*);
Dartmouth Database of Children's Faces (DDCF; [46])	640 standardized color images	8 expressions: happiness, content, sadness, disgust, anger, fear, surprise, neutral Five camera angles.	80 models: 6 – 16 years old; 40 female; All Caucasian	163 adults (59% female, M_{age} = 20) All undergraduate students; USA	Categorization of the expression (forced-choice: 6 Emotions + Neutral + Other) Subjective rating of the expression (5-point scales): 1. Intensity (*Low intensity* to 5 *High intensity*); Age estimation of the model (in years)

Child Affective Facial Expression (CAFE; [2])	1192 standardized color images	7 expressions: happiness, sadness, disgust, anger, fear, surprise, neutral	154 models: 2 – 8 years old; 90 female; 77 Caucasian/ European American, 27 African-American, 23 Latino, 16 Asian, 11 South Asian	100 adults (50% female, M_{age} = 21) All undergraduate students; USA	Categorization of the expression (forced-choice: 6 Emotions + Neutral)
Child Emotions Picture Set (CEPS; [47])	225 standardized black and white images	7 expressions: happiness, sadness, disgust, anger, fear, surprise, neutral	17 models: 6 – 11 years old; 9 female; Multiracial backgrounds	30 experts (psychologists with experience in child development); Brazil	Categorization of the expression (forced-choice: 6 Emotions + Neutral) Categorization of the expression intensity: Weak (0%-30%); Moderate (31%-70%) or Strong (71%-100%)
White, Pardo and Black Children Picture Set (BIC-Multicolor; [48])	120 standardized color images	Neutral expression	120 models: 6 – 12 years old 66 female Race not predetermined	210 adults (71% female, M_{age} = 30); Brazil	Categorization of the model's race (White, Pardo/Multiracial, Black) Subjective ratings (7-point scales): 1. Facial Valence (*Negative* to *Positive*); 2. Facial Friendliness (*Unfriendliness* to *Friendliness*)
Developmental Emotional Faces Stimulus Set[a] (DEFSS; [23])	404 standardized color images: 144 of children, 154 of teens and 106 of adults	5 expressions; happiness, sadness, anger, fear, neutral	116 models: 42 children (8-12 years old), 44 teens (13-19 years old) and 30 adults 20-30 years old; 73 female, 102 White, 15 Non-White	228 participants: 20% children, 20% teens and 52% adults 75% female, 185 White, 39 Non-White; USA	Categorization of the expression (forced-choice: 4 Emotions + Neutral + None of the Above) Subjective ratings of the expression (7-point scale): 1. Intensity (*Just a little* to *A lot*)
Tromsø Infant Faces (TIF; [49])	119 standardized color images	7 expressions: happiness, sadness, disgust, anger, fear, surprise, neutral	18 models: 4 – 12 months old; 10 female; All Caucasian	720 adults (79% female; M_{age} = 33) 50% with children; 90% from Norway or Germany	Categorization of the expression (forced-choice: 6 Emotions + Neutral + Other) Subjective ratings of the expression (5-point scales): 1. Intensity (*Weak* to *Strong*); 2. Clarity (*Ambiguous* to *Clear*);

					3. Valence (*Very Negative* to *Very Positive*)
City Infant Faces (CIF; [5])	195 naturalistic black and white images	3 expressions: negative, neutral, positive	68 models: 0 – 12 months old; 35 female; 62 Caucasian, 3 Asian, 2 Arab, 1 Indian	71 adults (89% female; M_{age} = 28) 58% midwives; 17% neonatal nurses; 25% general public; England	Categorization of the expression (forced-choice: Negative, Neutral, Positive) Subjective ratings of the expression (5-point scales): 1. Intensity (*Weak* to *Strong*); 2. Clarity (*Unclear* to *Clear*); 3. Genuineness (*Fake* to *Genuine*); Affective response of the participant while viewing the image (forced choice: Negative, Neutral, Positive) and strength of response (*Weak* to *Strong*)
Youth Emotion Picture Set (YEPS; [50])	42 standardized black and white images	7 expressions: happiness, sadness, disgust, anger, fear, surprise, neutral	31 models: 12-20 years old; 14 male; 28 Caucasian, 1 Black, 3 Multiracial	101 adults (68% female); 54 adolescents (59% female); Brazil	Categorization of the expression (forced-choice: 6 Emotions + Neutral)
Baby Faces (BF; [51])	57 standardized color images	6 expressions; happiness, sadness, anger, fear, surprise, neutral	12 models: 6 – 12 months old; 6 female; 8 Caucasian, 2 Black, 2 Japanese	119 adults (64% female M_{age} = 36); Brazil	Categorization of the expression (forced-choice: 5 Emotions + Neutral)

Note. Number of pictures (and corresponding model description) refers to the stimuli used as materials for the validation procedure.
[a] Database also includes images of adult models.

As shown in Table 1, nine databases exclusively with photographs of children's facial expressions were recently published. These databases comprise standardized stimuli regarding graphic features (e.g., size, color, background) that were typically obtained through photoshoots in controlled settings (the CIF is an exception, with parents conducting the photoshoot and photographs processed by the authors). Facial expressions were prompted by employing different strategies during the photoshoot. For example, the models were exposed to videos (e.g., CEPS) or coached to imagine situations that would elicit the intended expression (e.g., "sitting on chewing gum" for eliciting disgust, DDCF). In other cases, the experience of the situation actually took place during the shoot (e.g., having infants tasting an unfamiliar food such as lemon to induce disgust, TIF). Despite these differences, all databases (except TIF and BIC-Multicolor) include specific emotions like happiness or anger, as well as neutral expressions. The characteristics of the models are also diverse across databases. For example, regarding age, the databases include photographs of infants (e.g., TIF; CIF; BF) or adolescent models (e.g., NIMH-ChEFS; DDCF). Nonetheless, there is a prevalence of Caucasian models across the databases (for exceptions, see [52,53]), which may limit the selection of ecologically valid stimuli in other cultural backgrounds (for a discussion on the implications of the demographic homogeneity of models, see [53]). Regarding the validation procedure, most studies were conducted with adult participants untrained in emotion recognition (an exception is the NIMH-ChEFS, which was subsequently validated with children and adolescents [54]), and typically entailed a forced-choice task to categorize the emotion depicted. In some cases, participants were also asked to rate the child expression in several evaluative dimensions (e.g., intensity, clarity, genuineness).

The CAFE [1,2] comprises the largest stimuli set (i.e., 1192 photographs) and is one of the most diverse databases regarding the race or ethnicity of the models, including Caucasian/European American, African-American, Latino, Asian, and South Asian children (see Table 1). The set includes a wide range of facial expressions – happiness, sadness, disgust, anger, fear, surprise, neutral – with over 100 photographs per expression (minimum of 103 photographs depicting surprise, and maximum of 230 depicting a neutral expression). Another advantage of this database is the possibility to select different expressions produced by the same model. Moreover, although the models were photographed in constant conditions (e.g., same off-white background with overhead lighting), they are still depicted in a naturalistic way. For example, the hairstyle of the children is visible, in contrast with other databases such as the DDCF, which only shows the facial features and covers hair and ears.

The original CAFE stimuli were photographed by an expert (i.e., trained coder of facial expressions) and then validated by asking a sample of 100 untrained adult participants to identify the expressions (forced-choice task). As argued by Lobue and Trasher ([2], see also [19]), the use of untrained participants has the advantage of obtaining emotion recognition scores of participants who are similar to those who will be recruited in future studies. In the validation study, the overall accuracy rate was 66%. However, there were significant differences in accuracy across the seven facial expressions, with pictures depicting happiness obtaining the highest accuracy scores (85%), followed by surprise (72%), anger and neutral (66%), disgust (64%), sadness (62%), and fear (42%). These accuracy rates were all significantly different from each other (except for anger vs. neutral and disgust vs. sadness). Results also showed that emotion recognition accuracy was not systematically influenced by the characteristics of the model (i.e., sex and race/ethnicity). Regarding the characteristics of the participants, only a significant effect of sex emerged, such that women raters were more accurate than men at identifying all facial expressions.

A recent study examined preschoolers' (3-4 years old) emotional recognition accuracy of a subset of the CAFE, and revealed strong associations between their ratings and those obtained in the original validation with adult participants [55]. Further corroborating the usefulness of this database, since its publication in 2015, the CAFE stimuli have been used as materials in multiple research domains, such as the neural processing of emotional facial expressions [28], attentional bias [24], stereotyping [56–59], and morality [60–62].

The racial/ethnic diversity of the models included in the CAFE makes it a particularly useful database for research in the stereotyping domain, namely to investigate if the racial biases identified in response to adults of specific social groups (e.g., Blacks) generalize to children of that same group. For example, in a sequential priming task, adult participants were faster to identify guns (vs. toys) when preceded by pictures of Black (vs. White) boys, suggesting that the perceived threat typically associated to Black men generalizes to Black boys [59]. Likewise, children expected the same negative event (e.g., biting their tongue) to induce less pain when experienced by Black (vs. White) children, demonstrating that the assumption that Black people feel less pain than White people also generalizes to Black children [56]. Importantly, by including children of different age groups as participants, this latter study also allowed to identify when such bias emerges in development, given that the effect was only strongly detected by the age of 10.

Our main goal was to further develop the CAFE database by assessing how the stimuli are perceived in a set of eight evaluative dimensions. Some of these dimensions require judgments about the model (i.e., familiarity, attractiveness, arousal, in-group belonging), whereas other are focused on the expression being displayed (i.e., valence, clarity, intensity and genuineness).

The measures regarding the facial expression have been assessed in other databases of children's expressions (see Table 1). In contrast, the measures that entail judgments about the model are less common and have been assessed in validations of databases depicting adults (for a review, see [37]). For example, we included attractiveness ratings because attractive children (similar to attractive adults) are more positively perceived (e.g., more intelligent, honest, pleasant) than less attractive children (for a review, see [63]). Because the stimuli set was developed in a distinct cultural context we also included a measure of target's in-group belonging (i.e., rating of the likelihood of the child being Portuguese). This measure can be of interest given the evidence that the recognition accuracy of facial expressions is higher when there is a match (vs. mismatch) between the cultural group of the expresser and of the perceiver (for reviews, see [64,65]). This in-group advantage for emotion recognition was also found with child participants when judging emotional expressions displayed by adults (e.g., [66]). Moreover, we also included a forced-choice expression recognition task to replicate the original validation study. The comparison of the accuracy scores obtained with our Portuguese sample with those produced by an American sample also informs about the cross-cultural validity of the database.

Lastly, we will also examine if individual factors (e.g., sex of the participant, parental status) impact emotion recognition and subjective ratings of the facial expressions. For example, it was shown that parents of young children rated images portraying facial expressions of infants as clearer, when compared with participants without children, or with older children (TIF database, [49]).

Method

Participants

The sample included 450 adult participants, from 18 to 71 years old (84.7% women; M_{age} = 32.34; *SD* = 10.76), of Portuguese nationality, who volunteered to participate in a web-survey. Regarding their ethnic/cultural background, most participants reported being of

Portuguese ancestry (88.4%). The majority of participants were active workers (54.0%) or students (33.6%), who attained a bachelor's degree (37.8%) or had completed high-school (36.4%). Regarding parental status, 43.8% of the participants were parents, and reported having up to four children (M = 1.66, SD = 0.76), with ages varying between 1 and 40 years old (M_{age} = 9.93, SD = 9.22).

Materials

Our stimuli set included 283 images selected from CAFE [1]. The original database comprises color photographs of children posing in six basic emotional expressions (sadness, happiness, anger, disgust, fear and surprise), plus a neutral expression. The models (N = 154, 58.4% female) were heterogeneous in age (from 2 to 8 years old, M_{age} = 5.3) and ethnic background (50% Caucasian/European American, 17.5% African American, 14.9% Latino, 10.4% Asian and 7.1% South Asian). The models were prompted to display each of the emotions by the photographer, who exemplified the intended expression. All models were covered from the neck down with an off-white sheet. The final set of 1192 photographs corresponds to the number of poses deemed successful. The photographs are available in high resolution (2739 x 2739 pixels) and are standardized regarding background color (off-white), viewing distance and figure-ground composition.

The stimuli sub-set used in the current work was selected based on several criteria. First, we took into consideration the accuracy of emotional categorization (i.e., "proportion of 100 adult participants who correctly identified the emotion in the photograph") reported in the original validation. Only photographs depicting facial expressions correctly identified by more than 50% of the sample were selected (resulting in 891 images). Second, we selected models that included photographs portraying neutral, happy and angry expressions (resulting in 455 images, 63 models). Third, we selected models that exhibited at least four different emotions (besides the neutral expression). Whenever different versions of the same emotion were available for the same model (e.g., happiness displayed with open and closed mouth), we selected the version that obtained the highest accuracy in the original database. Table 2 summarizes the characteristics of the photographs included in our sub-set (N = 283, corresponding to 51 models: 28 female, M_{age} = 4.81; 23 male, M_{age} = 5.00).

Table 2.

Number of Photographs for Each Emotional Expression According to Model's Race/Ethnicity and Model's Sex.

	African-American (13 models)		European (23 models)		Latino (8 models)		South Asian (4 models)		Asian (3 models)		
	F	M	F	M	F	M	F	M	F	M	*Total*
Emotion											
Anger	8	5	12	11	4	4	4	0	0	3	*51*
Neutral	8	5	12	11	4	4	4	0	0	3	*51*
Happiness	8	5	12	11	4	4	4	0	0	3	*51*
Disgust	6	4	8	10	4	3	3	0	0	2	*40*
Sadness	5	2	6	4	3	4	3	0	0	2	*29*
Fear	3	2	3	2	1	0	1	0	0	3	*15*
Surprise	8	5	11	10	3	4	2	0	0	3	*46*
Total	*46*	*28*	*64*	*59*	*23*	*23*	*21*	*0*	*0*	*19*	***283***

Note. F = Female model; M = Male model.

Procedure

The study was reviewed and approved by the Ethics Committee of ISCTE-Instituto Universitário de Lisboa. The study involved human data collection from adult volunteers. The study was noninvasive, no false information was provided, data were analyzed anonymously and written informed consent was obtained. The use of CAFE stimuli was approved by the Ethics Committee of ISCTE-Instituto Universitário de Lisboa and consent was obtained from Databrary via the signature of an Access Agreement. The parents/guardians of the children participating in the original CAFE study [2] signed a release giving permission for the use of their data/image in scientific research.

Participants were invited (e.g., institutional email, social networking websites) to collaborate on a web-survey aimed at testing materials for future studies. The hyperlink directed participants to a secure webpage in Qualtrics. The opening page informed about the goals of the study (evaluation of photographs of children displaying different facial expressions), its expected duration (approximately 20 minutes), and ethical considerations (i.e., anonymity, confidentiality and the possibility to withdraw from the study at any point). After agreeing to collaborate in the study, participants were asked to evaluate each photograph

considering their overall perception of the child portrayed (i.e., familiarity, attractiveness, arousal and likelihood of the child being Portuguese) as well as the facial expression displayed (i.e., valence, clarity, genuineness and emotional intensity). All evaluations were made in 7-point rating scales (for detailed instructions and scale anchors, see Table 3). In addition, participants were asked to identify the facial expression by selecting the corresponding label (i.e., sadness, happiness, anger, disgust, fear, surprise or neutral).

Table 3.

Item Wording and Scale Anchors for each Dimension.

Dimension	Instructions: To what extent …	Scale Anchors
Model		
1. Attractiveness	… does this child look beautiful?	1= *Not very beautiful,* 7 = *Very beautiful*
2. Arousal	… does this child look calm or excited?	1 = *Calm,* 7 = *Excited*
3. Familiarity	… does this child look familiar?	1 = *Not familiar at all,* 7 = *Very familiar*
4. In-group belonging	… is it likely that this child is Portuguese?	1 = *Certainly not Portuguese,* 7 = *Certainly Portuguese*
Expression		
5. Clarity	… is the expression displayed by the child clear?	1 = *Very unclear,* 7 = *Very clear*
6. Genuineness	… is the expression displayed by the child genuine?	1 = *Not genuine at all,* 7 = *Very genuine*
7. Intensity	… is the expression displayed by the child intense?	1 = *Not intense at all,* 7 = *Very intense*
8. Valence	… is the expression displayed by the child negative or positive?	1 = *Negative,* 7 = *Positive*

Participants were informed that there were no right or wrong answers. Instructions also emphasized that the presentation order of the evaluative dimensions would vary across photographs. Before initiating the evaluation task, participants were required to indicate their nationality (if other than Portuguese they were directed to the end of the survey), gender, current occupation and education.

To prevent fatigue and demotivation, participants were asked to rate a subset of 20 photographs. These photographs were randomly selected from the 283 available to minimize any systematic response bias deriving from the composition of the subsets. Each trial corresponded to the evaluation of one photograph. Specifically, in a single page of the web-survey, the image was presented at the center of the page with all the rating scales below it. The rating scales were presented in a random order across trials. However, the facial expression identification task (labeling) was always presented at the end of each trial. The seven emotional labels were also presented in a random order across trials.

At the end of the 20 trials, participants were asked to report their cultural background (i.e., Portuguese of… "Portuguese ancestry", "African ancestry", "Brazilian ancestry"; "Ukrainian ancestry" or "Other"), as well as their parenting status (parents were also asked to report the number of children, as well as the age of each child). Finally, participants were asked if their work entails regular contact with children, and if they have social contact with children other than their own (both using the following scale anchors: 1 = *No regular contact at all;* 7 = *Very regular contact*). Upon completion of the questionnaire, participants were thanked and debriefed.

Results

Given that we only retained completed questionnaires for analyses (N = 450) there were no missing cases. The preliminary analysis of the data showed no indication of systematic responses (i.e., participant using the same value of the response scale across dimensions) and a small percentage of outliers (1.02% - outliers were identified considering the criterion of 2.5 standard deviations above or below the mean evaluation of each stimulus in a given dimension). Therefore, no responses were excluded.

Below, we will present the analyses required to validate the stimulus set, as well as additional analyses that are potentially useful for researchers interested in using the set:

(a) Overall subjective ratings: We present the descriptive statistics of the subjective ratings for the entire sample and compare ratings according to participants' gender and parental status. Additionally, we also examined the associations between evaluative dimensions and examined the role of individual differences (e.g., age, frequency of contact with children in social and work contexts) in these associations.

(b) Impact of facial expression and model characteristics on subjective ratings: We compared ratings across evaluative dimensions according to facial expression (i.e., sadness, happiness, anger, disgust, fear, surprise or neutral), and model characteristics (i.e., sex and race/ethnicity of the model);

(c) Emotion recognition: We examined individual differences in overall accuracy. We also examined the impact of the expression, as well as the influence of model characteristics, on the accuracy of emotion recognition (mean % of hit rates);

(d) Cross-cultural comparison: We compared the accuracy in emotion recognition between the original and the current validation according to emotion type;

(e) Frequency distribution: To facilitate the overall characterization of the stimuli in the set we also present the frequency distribution of images across three levels (low, moderate and high) of each evaluative dimension.

Each photograph was evaluated by a minimum of 31 and a maximum of 34 participants. Normative and raw data files are available at https://osf.io/mjqfx/. Appendix A includes item level data (i.e., descriptive results for the set of eight evaluative dimensions and accuracy rates of emotion recognition). Each photograph is described (e.g., file name, model characteristics and facial expression) according to the original CAFE database. Appendix B comprises normative data organized by participant (including socio-demographic information of the raters), overall emotion accuracy rate, and ratings for each evaluative dimension according to facial expression, and model's characteristics (i.e., sex and race/ethnicity). Appendix C includes full raw data.

Overall subjective ratings

We compared ratings across evaluative dimensions against the scale midpoint and tested for gender and parental status differences considering the entire set of stimuli (see Table 4).

Table 4.

Mean Evaluations Across Dimensions (Entire Sample; for Women vs. Men; for Parents vs. Non-Parents).

	Total (n = 450)		Women (n = 381)		Men (n = 69)		Difference Test			Parents (n = 253)		Non-parents (n = 197)		Difference Test		
Dimension	*M*	*SD*	*M*	*SD*	*M*	*SD*	*t*(449)	*p*	*d*	*M*	*SD*	*M*	*SD*	*t*(448)	*p*	*d*
Familiarity	3.94	1.01	3.96	1.00	3.84	1.03	1.31	.191	0.12	3.79	1.02	4.14	0.96	3.64	< .001	0.34
Attractiveness	4.81*	0.89	4.89	0.86	4.39	0.91	5.98	< .001	0.56	4.75	0.89	4.90	0.89	1.78	.077	0.17
Arousal	4.25*	0.57	4.27	0.59	4.15	0.48	2.29	.023	0.22	4.30	0.54	4.19	0.61	-2.05	.041	0.19
In-Group	3.73*	0.67	3.79	0.67	3.41	0.62	6.25	< .001	0.59	3.70	0.62	3.77	0.74	1.11	.266	0.10
Valence	3.78*	0.53	3.79	0.52	3.71	0.58	1.67	.096	0.16	3.77	0.54	3.80	0.51	< 1	.550	0.06
Clarity	4.97*	0.72	4.97	0.73	4.98	0.71	< 1	.889	0.01	4.97	0.70	4.98	0.76	< 1	.914	0.01
Genuineness	4.82*	0.73	4.83	0.73	4.74	0.76	1.20	.233	0.11	4.78	0.70	4.87	0.77	1.31	.192	0.12
Intensity	4.88*	0.62	4.91	0.62	4.74	0.60	2.95	.003	0.28	4.83	0.59	4.95	0.65	1.98	.049	0.19

Note. *Different from scale midpoint (i.e., 4).
Means and standard deviations are weighted to follow Portuguese male and female population effectives (weighting factors: Females = 0.617; Male = 3.123).

Overall, participants evaluated the photographs above the scale midpoint in attractiveness, arousal, clarity, genuineness and intensity, and below the scale midpoint for in-group belonging and valence, all *p*s ≤ .001. Familiarity ratings did not differ from the scale midpoint, p = .241. Regarding gender differences, results show that women provided higher attractiveness, arousal, in-group belonging, and intensity ratings than men. Lastly, parents evaluated the stimuli as more familiar, more intense, and aroused than non-parents.

The correlations between evaluative dimensions are described in Table 5. Taking the strength of the correlation as criteria [67], we report correlations that were at least weak (i.e., r ≥ .20). Results showed that clarity was strongly and positively associated with both genuineness and with intensity, such that facial expressions rated as clearer were also perceived as more genuine and intense. We also found a strong and positive association between genuineness and intensity. Familiarity ratings showed a moderate positive correlation with in-group belonging (i.e., models rated as more familiar were also perceived as more likely to be Portuguese). We also found the same type of correlation between intensity and arousal (i.e., children displaying more intense expressions were also perceived as more aroused). Attractiveness ratings were only weakly and positively associated with the remaining evaluative dimensions, as were the associations between arousal and clarity and genuineness, and between genuineness and familiarity and valence.

Frequency of contact with children in a work context was weakly and positively correlated with frequency of contact in a social context, and both variables were also weakly associated with participants' age. Note that overall the associations between these variables and the subjective ratings were non-significant or very weak (i.e., associations between each of these variables and familiarity, as well between frequency of work and social contact and attractiveness).

Table 5.

Correlations.

	1	2	3	4	5	6	7	8	9	10
1. Familiarity	-									
2. Attractiveness	.30***	-								
3. Arousal	.06	.20***	-							
4. In-group	.49***	.30***	.09	-						
5. Valence	.18***	.20***	.02	.18***	-					
6. Clarity	.19***	.28***	.23***	.07	.16***	-				
7. Genuineness	.27***	.38***	.24***	.11*	.22***	.66***	-			
8. Intensity	.19***	.33***	.40***	.11*	.12**	.69***	.64***	-		
9. Contact: Work	.19***	.10*	.02	.08	.01	.03	-.01	.05	-	
10. Contact: Social	.11*	.18***	-.05	.08	.09	-.01	.05	.01	.38***	-
11. Age	.17***	0.04	-.09	.02	.04	.03	.08	.12*	.27***	.24***

*** $p \leq .001$; ** $p \leq .010$; * $p \leq .050$

Impact of facial expression and model characteristics on subjective ratings

We computed mean ratings for each of the 283 stimuli across the eight evaluative dimensions and conducted three separate univariate ANOVAs to examine the influence of facial expression, the sex and race/ethnicity of the model on each variable (post-hoc comparisons were conducted with Bonferroni correction and only the extreme values will be presented). Descriptive results (means and standard deviations) are summarized in Table 6.

Table 6.

Hit Rates (%) and Subjective Ratings According to Emotion, Sex of the Model and Model's Race/Ethnicity.

	Hit Rate (%)		Familiarity		Attractiveness		Arousal		In-group		Valence		Clarity		Genuineness		Intensity		
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*N*
Emotion																			
Anger	78.74	16.35	3.85	0.37	4.61	0.46	5.26	0.54	3.76	0.59	2.29	0.37	5.26	0.56	4.62	0.51	5.68	0.54	*51*
Disgust	69.46	21.33	3.86	0.38	4.60	0.44	4.54	0.50	3.76	0.64	2.91	0.55	4.84	0.62	4.71	0.51	5.09	0.50	*40*
Fear	58.43	15.89	3.91	0.40	4.81	0.42	4.62	0.46	3.72	0.72	2.92	0.36	5.06	0.53	4.97	0.33	5.30	0.45	*15*
Happiness	89.01	13.82	4.14	0.44	5.03	0.52	4.07	0.56	3.72	0.56	5.99	0.45	5.47	0.59	5.18	0.66	4.93	0.63	*51*
Neutral	74.80	17.96	3.75	0.40	4.88	0.50	2.67	0.32	3.60	0.64	3.73	0.50	3.93	0.38	4.83	0.31	3.37	0.48	*51*
Sadness	70.10	22.73	3.88	0.37	4.67	0.44	3.79	0.45	3.77	0.58	2.36	0.33	4.87	0.71	4.26	0.77	4.68	0.60	*29*
Surprise	79.87	16.59	4.17	0.39	4.99	0.45	4.99	0.64	3.83	0.57	4.98	0.84	5.41	0.50	5.00	0.60	5.44	0.55	*46*
Model Sex																			
Female	75.57	18.82	3.97	0.41	4.85	0.51	4.20	1.02	3.75	0.54	3.69	1.46	4.95	0.74	4.82	0.60	4.88	0.93	*154*
Male	78.25	19.65	3.91	0.43	4.76	0.48	4.31	1.01	3.72	0.67	3.88	1.47	5.00	0.80	4.80	0.63	4.89	0.97	*129*
Model Race/ Ethnicity																			
African	77.40	15.62	4.03	0.36	4.93	0.41	4.26	1.02	3.69	0.40	3.92	1.51	4.99	0.77	4.92	0.69	4.91	0.99	*74*
Asian	73.51	18.34	4.01	0.44	4.74	0.32	4.31	1.00	3.84	1.08	3.67	1.37	5.02	0.80	4.83	0.64	4.93	1.10	*19*
European	78.12	20.22	3.91	0.44	4.89	0.56	4.29	1.02	3.69	0.56	3.75	1.47	5.04	0.72	4.79	0.53	4.91	0.94	*123*
Latino	75.06	20.94	3.91	0.42	4.63	0.39	4.18	1.06	3.86	0.64	3.84	1.46	4.81	0.89	4.76	0.70	4.80	0.92	*46*
South Asian	73.65	22.22	3.83	0.48	4.39	0.45	4.10	0.97	3.77	0.74	3.42	1.41	4.83	0.72	4.69	0.46	4.83	0.81	*21*
Total	*76.79*	*19.22*	*3.94*	*0.42*	*4.81*	*0.50*	*4.25*	*1.01*	*3.73*	*0.60*	*3.78*	*1.47*	*4.97*	*0.77*	*4.81*	*0.61*	*4.89*	*0.94*	*283*

Familiarity. Familiarity ratings varied according to the type of facial expression, $F(1,6) = 7.53$, $MSE = 1.27$, $p < .001$, $\eta_p^2 = .14$. Photographs displaying surprise obtained the highest familiarity ratings, all ps $\leq .008$ (but not different from sadness, $p = .053$, fear, $p = .617$ and happiness, $p = 1.000$), and neutral photographs obtained the lowest familiarity ratings, all ps $< .001$ (but not different from anger, disgust, fear and sadness, all ps $= 1.000$).

Familiarity ratings did not vary according to model's sex, $F(1,281) = 1.76$, $MSE = 0.31$, $p = .186$, $\eta_p^2 = .01$, or race/ethnicity, $F(4,278) = 1.57$, $MSE = 0.28$, $p = .182$, $\eta_p^2 = .02$.

Attractiveness. Attractiveness ratings also varied according to facial expression, $F(1,6) = 6.69$, $MSE = 1.49$, $p < .001$, $\eta_p^2 = .13$. Photographs displaying happiness obtained the highest attractiveness ratings, all ps $\leq .019$ (but not different from fear, neutral and surprise, all ps $= 1.000$), and those displaying disgust obtained the lowest attractiveness ratings, all ps $\leq .002$ (but not different from anger, fear, neutral and sadness, all ps $> .099$).

Attractiveness ratings did not vary according to the sex of the model, $F(1,281) = 2.61$, $MSE = 0.65$, $p = .107$, $\eta_p^2 = .01$. However, results show the impact of model's race/ethnicity on attractiveness ratings, $F(4,278) = 7.96$, $MSE = 1.80$, $p < .001$, $\eta_p^2 = .10$. Specifically, African-American models obtained the highest attractiveness ratings, all ps $\leq .007$ (but not different from Asian and European, both ps $= 1.000$) and South Asian models obtained the lowest attractiveness ratings, all ps $< .001$ (but not different from Asian, $p = .216$, and Latino, $p = .602$).

Arousal. Arousal ratings varied according to facial expression, $F(1,6) = 136.66$, $MSE = 36.13$, $p < .001$, $\eta_p^2 = .75$. Specifically, we observed that models displaying anger were perceived as more aroused, all ps $\leq .001$ (but not different from surprise, $p = .214$), and that those with neutral expressions obtained the lowest arousal ratings, all ps $< .001$.

Arousal ratings did not vary according to the sex, $F < 1$, or the model's race/ethnicity, $F < 1$.

In-group belonging. Ratings regarding the likelihood of the model being Portuguese did not vary according to the emotion displayed, the sex or the model's race/ethnicity, all $F < 1$.

Valence. Valence ratings varied according to facial expression, $F(1,6) = 311.80$, $MSE = 87.94$, $p < .001$, $\eta_p^2 = .87$, such that photographs displaying happiness were rated as the most positive, all ps $< .001$, and that photographs displaying anger were rated as the most negative, all ps $\leq .002$ (but not different from sadness, $p = 1.000$).

Valence ratings did not vary according to the sex, $F(1,281) = 1.22$, $MSE = 2.61$, $p = .271$, $\eta_p^2 = .00$, or the model's race/ethnicity, $F < 1$.

Clarity. Clarity ratings varied according to the facial expression, $F(1,6) = 44.64$, $MSE = 13.62$, $p < .001$, $\eta_p^2 = .49$. Specifically, happiness was perceived as the clearest expression, all ps < .001 (but not different from fear, $p = .258$, anger and surprise, both ps = 1.000), and neutral photographs were rated as the least clear, all ps < .001.

Clarity ratings did not vary according to the sex of the model or its race/ethnicity, both $F < 1$.

Genuineness. Genuineness ratings varied according to facial expression, $F(1,6) = 11.09$, $MSE = 3.38$, $p < .001$, $\eta_p^2 = .19$, with photographs displaying happiness perceived as the most genuine, , all ps ≤ .031 (but not different from fear and surprise, both ps = 1.000), and photographs displaying sadness rated as the least genuine, all ps ≤ .016 (but not different from anger, $p = .112$).

Genuineness ratings did not vary according to the sex of the model, or its race/ethnicity, both $F < 1$.

Intensity. Intensity ratings varied according to facial expression, $F(1,6) = 94.94$, $MSE = 28.19$, $p < .001$, $\eta_p^2 = .67$, with photographs displaying anger perceived as the most intense, all ps < .001 (but not different from fear, $p = .354$ and surprise, $p = .623$), and neutral photographs rated as the least intense, all ps < .001.

Intensity ratings did not vary according to the sex or race/ethnicity of the model, both $F < 1$.

Overall, we observed differences across subjective ratings according to the type of emotional expression, but not according to the characteristics (sex, race/ethnicity) of the models.

Facial expression recognition

Hit scores (%) were obtained for each stimulus by calculating the percentage of participants that correctly recognized the intended expression based on the number of participants that evaluated a given photograph.

Results showed that the mean accuracy rate across the full set of 283 photographs was 76.8%. No differences were found according to the sex of the rater - women ($M = 77.01\%$, $SD = 12.69$) and men ($M = 75.51\%$, $SD = 11.10$), $t(449) = 1.33$, $p = .184$, $d = 0.13$. Surprisingly,

participants without children (M = 78.77%, SD = 11.51) were more accurate than those with children (M = 74.21%, SD = 13.17), $t(448) = 3.92$, $p < .001$, $d = 0.37$. However, when examining the accuracy levels of those who reported having younger children (i.e., up to 8 years old - the maximum age of the models), parents with at least one young child were significantly more accurate (M = 76.64%, SD = 11.62) than parents with older children (M = 69.59%, SD = 15.53), $t(187) = 3.49$, $p = .001$, $d = 0.51$.

We also examined the influence of facial expression, and both sex and race/ethnicity of the model by conducting three separate univariate ANOVAs (see Table 6). As expected, accuracy varied according to the facial expression, $F(1,6) = 8.94$, $MSE = 2824.85$, $p < .001$, $\eta_p^2 = .16$ (see Table 6). Post-hoc comparisons with Bonferroni correction, showed that photographs displaying happiness obtained the highest accuracy rates, all ps $\leq .001$ (but not different from anger, $p = .080$, and surprise, $p = .252$), and that photographs displaying fear obtained the lowest accuracy rates, all ps $\leq .040$ (but not different from sadness, $p = .839$, and disgust, $p = .869$). Accuracy rates did not vary according to the sex, $F(1,281) = 1.37$, $MSE = 505.15$, $p = .243$, $\eta_p^2 = .01$, or the model's race/ethnicity, $F < 1$.

Again, we observed differences on accuracy rates according to the type of expression, but not according to the models' characteristics.

Cross cultural comparison

To compare the mean accuracy rates observed in our sample (for the same sub-set of stimuli) with those reported in the original validation study [2], we conducted a 2 (sample) x 7 (facial expression) univariate ANOVA.

Results showed a main effect of sample, $F(1,552) = 6.87$, $MSE = 1422.80$, $p = .009$, $\eta_p^2 = .01$, such that the accuracy rates observed with the Portuguese sample (M = 74.3%, SE = .94) were lower than the ones reported in the original validation sample (M = 77.8%, SE = .94). We also observed a main effect of emotion, $F(6,552) = 23.40$, $MSE = 4849.70$, $p < .001$, $\eta_p^2 = .20$, such that photographs displaying happiness obtained the highest accuracy rates, all ps $< .001$, and photographs displaying disgust obtained the lowest accuracy rates, all ps $\leq .003$ (but not different from anger, $p = .121$, sadness and disgust, both ps = 1.000). Moreover, results showed an interaction between sample and facial expression, $F(6,552) = 4.03$, $MSE = 835.20$, $p = .001$, $\eta_p^2 = .04$ (see Fig 1).

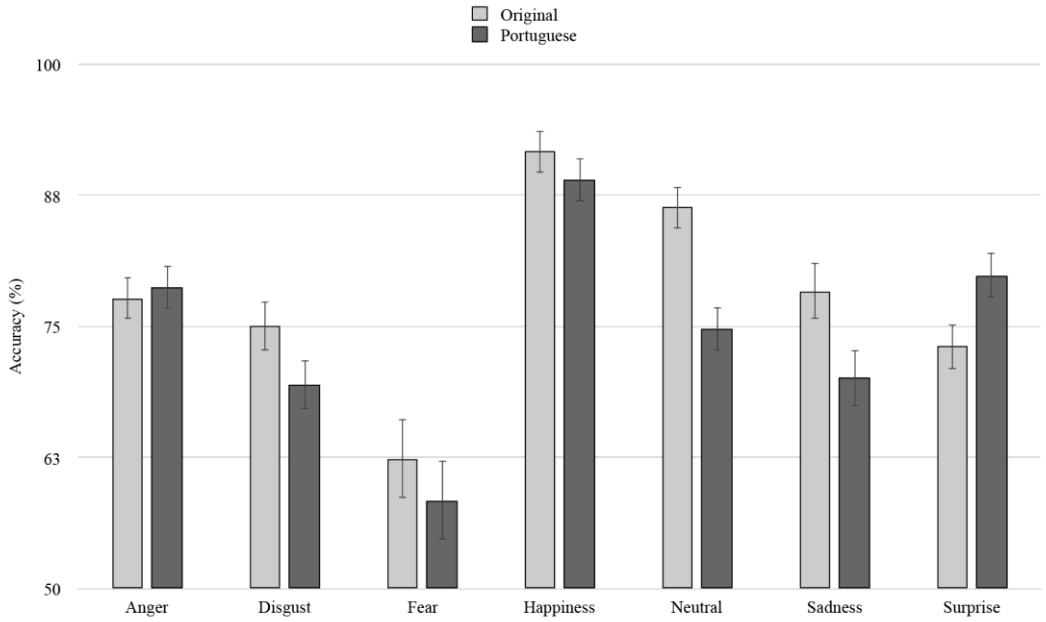


Figure 1. Comparison of mean accuracy rates (%) between samples by facial expression.

As shown in Fig 1, the original validation (vs. Portuguese) obtained higher accuracy ratings for neutral stimuli, $t(552) = 4.05$, $p < .001$, $d = 0.34$, as well as for those depicting sadness, $t(552) = 2.19$, $p = .029$, $d = 0.19$. For surprise, higher accuracy was observed in the current validation, $t(552) = -2.25$, $p = .025$, $d = 0.19$. No differences between samples were observed for the remaining expressions, all ps > .083.

Frequency distribution

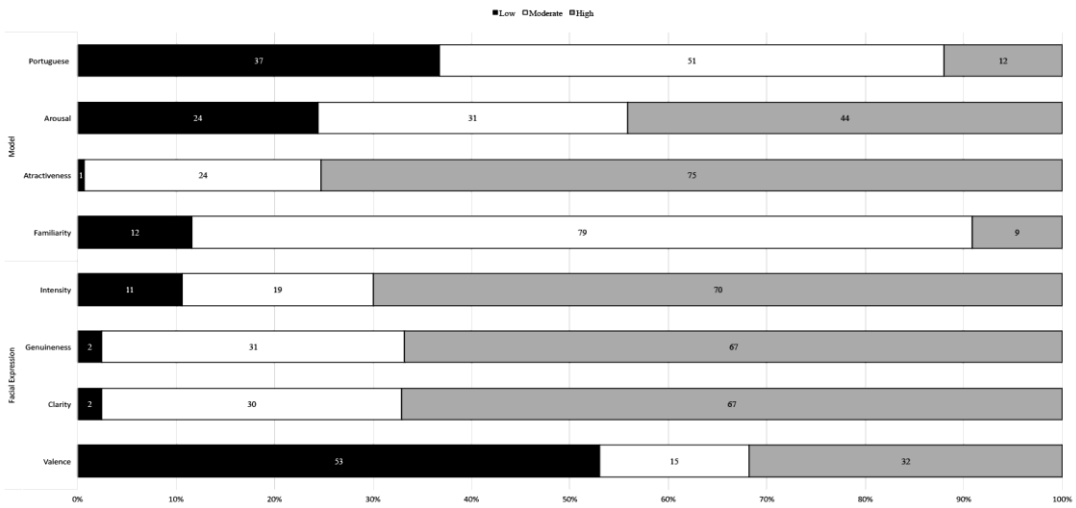


Figure 2. Distribution of photographs across each dimension level.

We computed descriptive statistics (i.e., means, standard deviations and confidence intervals) for each photograph per evaluative dimension (see https://osf.io/mjqfx/). According to the confidence interval, each photograph was categorized as low (i.e., lower bound below scale midpoint), moderate (confidence interval included the scale midpoint) or high (lower bound above scale midpoint) on a given dimension (for a similar procedure, see [68–70]. For the valence dimension, the low, moderate and high levels correspond to negative, neutral and positive, respectively. Fig 2 represents the frequency distribution of photograph across dimensions.

Regarding the evaluative dimensions concerning the model, results showed that most photographs were perceived as moderate in familiarity (79%) and in likelihood to belong to the in-group (51%), and as high in attractiveness (75%). In the case of arousal, photographs were distributed across the three levels with the highest percentage of photographs evaluated as high in arousal. Regarding the dimensions related to the evaluation of the expression, most photographs were perceived as high in intensity (70%), genuineness (67%) and clarity (67%), and also as negative (53%).

Discussion

Databases of children's facial expressions have been used in a myriad of research domains, such as emotion detection and recognition, social cognition (e.g., impression formation, stereotypes), cognitive psychology (e.g., attention bias), with samples of normative or non-normative (e.g., psychiatric disorders) children or adults (parents or non-parents).

In this work, we provide further validation for a sub-set of one of the most comprehensive databases of facial expressions depicting children – the CAFE [2]. This sub- set (283 photographs) is varied regarding the characteristics of the model, as it includes stimuli depicting boys and girls of heterogeneous race/ethnicity. It is also varied in the range of expressions depicted (i.e., sadness, happiness, anger, disgust, fear, surprise, neutral). Moreover, one of the primary criteria for selecting stimuli for the current validation was to select models that exhibited at least four different emotions (51 models) - with angry, neutral and happy expressions mandatory. Angry and happy faces have been used to activate negative versus positive valence (e.g., [71]), or as exemplars of socially aversive versus appetitive stimuli (e.g., [72]). The availability of neutral expression for all the models is also of particular interest, as these stimuli may serve as baseline in several experimental paradigms (e.g., affective priming,

approach-avoidance tasks), or as the target stimuli in impression formation tasks (e.g., [73]). Besides assessing emotion recognition accuracy (as in the original validation), we also asked participants to evaluate each stimulus in eight subjective dimensions focusing on the characteristics of the model or of the expression depicted.

Based on the overall mean ratings, the facial expressions were rated as high in clarity, genuineness and intensity, and the models were perceived as high in attractiveness and arousal, as moderately familiar and as low in their likelihood of in-group belonging. Overall valence ratings were negative, which is not surprising considering the range of facial expressions included (i.e., fear, sadness, anger and disgust vs. happiness, surprise and neutral). Differences according to the sex of the rater were only found for a few dimensions, such that woman (vs. men) evaluated the models as more attractive, aroused and as more likely to belong to the in-group, and the expressions as more intense. Parental status also impacted mean ratings, such that parents (vs. non-parents) evaluated the models as more familiar and less aroused, and the expressions as more intense.

The overall accuracy in emotion recognition was satisfactory (77%) and did not vary according to the sex of the rater. This finding contrasts with the results from the original validation CAFE validation (i.e., higher accuracy rates for female respondents), but is in line with the results obtained in other validations of children's photos (e.g., [49]). Parental status did impact overall accuracy, but in the reverse direction: overall non-parents were actually more accurate than parents. However, parents of younger children (up to 8 years old, as the models included in our sub-set) were more accurate than those with older children. Previous studies that examined parental status have also failed to demonstrate a general advantage of parents in children's emotion recognition (e.g., [49]). In turn, differences regarding parental status seem to be found only in interaction with other variables, such as sex and type of facial expression [26]. Finally, the overall ratings were not strongly associated with the frequency of contact with children (both in work and social contexts).

Accuracy also varied according to the facial expression, with the highest accuracy rate obtained for happy faces (although not statistically different from anger and surprise). Indeed, studies have consistently shown an advantage in the recognition speed and/or accuracy of happy faces in comparison to other basic emotional categories (for a review, see [74]). The accuracy of emotion recognition was independent of the models' characteristics such as sex or race/ethnicity, replicating the original CAFE validation. Finally, the comparison of the results of the emotional recognition measure between our sample and the original validation for the

same sub-set of stimuli, showed that overall, the accuracy rates of the Portuguese sample were lower. However, this difference was inferior to 4% and was due to higher recognition rates for neutral and sad faces in the original sample. Indeed, the accuracy rates for faces depicting surprise were higher in the Portuguese sample, whereas no cross-cultural differences were detected for the other facial expressions.

Overall, we found positive correlations between most evaluative dimensions (e.g., clarity was strongly and positively associated with genuineness and with intensity and the latter dimensions were also strongly associated). Importantly, the impact of facial expression was found for all dimensions (except judgments of in-group belonging). For example, happy faces were perceived as the most attractive, positive, clear and genuine, whereas angry faces were rated as the most aroused and intense. The characteristics of the models (i.e., sex, race/ethnicity) did not impact these ratings. Indeed, the only effect regarding race/ethnicity detected was for the attractiveness dimension, with African models rated as the most attractive (along with Asian and European models).

The CAFE database is suitable to be used with adult participants (e.g., to study how normative and non-normative samples differ regarding emotion recognition of child facial expressions). Moreover, this database is particularly useful in research conducted with samples of children as it allows for the use of peer-aged stimuli. Yet, the generalization of the current norms to children should be made cautiously. Although no differences between child and adult raters have been reported regarding emotion recognition performance [55], that might not be the case for some of the subjective dimensions. For example, a recent study showed that although ratings of valence and arousal produced by adults and children regarding facial expressions depicted by adult models were correlated, some differences emerged according to the raters' age group (e.g., children rated all expressions more positively [75]). The replication of the current validation procedure with children is recommended.

In sum, the current CAFE sub-set is diverse regarding the objective characteristics of the models and the range of facial expressions depicted. Note however, that this sub-set is limited regarding certain emotional expressions (e.g., photographs of fear expression are only available for 15 models). Another limitation is that the several model characteristics (race/ethnicity, sex and emotional expression) are not fully balanced (e.g., South Asian models are all females and Asian models are all males). This imbalance derives both from the distribution of exemplars across all categories in the original database and from the criteria used to select the subset for the current study. Also, the choice is limited for researchers interested in ambiguous facial

expressions, as only 35 photographs show recognition rates below 50%. We expanded the original database by assessing an extensive set of evaluative dimensions. Most stimuli were rated as depicting genuine, clear and intense facial expressions. Also, regarding the evaluation of the models, most stimuli were evaluated as portraying familiar and attractive children. Results from the in-group belonging measure suggest the applicability of this set across different cultural backgrounds. For example, Portuguese participants indicated that most pictures (63%) depicted models with a moderate or high likelihood of belonging to their in-group. For valence and arousal dimensions, the stimuli are more equally distributed across the three levels of the dimensions. Hence, numerous exemplars of each level can be selected for future research. This normative data allows researchers to select adequate stimuli according to different criteria, for example manipulating the dimensions of interest (e.g., type of expression), while controlling for other variables (e.g., model characteristics).

References

1. LoBue V. The Child Affective Facial Expression (CAFE) set. Databrary. 2014; doi:http://doi.org/10.17910/B7301K
2. LoBue V, Thrasher C. The Child Affective Facial Expression (CAFE) set: Validity and reliability from untrained adults. Front Psychol. 2015;5: 1532. doi:10.3389/fpsyg.2014.01532
3. Halberstadt AG, Parker AE, Castro VL. Nonverbal communication: Developmental perspectives. Handbooks of communication science. Berlin: De Gruyter Mouton; 2013. pp. 93–128.
4. Aradhye C, Vonk J, Arida D. Adults' responsiveness to children's facial expressions. J Exp Child Psychol. 2015;135: 56–71. doi:10.1016/j.jecp.2015.02.006
5. Webb R, Ayers S, Endress A. The City Infant Faces Database: A validated set of infant facial expressions. Behav Res Methods. 2017; Advance online publication. doi:10.3758/s13428-017-0859-9
6. Paiva-Silva AI de, Pontes MK, Aguiar JSR, de Souza WC. How do we evaluate facial emotion recognition? Psychol Neurosci. 2016;9: 153–175. doi:10.1037/pne0000047
7. Rodger H, Vizioli L, Ouyang X, Caldara R. Mapping the development of facial expression recognition. Dev Sci. 2015;18: 926–939. doi:10.1111/desc.12281

8. Lawrence K, Campbell R, Skuse D. Age, gender, and puberty influence the development of facial emotion recognition. Front Psychol. 2015;6. doi:10.3389/fpsyg.2015.00761

9. Widen SC. Children's interpretation of facial expressions: The long path from valence-based to specific discrete categories. Emot Rev. 2013;5: 72–77. doi:10.1177/1754073912451492

10. Mancini G, Agnoli S, Baldaro B, Bitti PER, Surcinelli P. Facial expressions of emotions: Recognition accuracy and affective reactions during late childhood. J Psychol. 2013;147: 599–617. doi:10.1080/00223980.2012.727891

11. Castro VL, Halberstadt AG, Lozada FT, Craig AB. Parents' emotion-related beliefs, behaviors, and skills predict children's recognition of emotion. Infant Child Dev. 2015;24: 1–22. doi:10.1002/icd.1868

12. Collin L, Bindra J, Raju M, Gillberg C, Minnis H. Facial emotion recognition in child psychiatry: A systematic review. Res Dev Disabil. 2013;34: 1505–1520. doi:10.1016/j.ridd.2013.01.008

13. Guyer AE, McClure EB, Adler AD, Brotman MA, Rich BA, Kimes AS, et al. Specificity of facial expression labeling deficits in childhood psychopathology. J Child Psychol Psychiatry. 2007;48: 863–871. doi:10.1111/j.1469-7610.2007.01758.x

14. Koizumi M, Takagishi H. The relationship between child maltreatment and emotion recognition. PLoS ONE. 2014;9. doi:10.1371/journal.pone.0086093

15. Pollak SD, Cicchetti D, Hornung K, Reed A. Recognizing emotion in faces: Developmental effects of child abuse and neglect. Dev Psychol. 2000;36: 679–688. doi:10.1037/0012-1649.36.5.679

16. Shenk CE, Putnam FW, Noll JG. Predicting the accuracy of facial affect recognition: The interaction of child maltreatment and intellectual functioning. J Exp Child Psychol. 2013;114: 229–242. doi:10.1016/j.jecp.2012.08.007

17. da Silva Ferreira GC, Crippa JAS, de Lima Osório F. Facial emotion processing and recognition among maltreated children: A systematic literature review. Front Psychol. 2014;5. doi:10.3389/fpsyg.2014.01460

18. Barnard-Brak L, Abby L, Richman DM, Chesnut S. Facial emotion recognition among typically developing young children: A psychometric validation of a subset of NimStim stimuli. Psychiatry Res. 2017;249: 109–114.

19. Tottenham N, Tanaka JW, Leon AC, McCarry T, Nurse M, Hare TA, et al. The NimStim set of facial expressions: Judgments from untrained research participants. Psychiatry Res. 2009;168: 242–249. doi:10.1016/j.psychres.2008.05.006

20. LoBue V. More than just another face in the crowd: Superior detection of threatening facial expressions in children and adults. Dev Sci. 2009;12: 305–313. doi:10.1111/j.1467-7687.2008.00767.x

21. Lundqvist D, Flykt A, Öhman A. The Karolinska Directed Emotional Faces - KDEF [CD ROM] Department of Clinical Neuroscience, Psychology section, Karolinska Institutet, ISBN 91-630-7164-9. 1998.

22. Augusti E-M, Torheim HK, Melinder A. The effect of emotional facial expressions on children's working memory: associations with age and behavior. Child Neuropsychol. 2014;20: 86–105. doi:10.1080/09297049.2012.749225

23. Meuwissen AS, Anderson JE, Zelazo PD. The creation and validation of the Developmental Emotional Faces Stimulus Set. Behav Res Methods. 2017;49: 960–966. doi:10.3758/s13428-016-0756-7

24. LoBue V, Matthews K, Harvey T, Thrasher C. Pick on someone your own size: The detection of threatening facial expressions posed by both child and adult models. J Exp Child Psychol. 2014;118: 134–142. doi:10.1016/j.jecp.2013.07.016

25. Morey JN, Gentzler AL. Parents' perceptions of and responses to children's emotions: Relations with meta-emotion philosophy and adult attachment. Parenting. 2017;17: 73–103. doi:10.1080/15295192.2017.1304782

26. Parsons CE, Young KS, Jegindoe Elmholdt E-M, Stein A, Kringelbach ML. Interpreting infant emotional expressions: Parenthood has differential effects on men and women. Q J Exp Psychol. 2017;70: 554–564. doi:10.1080/17470218.2016.1141967

27. Bernard K, Simons R, Dozier M. Effects of an attachment-based intervention on CPS-referred mothers' event-related potentials to children's emotions. Child Dev. 2015;86: 1673–1684. doi:10.1111/cdev.12418

28. Kolijn L, Euser S, van den Bulk BG, Huffmeijer R, van IJzendoorn MH, Bakermans-Kranenburg MJ. Which neural mechanisms mediate the effects of a parenting intervention program on parenting behavior: Design of a randomized controlled trial. BMC Psychol. 2017;5: 9. doi:10.1186/s40359-017-0177-0

29. Yrttiaho S, Niehaus D, Thomas E, Leppänen JM. Mothers' pupillary responses to infant facial expressions. Behav Brain Funct. 2017;13: 2. doi:10.1186/s12993-017-0120-9

30. Elliot R-L, Campbell L, Hunter M, Cooper G, Melville J, McCabe K, et al. When I look into my baby's eyes…Infant emotion recognition by mothers with borderline personality disorder. Infant Ment Health J. 2014;35: 21–32. doi:10.1002/imhj.21426

31. Hildyard K, Wolfe D. Cognitive processes associated with child neglect. Child Abuse Negl. 2007;31: 895–907. doi:10.1016/j.chiabu.2007.02.007

32. Francis KJ, Wolfe DA. Cognitive and emotional differences between abusive and non-abusive fathers. Child Abuse Negl. 2008;32: 1127–1137. doi:10.1016/j.chiabu.2008.05.007

33. Cogsdill EJ, Banaji MR. Face-trait inferences show robust child–adult agreement: Evidence from three types of faces. J Exp Soc Psychol. 2015;60: 150–156. doi:10.1016/j.jesp.2015.05.007

34. Parmley M, Cunningham JG. She looks sad, but he looks mad: The effects of age, gender, and ambiguity on emotion perception. J Soc Psychol. 2014;154: 323–338. doi:10.1080/00224545.2014.901287

35. Griffiths S, Penton-Voak IS, Jarrold C, Munafò MR. No own-age advantage in children's recognition of emotion on prototypical faces of different ages. PLOS ONE. 2015;10: e0125256. doi:10.1371/journal.pone.0125256

36. Chaplin TM, Aldao A. Gender differences in emotion expression in children: A meta-analytic review. Psychol Bull. 2013;139: 735–765. doi:10.1037/a0030737

37. Garrido MV, Lopes D, Prada M, Rodrigues D, Jerónimo R, Mourão RP. The many faces of a face: Comparing stills and videos of facial expressions in eight dimensions (SAVE database). Behav Res Methods. 2017;49: 1343–1360. doi:10.3758/s13428-016-0790-5

38. Olszanowski M, Pochwatko G, Kuklinski K, Scibor-Rylski M, Lewinski P, Ohme RK. Warsaw set of emotional facial expression pictures: A validation study of facial display photographs. Front Psychol. 2015;5. doi:10.3389/fpsyg.2014.01516

39. Vaiman M, Wagner MA, Caicedo E, Pereno GL. Development and validation of an Argentine set of facial expressions of emotion. Cogn Emot. 2017;31: 249–260. doi:10.1080/02699931.2015.1098590

40. Minear M, Park DC. A lifespan database of adult facial stimuli. Behav Res Methods Instrum Comput. 2004;36: 630–633. doi:10.3758/bf03206543

41. Ebner NC, Riediger M, Lindenberger U. FACES—A database of facial expressions in young, middle-aged, and older women and men: Development and validation. Behav Res Methods. 2010;42: 351–362. doi:10.3758/BRM.42.1.351

42. Giuliani NR, Flournoy JC, Ivie EJ, Von Hippel A, Pfeifer JH. Presentation and validation of the DuckEES child and adolescent dynamic facial expressions stimulus set. Int J Methods Psychiatr Res. 2017;26: e1553. doi:10.1002/mpr.1553

43. Nojavanasghari B, Baltrušaitis T, Hughes CE, Morency L-P. EmoReact: A multimodal approach and dataset for recognizing emotional responses in children. Proceedings of the 18th ACM International Conference on Multimodal Interaction. New York, NY, USA: ACM; 2016. pp. 137–144. doi:10.1145/2993148.2993168

44. Langner O, Dotsch R, Bijlstra G, Wigboldus DHJ, Hawk ST, van Knippenberg A. Presentation and validation of the Radboud Faces Database. Cogn Emot. 2010;24: 1377–1388. doi:10.1080/02699930903485076

45. Egger HL, Pine DS, Nelson E, Leibenluft E, Ernst M, Towbin KE, et al. The NIMH Child Emotional Faces Picture Set (NIMH-ChEFS): A new set of children's facial emotion stimuli. Int J Methods Psychiatr Res. 2011;20: 145–156. doi:10.1002/mpr.343

46. Dalrymple KA, Gomez J, Duchaine B. The Dartmouth Database of Children's Faces: Acquisition and validation of a new face stimulus set. PLOS ONE. 2013;8: e79131. doi:10.1371/journal.pone.0079131

47. Romani-Sponchiado A, Sanvicente-Vieira B, Mottin C, Hertzog-Fonini D, Arteche A. Child Emotions Picture Set (CEPS): Development of a database of children's emotional expressions. Psychol Neurosci. 2015;8: 467–478. doi:10.1037/h0101430

48. Sacco AM, de Paula Couto MCP, Koller SH. Construction and validation of the White, Pardo, and Black Children Picture Set (BIC-Multicolor). Psychol Neurosci. 2016;9: 68–78. doi:10.1037/pne0000040

49. Maack JK, Bohne A, Nordahl D, Livsdatter L, Lindahl ÅAW, Øvervoll M, et al. The Tromso Infant Faces Database (TIF): Development, validation and application to assess parenting experience on clarity and intensity ratings. Front Psychol. 2017;8. doi:10.3389/fpsyg.2017.00409

50. Novello B, Renner A, Maurer G, Musse S, Arteche A. Development of the Youth Emotion Picture Set. Perception. 2018;47: 1029–1042. doi:10.1177/0301006618797226

51. Donadon MF, Martin-Santos R, Osório FL. Baby Faces: Development and psychometric study of a stimuli set based on babies' emotions. J Neurosci Methods. 2019;311: 178–185. doi:10.1016/j.jneumeth.2018.10.021

52. Conley MI, Dellarco DV, Rubien-Thomas E, Cohen AO, Cervera A, Tottenham N, et al. The racially diverse affective expression (RADIATE) face stimulus set. Psychiatry Res. 2018;Advance online publication. doi:10.1016/j.psychres.2018.04.066

53. Ma DS, Correll J, Wittenbrink B. The Chicago Face Database: A free stimulus set of faces and norming data. Behav Res Methods. 2015;47: 1122–1135. doi:10.3758/s13428-014-0532-5

54. Coffman MC, Trubanova A, Richey JA, White SW, Kim-Spoon J, Ollendick TH, et al. Validation of the NIMH-ChEFS adolescent face stimulus set in an adolescent, parent, and health professional sample. Int J Methods Psychiatr Res. 2015;24: 275–286. doi:10.1002/mpr.1490

55. LoBue V, Baker L, Thrasher C. Through the eyes of a child: Preschoolers' identification of emotional expressions from the child affective facial expression (CAFE) set. Cogn Emot. 2018; 1122–1130. doi:10.1080/02699931.2017.1365046

56. Dore RA, Hoffman KM, Lillard AS, Trawalter S. Children's racial bias in perceptions of others' pain. Br J Dev Psychol. 2014;32: 218–231. doi:10.1111/bjdp.12038

57. Mandalaywala TM, Ranger-Murdock G, Amodio DM, Rhodes M. The nature and consequences of essentialist beliefs about race in early childhood. Child Dev. 2018; doi:10.1111/cdev.13008

58. Todd AR, Simpson AJ, Thiem KC, Neel R. The generalization of implicit racial bias to young black boys: Automatic stereotyping or automatic prejudice? Soc Cogn. 2016;34: 306–323. doi:10.1521/soco.2016.34.4.306

59. Todd AR, Thiem KC, Neel R. Does seeing faces of young black boys facilitate the identification of threatening stimuli? Psychol Sci. 2016;27: 384–393. doi:10.1177/0956797615624492

60. Tasimi A, Dominguez A, Wynn K. Do-gooder derogation in children: The social costs of generosity. Front Psychol. 2015;6. doi:10.3389/fpsyg.2015.01036

61. Tasimi A, Johnson MK. A self-serving bias in children's memories? J Exp Psychol Gen. 2015;144: 528–533. doi:10.1037/xge0000072

62. Tasimi A, Young L. Memories of good deeds past: The reinforcing power of prosocial behavior in children. J Exp Child Psychol. 2016;147: 159–166. doi:10.1016/j.jecp.2016.03.001

63. Chatterjee A, Thomas A, Smith SE, Aguirre GK. The neural response to facial attractiveness. Neuropsychology. 2009;23: 135–143. doi:10.1037/a0014430

64. Elfenbein HA. In-group advantage and other-group bias in facial emotion recognition. In: Mandal MK, Awasthi A, editors. Understanding facial expressions in communication: Cross-cultural and multidisciplinary perspectives. New Delhi: Springer India; 2015. pp. 57–71. doi:10.1007/978-81-322-1934-7_4

65. Elfenbein HA, Ambady N. Is there an in-group advantage in emotion recognition? Psychol Bull. 2002;128: 243–249. doi:10.1037/0033-2909.128.2.243

66. Tuminello ER, Davidson D. What the face and body reveal: In-group emotion effects and stereotyping of emotion in African American and European American children. J Exp Child Psychol. 2011;110: 258–274. doi:10.1016/j.jecp.2011.02.016

67. Evans JD. Straightforward statistics for the behavioral sciences. Pacific Grove, CA: Brooks/Cole; 1996.

68. Prada M, Rodrigues D, Garrido MV, Lopes J. Food-pics-PT: Portuguese validation of food images in 10 subjective evaluative dimensions. Food Qual Prefer. 2017;61: 15–25. doi:10.1016/j.foodqual.2017.04.015

69. Prada M, Rodrigues D, Silva RR, Garrido MV. Lisbon Symbol Database (LSD): Subjective norms for 600 symbols. Behav Res Methods. 2016;48: 1370–1382. doi:10.3758/s13428-015-0643-7

70. Rodrigues D, Prada M, Gaspar R, Garrido MV, Lopes D. Lisbon Emoji and Emoticon Database (LEED): Norms for emoji and emoticons in seven evaluative dimensions. Behav Res Methods. 2017;50: 392–405. doi:10.3758/s13428-017-0878-6

71. Murphy ST, Zajonc RB. Affect, cognition, and awareness: affective priming with optimal and suboptimal stimulus exposures. J Pers Soc Psychol. 1993;64: 723–739. doi:10.1037//0022-3514.64.5.723

72. Enter D, Spinhoven P, Roelofs K. Alleviating social avoidance: Effects of single dose testosterone administration on approach–avoidance action. Horm Behav. 2014;65: 351–354. doi:10.1016/j.yhbeh.2014.02.001

73. Bar M, Neta M, Linz H. Very first impressions. Emotion. 2006;6: 269–278. doi:10.1037/1528-3542.6.2.269

74. Nummenmaa L, Calvo MG. Dissociation between recognition and detection advantage for facial expressions: A meta-analysis. Emotion. 2015;15: 243–256. doi:10.1037/emo0000042

75. Vesker M, Bahn D, Degé F, Kauschke C, Schwarzer G. Perceiving arousal and valence in facial expressions: Differences between children and adults. Eur J Dev Psychol. 2017; Advance online publication. doi:10.1080/17405629.2017.1287073

2. RECOGNIZING CHILDREN'S EMOTIONS IN CHILD ABUSE AND NEGLECT [7]

Abstract

Past research has long suggested that parents' ability in recognizing children's emotions is associated with an enhanced quality of parent-child interactions and appropriateness of parental caregiving behaviors. This association has also been examined in abusive and neglectful parents. However, this research presents mixed results and rarely addresses child neglect. Based on the Social Information Processing model of child abuse and neglect, the present study examined the association between mothers' abilities to recognizeg children's emotions and self- and professional-reported abuse and neglect.

The ability to recognize children's emotions was assessed with an implicit valence classification task and an emotion labeling task. A convenience sample of 166 mothers (half with at least one child referred to Child Protection Services) completed the tasks. Abuse and neglect were measured with self-report and hetero-report instruments. The moderating role of mothers' intellectual functioning and socioeconomic status were also explored.

Results revealed that more abusive mothers showed a lower performance in recognizing negative emotions, while mothers scoring higher on neglect demonstrated a lower overall ability in recognizing children's emotions. Moreover, the results for abuse were mainly observed with self-report measures, while for neglect they predominantly emerged with hetero-report. Intellectual functioning moderated the relationship between neglect and valence classification of emotions, while moderation effects of socioeconomic status were not observed.

Our findings are likely to bring valuable theoretical contributions to the SIP model of child maltreatment, with implications for prevention and intervention in child maltreatment.

Keywords: child abuse and neglect; maladaptive parenting; emotion recognition; attentional processes.

[7] Camilo, C., Garrido, M. V., & Calheiros, M. M. (2019). *Recognizing children's emotions in child abuse and neglect*. Manuscript submitted for publication.

Introduction

Children's positive and negative emotions are communicated to caregivers in different ways, such as vocalizations, gestures, body postures, body movements and facial expressions (Halberstadt, Parker, & Castro, 2013). Acknowledging and addressing children's emotions constitute key processes in the quality of parent-child interactions and appropriateness of parental caregiving behaviors (e.g., Webb, Ayers, & Endress, 2019).

Parents' recognition of children facial expressions has been a focus of interest in the child maltreatment literature, which has been exploring the association between parents' ability to recognize facial expressions and maladaptive parental practices (e.g., Camilo, Garrido, & Calheiros, 2019; Hildyard & Wolfe, 2007; Wagner et al., 2015). Based in a Social Information Processing (SIP) model of child abuse and neglect (Crittenden, 1993; Milner, 2003), the present study further examined abusive and neglectful mothers' ability in recognizing children's emotions using implicit and explicit measures.

Emotion recognition accuracy has been considered a fundamental skill to the development of empathic responses and well-adapted behaviors to the emotional state of others (e.g., Besel & Yuille, 2010). Specifically in the case of children, facial expressions not only inform about the child's emotional state, but also evoke behavioral motives in the caregivers (for a review, see Aradhye, Vonk, & Arida, 2015).

Even though the literature on parents' perception of children facial expressions has received little attention (Bolzani-Dinehart et al., 2005; Braungart-Rieker, Garwood, Powers, & Wang, 2001), parental sensitivity to infant emotions' expression has been identified as an important predictor of the quality of parent-child interactions (Mesman et al., 2012; Murray, Halligan, & Cooper, 2010). Indeed, the smiling and crying of a child communicating her emotional state have been shown to trigger caretaking mechanisms even when the adults have no previous relationship with the child (Aradhye et al., 2015). Research also indicates that adults are in general responsive to children's facial cues and expressions (Sprengelmeyer et al., 2009) and the neurobiology of parental sensitivity suggests that specific brain regions implicated in emotion perception, response, and regulation are activated in response to children's visual stimuli (e.g., Swain, 2011). Other studies indicate that maternal sensitivity is correlated with more attentional resources engaged in children's emotional face processing (Bernard, Simons, & Dozier, 2015). Moreover, emotion recognition ability is likely to be

impaired in cases of mothers' depression (Arteche et al., 2011) and borderline personality disorder (Elliot et al., 2014).

Socio-cognitive approaches to maladaptive parenting have emphasized the importance of parents' perception of child cues, signals or states, such as the recognition of children's emotions. The SIP model on child maltreatment suggests that abusive and neglectful parents present biases in perceiving and interpreting children's signals in a parent-child interaction. Specifically, children's signals are perceived and encoded through attentional processes, involving selective attention and encoding of child-related information, and filtered by parents' preexisting cognitive schemata about caregiving. The potential biases involved in these processes influence the way they integrate information about the event, select a parental response and behave towards the child (Crittenden, 1993; Milner, 1993, 2003).

The literature has also advanced different hypotheses regarding emotional recognition abilities for abuse and for neglect. The SIP model applied to child abuse (Milner, 1993, 2003) states that abusive parents are less attentive and aware of their children's behavior than non-abusive parents, and are more likely to observe more noncompliant child behaviors. Further, these parents are less accurate in encoding child-related information, make more errors in recognizing children's emotional expressions, namely low intensity emotions, and tend to incorrectly evaluate the intensity of emotions. Such biases are believed to occur due to attentional differences occurring when parents are experiencing stress, becoming more inattentive or hypervigilant to child-related stimuli because such stimuli are aversive to them (Milner, 2000). Moreover, research on aggression has suggested that aggressive individuals, such as abusive parents, are more attentive to negative stimuli, presenting a negativity bias in their attentional processes (e.g., Larkin, Martin, & McClain, 2002). Research regarding abuse has been focusing on emotion recognition errors (e.g., Balge & Milner, 2000) and biased encoding of children's behaviors (e.g., Rodriguez, 2018). Specifically in the context of emotion recognition, a few studies report that abusive and high-risk parents showed more errors in recognizing specific emotional expressions (Asla, De Paúl, & Pérez-Albéniz, 2011; Kropp & Haynes, 1987) and labeled ambiguous emotions more often as negative (Francis & Wolfe, 2008), when compared to non-abusive and low-risk parents. However, other studies found no significant differences between high and low risk parents (Balge & Milner, 2000; Wagner et al., 2015), and abusive and non-abusive mothers (Camras et al., 1988) in recognizing children emotional expressions. Despite these inconsistencies, meta-analytic data revealed that, overall, high-risk and abusive parents exhibit significantly lower emotion recognition accuracy

(Wagner et al., 2015). In the context of neglect, the literature suggests that neglectful parents fail to perceive their children's signals due to psychological states of withdrawal and depression, and even due to cognitive deficits that can sometimes be associated with this type of parenting (Crittenden, 1993). Specifically, these psychological characteristics impede parents from displaying lively affective involvement with their children, failing to interact with them and to notice interpersonal signals (e.g., child crying or requesting attention) and contextual needs (e.g., time since the last meal) of their children. Neglectful parents are likely to preconsciously exclude from cognitive perception information that elicits affect, reducing their flexibility to respond to environmental demands (Crittenden, 1993). Research on attachment has also explored parents' emotion recognition capabilities, which provide further support for their association with child neglect. For example, non-secure mothers have been shown to be more likely to label infants' emotions in a simplistic "black or white" manner. This pattern suggests that neglect is possibly associated with an avoidance strategy towards emotional information (DeOliveira, Moran, & Pederson, 2005), which is likely related to parents' past trauma and loss (Éthier, Lemelin, & Lacharité, 2004). Further, results from neuropsychological data (Bernard, Simons, & Dozier, 2015) suggest that the lack of maternal sensitivity, that often characterizes neglectful behavior, is associated with disruptions in attentional processes entangled in the processing of children's emotional cues. Applying the SIP model specifically to child neglect, Hildyard and Wolfe (2007) found that neglectful mothers tend to present more difficulties in recognizing children emotions, compared with non-neglectful mothers. Moreover, neglectful mothers were more likely to label infants' facial expressions as negative emotions (e.g., shame, sadness) and their emotion vocabulary seemed less developed (Hildyard & Wolfe, 2007).

Problems in recognizing emotions from facial expressions have been further associated with general cognitive skills and executive functions. Research conducted with children with intellectual disabilities has shown that these children revealed underdeveloped emotion recognition skills. Specifically, they tend to encode less emotional information from the situation, which in turn impairs their interpretation skills and adequacy of response selection and implementation (Van Nieuwenhuijzen & Vriens, 2012). Results from studies conducted with adults demonstrated that intellectual functioning predicted the ability to label emotional faces (Jahoda, Pert, & Trower, 2006). In parallel, poverty-related adversity has been associated with impoverished emotion labeling ability (e.g., Erhart, Dmitrieva, Blair, & Kim, 2019; Raver et al., 2015). Studies about the relationship between poverty and emotion labeling in adults are

scarce. However, research on parental sensitivity (which is associated with emotion perception) showed that parents experiencing poverty presentreduced parental sensitivity (Pinderhughes, Nix, Foster, Jones, & The Conduct Problems Prevention Research Group, 2007).

Regarding the measures used in emotion recognition studies, research on child abuse and neglect has been evaluating the two major components of emotional expressions: the explicit prototypical emotion recognition in categorization tasks (labeling of facial expressions) and measures of implicit affect towards facial expressions, namely valence and arousal (Calvo & Nummenmaa, 2016; for a review see Camilo, Garrido, & Calheiros, 2016). The categorical approach has mainly been considering the six basic emotional expressions (happiness, anger, sadness, fear, disgust and surprise; Ekman & Friesen, 1978) and its application to the study of abusive and neglectful parenting has been predominantly made by using the Facial Action Coding System (e.g., During & McMahon, 1991), the IFEEL Pictures lexicon clusters (e.g., Francis & Wolfe, 2008) or the DANVA II (e.g., Asla et al., 2011). Studies involving the measurement of implicit affect are scarce and have been based on affective priming paradigms to evaluate emotional valence (e.g., Wagner et al., 2015).

Considering the inconsistent results found in the literature on emotion recognition in the context of child abuse and neglect (Wagner et al., 2015), as well as the lack of studies comparing abusive and neglectful parents, the present study was designed to examine mothers' abilities in recognizing children's emotions as a function of their self and hetero-reported abuse and neglect scores. To this end, two different tasks were developed: an implicit valence classification task, evaluating mothers' accuracy and response latencies in classifying the valence of children's emotional expressions as positive or negative, and a categorization task, to assess mothers' ability in labeling children's basic emotions. Based on the SIP model (Crittenden, 1993; Milner, 2003), we expected that mothers with higher abuse scores (a) would be less accurate and slower in classifying positive than negative emotions in the implicit valence classification task, (b) would be less accurate in labeling positive than negative emotions, in the categorization task, and (c) would label ambiguous emotional faces more often as negative in both tasks. Mothers with higher neglect scores were expected to present (a) lower accuracy and slower responses in classifying the valence of children's emotions (positive and negative emotions), in the implicit valence classification task; (b) a lower general ability in labeling specific children's emotions, in the categorization task; and (c) to label ambiguous faces more often as negative, in both tasks. Moreover, it was expected that these effects would be maximized in mothers with low intellectual functioning and low socioeconomic status.

Finally, we were interested in exploring the convergence of the results depending on the self- and hetero-report nature of the measures of abuse and neglect used.

Method

Participants

A convenience sample of 166 mothers participated in this study. Their age ranged from 24 to 53 years old (M = 38.60, SD = 6.39), and they had between 1 and 8 children (M = 2.63, SD = 1.41). Most of the mothers were White (70.5%) and did not complete high school (54.2%).

Approximately half of the sample (n=78) had at least one child referred to Child Protection Services (CPS). The remaining (n=88) were recruited in schools and community services for socially vulnerable communities, to balance the socio-demographic characteristics of the sample. Mothers were eligible for participation if they had at least one child within the age range of 5–13 years old living with the family. Exclusion criteria included mothers with severe intellectual disabilities, lack of native language proficiency, and for the referred group, mothers with a substantiated record of sexual child abuse.

Measures

Professionals' report of Abuse and Neglect. These reports were obtained through the *Maltreatment Severity Questionnaire* (MSQ; Calheiros, Silva, & Magalhães, 2019), consisting of 21 items (e.g., *Physical hygiene and wellbeing*), each composed of four severity descriptors: e.g., from *They keep the child looking dirty (e.g., does not take a bath, does not wash her head or teeth, stinks, has parasites and/or fleas)* to *They let the child have health problems or injuries due to her hygienic conditions (e.g., skin diseases, infected skin injuries*), and a 5-point scale ranging from 1 = *unknown/ never occurred* to 5 = *extremely severe*. Originally, the MSQ was organized in a three-factor structure: Physical neglect, Psychological neglect, and Physical and psychological abuse. In the current study, we obtained two separate global scores of abuse and neglect, based on a second-order confirmatory factor analysis that revealed an acceptable model fit [χ^2 (129) = 387.567, $p < .001$, χ^2/df = 3.004; comparative fit index (CFI) = .815; and root mean square error of approximation (RMSEA) = .101] and good internal consistency indicators for the two factors: Physical and Psychological neglect (14 items; α = .87) and Physical and Psychological abuse (4 items; α = .71). Higher scores in the MSQ dimensions mean higher levels of maltreatment. The MSQ was completed with the information available

regarding each target child by CPS case-workers (for the referred group of mothers) and by the child's teacher/ professional of community service (for the non-referred group).

Self-reported Abuse. The *Conflict Tactics Scale - Parent to Child* (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998) is a self-report measure that obtains reports of abuse from parents. The questionnaire with 22 items (e.g., *Spanked him/her on the bottom with your bare hand*) is originally organized in three main dimensions: Non-violent discipline, Psychological aggression, and Physical assault (Corporal punishment, Physical maltreatment, and Extreme physical maltreatment). Mothers rated statements on a 7-point scale ranging from 0 = *never happened* to 7 = *more than 20 times in the past year*. In the current study, a second-order model was tested with a dimension of Abuse (with the subscales Psychological aggression and Corporal punishment) and a dimension of Non-violent discipline, which revealed an adequate fit [χ^2 (39) = 79.198, $p < .001$, $\chi^2/df = 2.031$; comparative fit index (CFI) = .907; and root mean square error of approximation (RMSEA) = .067]. The sub-scale of Abuse used in this study included 7 items ($\alpha = .72$), with higher scores indicating higher abuse.

Self-reported Neglect. The *Multidimensional Neglectful Behavior Scale – Parent Report* (MNBS; Kantor, Holt, & Straus, 2003) is a self-report measure that obtains reports of neglect from parents with children aged between 5-15 years old. A face-validated version of the MNBS (Neves & Lopes, 2013) was used, composed of 49 items (e.g., *Did not know where your child was playing when she/he was outdoors*), divided in four core dimensions: Emotional neglect, Cognitive neglect, Supervision neglect, and Physical neglect. Respondents were asked about their parental behaviors in a 4-point scale, ranging from 1 = *never* to 4 = *always*. In the current study a global score of neglect was obtained based on a second-order model revealing an adequate fit [χ^2 (346) = 573.744, $p < .001$, $\chi^2/df = 1.658$; comparative fit index (CFI) = .926; and root mean square error of approximation (RMSEA) = .057]. The internal consistency of the total scale was high ($\alpha = .83$), with higher scores suggesting higher neglect.

Valence of children's emotions. A speed-accuracy task was developed to indirectly measure how mothers recognize the valence of children's emotional expressions. This task was adapted from a previous study about emotion recognition ability in individuals at high-risk of child physical abuse (Wagner et al., 2015). The pictures of children's facial emotions used in the present study were taken from the Child Affective Facial Expression set (CAFE; LoBue & Thrasher, 2015) and validated by Prada, Garrido, Camilo, and Rodrigues (2018). Sixty child frontal photographs: twenty models (ten male and ten female), posing in three different facial expressions (happiness, sadness and neutral) were presented twice (counterbalanced block

order). The photographs were selected based on accuracy and valence scores (see Prada et al., 2018). Participants were asked to classify the emotions displayed (presented randomly within each block) as positive or negative using two response keys (counterbalanced). Each of the two blocks consisted of a fixation point (250 ms), followed by the presentation of the child's photograph, and the classification task as "Positive" (left key in the first block; right key in the second block) or as "Negative" (right key in the first block; left key in the second block). Each experimental block was preceded by a practice block with five practice trials, in which participants classified randomly presented emojis displaying happiness, sadness or neutral emotions as positive or negative. The stimuli remained on the screen until the participants responded. In the practice trials, if participants failed to respond within 600 ms, a reminder to "Please respond more quickly!" appeared. Accuracy and response times were collected.

Recognition of children's emotions. A forced-choice task was developed to directly measure mothers' accuracy in labeling children's facial expressions. Forty child frontal photographs were selected form the Child Affective Facial Expression set (CAFE; LoBue & Thrasher, 2015; Prada et al., 2018): eight models (four male and four female), posing in five different facial expressions (happiness, sadness, fear, anger and neutral) were randomly presented). The photographs were selected based on labeling accuracy scores (see Prada et al., 2018). The photographs depicted five facial emotions (happiness, sadness, anger, fear and neutral), randomly presented once to each participant. Participants were asked to identify the facial expression presented by the model by selecting the corresponding label (i.e., sadness, happiness, anger, fear or neutral) that was displayed on the screen, bellow the photo.

Family socioeconomic status. Mothers were asked to report their highest completed education level, monthly family income, income source, housing and neighborhood characteristics, in a 5-point scale. Since all variables were positively and significantly correlated (all p's < .01), the scores were combined into a total mean score of socioeconomic status (SES; $\alpha = .77$) (e.g., Beckerman, van Berkel, Mesman, & Alink, 2018). Lower scores indicated lower SES.

Mothers' intellectual functioning. Four subscales of the *WAIS-III* (Arithmetic, Matrix reasoning, Information, Coding; $\alpha = .62$) (Wechsler, 1997) were used as an estimate of general intellectual functioning due to previously reported high correlation with the full scale (e.g., Azar, McGuier, Miller, Hernandez-Mekonnen, & Johnson, 2017).

Procedure

The data used in the current paper represent a selection of the measures collected in the context of a more comprehensive research program. All measures and procedures were approved by the Ethics Committee of the host institution (EA# 08/2016). After obtaining the permission from the institution, data were collected in agencies of CPS (referred group) and in schools and community services (non-referred group), during two individual sessions with each mother. Participants were informed that they would participate in a study examining how mothers perceive, think, and remember information about child rearing and development, and their influence on parental practices.

After reading and signing the informed consent, participants were asked to provide demographic information. Then they completed the implicit valence classification task and the emotions' labeling task, using E-Prime 2.0 on a laptop provided by the researcher. Finally, participants completed the WAIS subscales, the MNBS and the CTS-PC. At the end, participants were thanked, debriefed and compensated with a 10€ gift card. Later, the MSQ was completed by the CPS caseworkers or by the child's teacher/ professional of community service.

Data analysis strategy

SPSS 25.0 was used to conduct data analysis. The independent variables were standardized, and analysis of normal distribution and potential outliers revealed the absence of standardized scores extremely lower than -3.29 or extremely higher than 3.29 (Tabachnick & Fidell, 2012), except for the abuse dimension of MSQ. Moreover, since the absolute value of skewness of this dimension was higher than 3 (Kline, 2005), the highest three values were eliminated, and normality was reached.

To test our hypotheses, the relationship between abuse/neglect and emotions' recognition was explored by means of the General Linear Model (GLM). Specifically, our independent variables were self-reported abuse and neglect, and professional-reported (hetero-report) abuse and neglect (since no significant correlations were found between self and hetero-reports; see Table 1). The dependent variables were: a) accuracy and response latency of correct responses and b) valence (positive or negative) attributed to neutral faces in the implicit valence classification task; c) accuracy in labeling emotions and d) labels (positive or negative) attributed to ambiguous emotions in the categorization task. Given the high co-occurrence of different types of maltreatment (Kim, Mennen, & Trickett, 2017), abuse and neglect were both included in the models. Moreover, we tested the moderation effect of mothers' general

intellectual functioning and socioeconomic status in the association of child abuse and neglect and emotion recognition.

Table 1.

Summary of correlations, means, standard deviations and range for study variables (n = 166).

	1.	**2.**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**	**11**	**12**	***M* (*SD*)**	**Range**
1. Acc - Happy	-												36.94 (3.83)	19 – 40
2. Acc – Sad	**.179***	-											35.20 (6.09)	2 – 40
3. Rt – Happy	-.080	**.159***	-										843.58 (161.84)	478.16 – 1518.71
4. Rt – Sad	.094	**-.367****	**.619****	-									924.98 (210.40)	581.93 – 2121.00
5. Neutral as negative	-.117	**.158***	**-.187***	**-.255****	-								24.16 (11.42)	0 – 40
6. Acc label	**.303****	**.269****	**-.185***	**-.251****	-.042	-							30.14 (5.51)	14 – 40
7. Neutral as negative	-.095	-.084	**.166***	.155	**.185***	**-.401****	-						.60 (.44)	0 – 1
8. CTS. Abuse	.022	**-.176***	-.044	.112	**-.160***	.106	.026	-					1.95 (1.22)	0 – 6
9. MNBS. Neglect	-.048	.096	-.010	.033	-.059	.140	.023	**.229****	-				1.55 (.35)	1.03 – 2.82
10. MSQ. Abuse	.032	.016	.072	.032	.111	-.098	.079	.074	.098	-			1.16 (.41)	1 – 3.50
11. MSQ. Neglect	-.107	-.062	**.186***	**.198***	.102	**-.245****	**.204***	**.157***	.112	**.606****	-		1.39 (.58)	1 – 3.73
12. Cognitive functioning	**.267****	**.177***	**-.497****	**-.418****	.057	**.489****	**-.194***	.138	.014	-.108	**-.259****	-	85.69 (26.58)	20 – 155
13. SES	**.236****	.102	**-.309****	**-.217****	.049	**.351****	**-.259****	-.037	.020	**-.296****	**-.449****	**.528****	2.93 (.69)	1.20 – 4.50

Note. Acc = accuracy; Rt = reaction time.

***** $p < .05$.

****** $p < .01$.

Results

Implicit valence classification task

We started with data reduction (e.g., Bargh & Chartrand, 2014), where participants with an accuracy rate lower than 50% on the task were excluded from the analysis, resulting in the elimination of 8 participants (4.82%). Data from the practice blocks were discarded. Responses with latencies lower than 350 ms and higher than 2500 ms were eliminated; subsequently responses lower or higher than 2.5 standard deviation from the mean of each block were eliminated. Finally, participants with less than 50% of valid responses were excluded from analysis, resulting in the additional exclusion of 6 participants (rate of valid responses between 37.50% - 48.75%). In total 14 participants (8.43%) were excluded from the analysis.

Regarding the accuracy in classifying the valence of emotions, a main effect of stimulus type was observed, $F(1, 147) = 11.459$, $p = .001$, $\eta_p^2 = .072$, such that happy faces ($M = 37.25$, $SE = 0.26$) obtained higher accuracy than sad faces ($M = 35.62$, $SE = 0.42$). The main effects of self-reported abuse, $F(1, 147) = 1.892$, $p = .171$, and neglect, $F(1, 147) = 2.916$, $p = .090$ were not significant. However, significant interactions were found between stimulus type and abuse, $F(1, 147) = 6.744$, $p = .010$, $\eta_p^2 = .044$. Surprisingly, contrast analyses showed that mothers with higher scores on the abuse scale revealed less accuracy in classifying sad faces ($b = -1.00$), $t(147) = -2.311$, $p = .022$, $\eta_p^2 = .035$, but not happy faces, $t(147) = 1.108$, $p = .270$. When using hetero-reported abuse and neglect, no significant main effects of abuse, $F(1, 147) = 0.643$, $p = .424$, or neglect, $F(1, 147) = 1.328$, $p = .251$, were observed, neither interactions between stimulus type and abuse and neglect (all p's $> .05$).

For latency, the results also revealed a main effect of the stimulus type, $F(1, 147) = 48.249$, $p < .001$, $\eta_p^2 = .247$, with faster response latencies for happy faces ($M = 837.58$, $SE = 11.97$) than for sad faces ($M = 908.52$, $SE = 13.93$). The main effects of self-reported abuse $F(1, 147) = 1.798$, $p = .182$ and neglect $F(1, 147) = 0.073$, $p = .788$ were not significant. However, the interaction between stimulus type and abuse, $F(1, 147) = 5.524$, $p = .020$, $\eta_p^2 = .036$, was significant. In line with the accuracy results, contrast analyses showed that mothers scoring higher on abuse were slower in recognizing sad faces ($b = 29.02$), $t(147) = 2.014$, $p = .046$, $\eta_p^2 = .027$, but not happy faces, $t(147) = 0.329$, $p = .743$. Regarding hetero-reported abuse and neglect, the results revealed a main effect of neglect ($b = 34.96$), $F(1, 147) = 5.321$, $p = .024$, $\eta_p^2 = .034$, with higher neglect scores being associated with higher latencies in classifying both positive and negative emotions as expected. The main effect of abuse was not significant,

$F(1, 147) = 0.409$, $p = .523$, and no significant interactions were found between stimulus type and abuse and neglect (all p's > .05).

None of the measures of abuse and neglect were associated with the valence (positive or negative) attributed to neutral faces (all p's > .05).

In sum, regarding the implicit valence classification task, mothers were overall more accurate and faster in recognizing positive than negative emotions. Notably, mothers scoring higher on self-reported abuse were less accurate and slower in recognizing negative emotional expressions. In turn, mothers scoring higher on hetero-reported neglect were overall slower in classifying both positive and negative facial expressions.

Labeling children's emotions

For the accuracy in labeling children's emotions, a main effect of stimulus type was observed, $F(4,620) = 69.674$, $p < .001$, $\eta_p^2 = .310$, with happiness ($M = 7.51$, $SE = 0.08$) obtaining the highest accuracy and fear ($M = 4.92$, $SE = 0.17$) obtaining the lowest. The main effects of self-reported abuse $F(1, 155) = 0.701$, $p = .404$, and neglect $F(1, 155) = 2.560$, $p = .112$, were not significant, neither the interactions between stimulus type and abuse and neglect (all p's > .05). However, a significant main effect of hetero-reported neglect was observed ($b = -1.68$), $F(1, 155) = 9.552$, $p = .002$, $\eta_p^2 = .058$, with higher neglect scores associated with less accuracy in labeling children's emotions. No significant results were found for abuse, $F(1, 155) = 0.831$, $p = .363$, neither significant interactions between stimulus type and abuse and neglect (all p's > .05).

When labeling ambiguous emotions, no significant effects were found for self-reported abuse, $F(1, 155) = 0.070$, $p = .791$, or neglect, $F(1, 155) = 0.049$, $p = .825$. Regarding hetero-reported abuse and neglect, a main effect of neglect was observed ($b = 0.12$), $F(1, 155) = 6.469$, $p = .012$, $\eta_p^2 = .040$, indicating that mothers with higher neglect scores labeled ambiguous emotions more often as negative. No significant results were found for abuse, $F(1,155) = 0.715$, $p = .399$.

Overall, mothers were more accurate in classifying happy faces than negative faces. Importantly, mothers scoring higher on hetero-reported neglect were less accurate in labeling children's emotions and labeled ambiguous facial expressions more often as negative emotions, while no significant effects were found for abuse. No significant results were found for self-reported abuse and neglect.

The moderating role of mothers' general intellectual functioning and socioeconomic status

In order to examine whether the relationship between abuse and neglect and mothers' emotion recognition capabilities differs according to their intellectual functioning and socioeconomic status, a set of moderation effects were tested.

A moderation effect was only found in the implicit valence classification task. Specifically, a significant interaction between mothers' intellectual functioning and self-reported neglect was observed for response latencies (b = -28.98), $F(1, 136) = 3.971$, $p = .048$, $\eta_p^2 = .028$. Mothers with higher scores of neglect revealed a higher positivity bias (faster classification of positive than negative emotions) when they exhibit lower levels of intellectual functioning.

Socioeconomic status did not significantly interact with abuse and neglect in any of the tasks.

Discussion

The literature has long suggested that parents' ability to recognize children's emotions is associated with an enhanced quality of parent-child interactions and appropriateness of parental caregiving behaviors (e.g., Webb et al., 2019). Studies exploring parents' information processing in child maltreatment have examined whether abusive and neglectful parents are more likely to present bias in recognizing children's emotional states (e.g., Hildyard & Wolfe, 2007; Wagner et al., 2015). However, these studies present mixed results (e.g., Wagner et al., 2015) and only a few have addressed child neglect (Hildyard & Wolfe, 2007).

Based on the SIP model of child abuse and neglect, the present study used an implicit valence classification task and a labelling task to examine mothers' ability in recognizing children's emotions depending on their levels of self- and hetero-reported abuse and neglect. The moderating role of mothers' intellectual functioning and socioeconomic status, as well as the convergence of the results depending on the self- and hetero-report measures of abuse and neglect, were also explored.

The results indicated that mothers were overall faster and more accurate in classifying the valence of positive emotional expressions as well as more competent in labeling positive than negative emotions. This result is in line with face-perception research conducted with the

general population, which has consistently demonstrated that happy facial expressions are more salient, and subsequently easier to identify (e.g., Elfenbein & Ambady, 2002). Specifically, happy faces are perceived as cues to pleasurable interaction and have important adaptive functions (Nummenmaa & Calvo, 2015). Considering that children's happy expressions are motivationally relevant stimuli to parents, evoking an approach response and motivating the parents to care for and nurture the child (for a review see Ferrey et al., 2016), it is an interesting result that this pattern has still emerged even in potentially maltreating samples.

Importantly, and contrary to our hypotheses, mothers scoring higher on abuse were slower and less accurate in classifying the valence of children's emotional expressions when classifying sad faces. Although the literature has suggested that abusive parents have a negativity bias when recognizing children's emotions (e.g., Bauer & Twentyman, 1985; Farc, Crouch, Skowronski, & Milner, 2008), our results suggest that abusive parents may present difficulties in perceiving children's facial expressions displaying negative emotions. This is an important result since the literature has been identifying difficulties in emotion recognition in aggressive individuals, but results regarding particular emotions have been inconclusive (García-Sancho, Salguero, & Fernández-Berrocal, 2015). Our results suggest that when facing negative emotions in others, namely those that motivate helping behaviors such as sadness, abusive parents present difficulties in detecting these signals. This apparent difficulty in processing negative emotions might be related to impoverished empathy (Besel & Yuille, 2010). Moreover, our results may differ from studies that found the negativity bias in abusive parents because of the specific emotion presented. Indeed, previous studies presented negative stimuli such as anger and hostile emotions (e.g., Farc et al., 2008), while in our study mothers were asked to classify sad faces. Thus, aggression in abusive parents may be primed by aversive child-related stimuli, and not by sadness, which might readily prompt empathy and helping behavior. Since the current study did not contrast these different types of negative emotions (e.g., sadness vs. anger) nor assessed variables such as empathy, only future research might directly disentangle this issue.

As for neglect, mothers scoring higher in these measures were overall slower in classifying both positive and negative emotional expressions. These mothers were also less accurate in labeling children's emotions. Moreover, when labeling ambiguous facial expressions, mothers scoring higher on neglect labeled them more often as negative emotions, as expected. These results are in line with previous research with neglectful mothers, that reported more difficulties in recognizing children emotions, compared with non-neglectful

mothers (Hildyard & Wolfe, 2007). Neglectful parents are known to be under extreme psychological suffering, experiencing high levels of negative emotions. These experiences are thought to increase negative perceptions, and consequently evaluations of children's behavior (Dix, 1991). Moreover, neglectful parents are likely to preconsciously exclude emotional information from cognitive perception, reducing their flexibility to respond to environmental demands (Crittenden, 1993), and to show less empathy towards others' emotional complexity (DeOliveira, Moran, & Pederson, 2005). Further, neglectful parents are more likely to have had adverse childhood experiences and been victims of extreme poverty, neglect and abuse (Mulder, Kuiper, van der Put, Stams, & Assink, 2018). These negative past experiences might lead them to learn associations between neutral stimulus or events and negative outcomes, distorting this kind of information in their cognitive processing of child-related information in adulthood (Crittenden, 1999). Still, we found a significant interaction between neglect and intellectual functioning in the valence task, with more neglectful mothers revealing a higher positivity bias when exhibiting lower levels of intellectual functioning. Specifically, when classifying the valence of emotions, these mothers were faster in recognizing positive emotional expressions than negative ones. Given the complexity of negative information when compared to positive (e.g., Unkelbach, Fiedler, Bayer, Stegmuller, & Danner, 2008), mothers with low levels of intellectual functioning, who often held more simplistic cognitive schemata (e.g., Azar, Reitz, & Goslin, 2008) are more likely to present difficulties in dealing with negative emotional information.

The nature of abusive and neglectful parents' difficulties in recognizing children's emotions can also be related with the intergenerational transmission of abuse and neglect. Indeed, abusive and neglectful parents are likely to have been, in their childhood, victims of maltreatment experiences (Stith et al., 2009), which impacts their socio-emotional development. The effects of these victimization processes may have decreased their ability to recognize emotions in others (Koizumi & Takagishi, 2014), which could be reflected in adulthood and in their parental role.

Regarding the consistency between self- and hetero reported measures of maltreatment, the results for abuse were found mainly with the self-reported measure, while results for neglect predominantly emerged with the hetero-reported measure. A possible explanation for this difference is likely to rest on the different pathways of information processing in child abuse and neglect. Specifically, although presenting bias and errors, abusive parents actually process the child-related information (Milner, 2003), which makes them probably more aware of their

own practices. In neglect, the caregiving-related information processing is interrupted and not completed (Crittenden, 1993), and neglect is often characterized by the absence of a parental response (contrary to abuse where inadequate behaviors emerge). Thus it is more likely that neglectful parents do not have insights about their own behaviors (e.g., Berthelot et al., 2015), as noted in the mixed results observed between self and hetero report of neglect. Another possible interpretation for the lack of convergence between the results obtained across self and hetero-report measures is the fact that neglectful families, often characterized by poverty, psychological distress and low educational levels, are more "visible" to professionals and services (being the most common form of maltreatment reported to CPS; Stoltenborgh, Bakermans-Kranenburg, & van IJzendoorn, 2013). In turn, abuse is only noted in its severe forms, when children suffer physical injuries and marks, making the less severe abusive interactions non-visible to the professionals, and therefore unreported (Gilbert et al., 2009). Indeed, these results are in line with the importance of having multiple sources of information in the assessment of child abuse and neglect (Kaufman, Jones, Stieglitz, Vitulano, & Mannarino, 1994).

Finally, and in contrast to our hypothesis, no moderation effects were found for socioeconomic status. However, poverty has been associated with deficits in social information processing (Mani, Mullainathan, Shafir, & Zhao, 2013; Shah, Mullainathan, & Shafir, 2012), and specifically with lack of ability in emotion recognition (e.g., Erhart et al., 2019). Since the association of poverty with emotion recognition is mediated by stress (e.g., Daudelin-Peltier, Forget, Blais, Deschênes, & Fiset, 2017), the artificial context of the task might not have captured the influence of the contextual stressors in mothers' emotion recognition ability. It is therefore possible that future studies manipulating stressors of the context during the task might obtain different results.

Despite some interesting findings, our study is not without limitations. First, we used static facial expressions instead of dynamic (Garrido et al., 2017), which would be more proximal to natural parental contexts of caregiving, enhancing the mothers' sensitivity to children facial expressions (Branger, Emmen, Woudstra, Alink, & Mesman, 2019). Further, facial expressions presented in the tasks were of unknown children. While some studies with abusive samples reported no differences between parental perceptions of own versus other children (Dadds, Mullins, McAllister, & Atkinson, 2003), others reported that maternal responses to facial emotions were different for their own child, compared to an unrelated child (Strathearn, Li, Fonagy, & Montague, 2008). Finally, considering previous research that

suggests sex-differences in emotion recognition (e.g., Saylik, Raman, & Szameitat, 2018), our sample composed only by mothers precludes the possibility of comparisons with fathers. Future studies should address these limitations, namely considering the development of emotion recognition tasks with dynamic and familiar children, or complement these assessments with observational measures of parent-child interactions (Aspland & Gardner, 2003). Moreover, it would be important to manipulate contextual factors, namely the presence of stressors, although previous studies (Asla et al., 2011; Balge & Milner, 2000) already tested this hypothesis with high-risk of child physical abuse parents and found inconsistent results. Further, given the importance of parental psychological states in emotion recognition (Arteche et al., 2011; Elliot et al., 2014), future research should consider the moderation effect of depression and hostility in this stage of information processing. Finally, considering the overall SIP model of child abuse and neglect, further research is still required to test the mediating role of parents' perception of child signals between parents' preexisting cognitive schemata (e.g., Camilo, Garrido, Ferreira, & Calheiros, 2019) and abusive and neglectful behaviors.

Notwithstanding, our study is likely to entail important theoretical and methodological contributions to unravel the differences between abusive and neglectful parents in recognizing children's emotions. Moreover, the present study might bring valuable implications for intervention in child maltreatment, namely by informing cognitive-behavioral programs with parents (Azar & Wolfe, 2006; Chaffin et al., 2004) and community-based parenting interventions (Camilo & Garrido, 2013). For example, interventions in emotion recognition abilities of abusive and neglectful parents could specifically target parents' meta-cognitive awareness and attentional focus management, emotion knowledge (Izard, Stark, Trentacosta, & Schultz, 2008) and emotional competence (Kotsou, Nelis, & Mikolajczak, 2011). Finally, interventions such as empathy training (Feshbach & Feshbach, 1982), mentalising and emotion recognition training, cuing selective/focused attention and Mentalisation-Based Therapy (Yeates, 2014), or attention control training like mixed attention training, working memory training and mindfulness meditation (Wass, Scerif, & Johnson, 2012) might provide important inputs to successfully improve parents' emotion recognition capabilities.

References

Aradhye, C. Vonk, J., & Arida, D. (2015). Adults' responsiveness to children's facial expressions. *Journal of Experimental Child Psychology, 135,* 56–71. doi:10.1016/j.jecp.2015.02.006.

Arteche, A., Joormann, J., Harvey, A., Craske, M., Gotlib, I. H., Lehtonen, A., … Stein, A. (2011). The effects of postnatal maternal depression and anxiety on the processing of infant faces. *Journal of Affective Disorders, 133,* 197–203. doi:10.1016/j.jad.2011.04.015

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. doi: 10.1016/j.chiabu.2011.05.010

Aspland, H. & Gardner, F. (2003). Observational measures of parent-child interaction: An introductory review. *Child and Adolescent Mental Health, 8*, 136–143. doi:10.1111/1475-3588.00061

Azar, S. T., & Wolfe, D. (2006). Child physical abuse and neglect. In E. J. Mash & R. A. Barkley (Eds.), *Treatment of childhood disorders* (3rd ed., pp. 595–646). New York, NY: Guilford Press.

Azar, S. T., McGuier, D. J, Miller, E. A., Hernandez-Mekonnen, R., & Johnson, D. R. (2017). Child neglect and maternal cross-relational social cognitive and neurocognitive disturbances. *Journal of Family Psychology, 31,* 8–18. doi:10.1037/fam0000268

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 doing intervention and prevention work. *Journal of Applied Developmental Psychology, 29*, 295–304. doi:10.1016/j.appdev.2008.04.009

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*, 1289–1298. doi:10.1016/S0145-2134(00)00188-5

Bargh, J., & Chartrand, T. (2014). The mind in the middle: A practical guide to priming and automaticity research. In H. Reis & C. Judd (Eds.), *Handbook of research methods in social and personality psychology* (2nd ed., pp. 311–344). Cambridge: Cambridge University Press. doi:10.1017/CBO9780511996481.017

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. doi:10.1037/0022-006X.53.3.335

Beckerman, M., van Berkel, S. R., Mesman, J., & Alink, L. R. A. (2018). Negative parental attributions mediate associations between risk factors and dysfunctional parenting: A replication and extension. *Child Abuse & Neglect, 81*, 249–258. doi:10.1016/j.chiabu.2018.05.001

Bernard, K., Simons, R., & Dozier, M. (2015). Effects of an attachment-based intervention on CPS-referred mothers' event-related potentials to children's emotions. *Child Development, 86*, 1673–1684. doi:10.1111/cdev.12418

Berthelot, N., Ensink, K., Bernazzani, O., Normandin, L., Luyten, P., & Fonagy, P. (2015), Intergenerational transmission of attachment in abused and neglected mothers: The role of trauma-specific reflective functioning. *Infant Mental Health Journal, 36*, 200–212. doi:10.1002/imhj.21499

Besel, L. D. S., & Yuille, J. C. (2010). Individual differences in empathy: The role of facial expression recognition. *Personality and Individual Differences, 49*, 107–112. doi:10.1016/j.paid.2010.03.013

Bolzani Dinehart, L. H., Messinger, D. S, Acosta, S. I., Cassel, T., Ambadar, Z., & Cohn, J. (2005). Adult perceptions of positive and negative infant emotional expressions. *Infancy, 8*, 279–303. doi:10.1207/s15327078in0803_5

Branger, M. C. E., Emmen, R. A. G., Woudstra, M. J., Alink, L. R. A., & Mesman, J. (2019). Context matters: Maternal and paternal sensitivity to infants in four settings. *Journal of Family Psychology, 33*, 851–856. doi:10.1037/fam0000562

Braungart-Rieker, J. M., Garwood, M. M., Powers, B. P., & Wang, X. (2001). Parental sensitivity, infant affect, and affect regulation: predictors of later attachment. *Child Development, 72*, 252–270. doi:10.1111/1467-8624.00277

Calheiros, M. M., Silva, C. S., & Magalhães, E. (2019). Development and validation of the Questionnaire of Child Maltreatment. *Assessment*. doi:10.1177/1073191119890030

Calvo, M. G. & Nummenmaa, L. (2016). Perceptual and affective mechanisms in facial expression recognition: An integrative review. *Cognition and Emotion, 30*, 1081–1106, doi:10.1080/02699931.2015.1049124

Camilo, C., & Garrido, M. V. (2013). Desenho e avaliação de programas de desenvolvimento de competências parentais para pais negligentes: Uma revisão e reflexão [Design and evaluation of intervention programs for neglectful parents: A review and reflection]. *Análise Psicológica, 31*, 245–268. doi:10.14417/ap.697

Camilo, C., Garrido, M. V., & Calheiros, M. M. (2016). Implicit measures of child abuse and neglect: A systematic review. *Aggression and Violent Behavior, 29*, 43–54. doi:10.1016/j.avb.2016.06.002

Camilo, C., Garrido, M. V., & Calheiros, M. M (2019). *The social information processing model in child abuse and neglect: A meta-analytic review*. Manuscript submitted for publication.

Camilo, C., Garrido, M. V., Ferreira, M. B., & Calheiros, M. M. (2019). How does mothering look like: A multidimensional approach to maternal cognitive representations. *Journal of Family Issues, 40*, 2528–2552. doi:10.1177/0192513X19860171

Camras, L.A., Ribordy, S., 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. doi:10.1037/0012-1649.24.6.776

Chaffin, M., Silovsky, J. F., Funderburk, B., Valle, L. A., Brestan, E. V., Balachova, T., …, & Bonner, B. L. (2004). Parent-child interaction therapy with physically abusive parents: Efficacy for reducing future abuse reports. *Journal of Consulting and Clinical Psychology, 72*, 500–510. doi:10.1037/0022-006X.72.3.500.

Crittenden, P. (1993). An information-processing perspective on the behavior of neglectful parents. *Criminal Justice and Behavior, 20*, 27–48. doi:10.1177/0093854893020001004

Crittenden, P. M. (1999). Child neglect: Causes and contributors. In H. Dubowitz (Ed.), *Neglected children: Research, practice, and policy* (pp. 47–68). Thousand Oaks, CA: Sage Publications.

Crouch, J. L., & Milner, J. S. (2005). The social information processing model of child physical abuse: A conceptual basis for prevention and intervention strategies. In K. Kendall-Tackett & S. Giacomoni (Eds.), *Child victimization: Maltreatment, bullying and dating violence, prevention and intervention*. Kingston, NJ: Civic Research Institute.

Dadds, M. R., Mullins, M. J., McAllister, R. A., & Atkinson, E. (2003). Attributions, affect, and behavior in abuse-risk mothers: A laboratory study. *Child Abuse & Neglect, 27*, 21–45. doi:10.1016/S0145-2134(02)00510-0

DeOliveira, C. A., Moran, G., & Pederson, D. R. (2005). Understanding the link between maternal adult attachment classifications and thoughts and feelings about emotions. *Attachment & Human Development, 7*, 153–170. doi: 10.1080/14616730500135032

Dix, T. (1991). The affective organization of parenting: Adaptive and maladaptive processes. *Psychological Bulletin, 110*, 3–25. doi:10.1037/0033-2909.110.1.3

During, S. M., & McMahon, R. J. (1991). Recognition of emotional facial expressions by abusive mothers and their children. *Journal of Clinical Child Psychology, 20*, 132–139. doi:10.1207/s15374424jccp2002_4

Elfenbein, H. A., & Ambady, N. (2002). Is there an in-group advantage in emotion recognition? *Psychological Bulletin, 128*, 243–249. doi:10.1037/0033-2909.128.2.243

Elliot, R., Campbell, L., Hunter, M., Cooper, G., Melville, J., McCabe, K., Newman, L. & Loughland, C. (2014). When i look into my baby's eyes . . . Infant emotion recognition by mothers with borderline personality disorder. *Infant Mental Health Journal, 35*, 21–32. doi:10.1002/imhj.21426

Erhart, A., Dmitrieva, J., Blair, R. J., & Kim, P. (2019). Intensity, not emotion: The role of poverty in emotion labeling ability in middle childhood. *Journal of Experimental Child Psychology, 180*, 131–140 doi:10.1016/j.jecp.2018.12.009

Éthier, L. S., Lemelin, J.P., & Lacharité, C. (2004). A longitudinal study of the effects of chronic maltreatment on children's behavioral and emotional problems. *Child Abuse & Neglect, 28*, 1265–1278. doi:10.1016/j.chiabu.2004.07.006

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. doi:10.1016/j.chiabu.2007.06.001

Feshbach, N. D., & Feshbach, S. (1982). Empathy training and the regulation of aggression: Potentialities and limitations. *Academic Psychology Bulletin, 4*, 399–413.

Ferrey, A. E., Santascoy, N., McCrory, E. J., Thompson-Booth, C., Mayes, L. C., & Rutherford, H. J. V. (2016). Motivated attention and reward in parenting. *Parenting, 16*, 284–301. doi:10.1080/15295192.2016.1184928

Francis, K. J., & Wolfe, D. A. (2008). Cognitive and emotional differences between abusive and non-abusive fathers. *Child Abuse & Neglect, 32*, 1127–1137. doi:10.1016/j.chiabu.2008.05.007

Garrido, M.V., Lopes, D., Prada, M., Rodrigues, D., Jerónimo, R., & Mourão, R. P. (2017). The many faces of a face: Comparing stills and videos of facial expressions in eight dimensions (SAVE database). *Behavior Research Methods, 49*, 1343–1360. doi:10.3758/s13428-016-0790-5

Gilbert, R., Widom, C. S., Browne, K., Fergusson, D., Webb, E., & Janson, S. (2009). Burden and consequences of child maltreatment in high-income countries. *Lancet, 373*, 68–81. doi:10.1016/S0140-6736(08)61706-7

Halberstadt, A. G., Parker, A. E., & Castro, V. L. (2013). Nonverbal communication: Developmental perspectives. In J. A. Hall & M. L. Knapp (Eds.), *Handbooks of communication science. Non-verbal communication, Vol. 2* (pp. 93–128). Berlin: De Gruyter Mouton.

Hildyard, K., & Wolfe, D. (2007). Cognitive processes associated with child neglect. *Child Abuse & Neglect, 31*, 895–907. doi:10.1016/j.chiabu.2007.02.007

Jahoda, A., Pert, C., & Trower, P. (2006). Socioemotional understanding and frequent aggression in people with mild to moderate intellectual disabilities. *American Journal on Mental Retardation, 111*, 77–89.doi:10.1352/08958017

Kantor, G. K., Holt, M., & Straus, M. A. (2003). *The parent-report Multidimensional Neglectful Behavior Scale.* Unpublished manuscript, Family Research Laboratory, University of New Hampshire, Durham, NH.

Kaufman, J., Jones, B., Stieglitz, E., Vitulano, L., & Mannarino. A. P. (1994). The use of multiple informants to assess children's maltreatment experiences. *Journal of Family Violence, 9*, 227–248. doi:10.1007/BF01531949

Kim, K., Mennen, F., & Trickett, P. K. (2017). Patterns and correlates of co-occurrence among multiple types of child maltreatment. *Child & Family Social Work, 22*, 492– 502. doi:10.1111/cfs.12268

Kotsou, I., Nelis, D., Grégoire, J., & Mikolajczak, M. (2011). Emotional plasticity: Conditions and effects of improving emotional competence in adulthood. *Journal of Applied Psychology, 96*, 827–839. https://doi.org/10.1037/a0023047

Kropp, J., & Haynes, M. (1987). Abusive and nonabusive mothers' ability to identify general and specific emotion signals of infants. *Child Development, 58,* 187–190. doi:10.2307/1130300

Larkin, K. T., Martin, R. R., & McClain, S. E. (2002). Cynical hostility and the accuracy of decoding facial expressions of emotions. *Journal of Behavioral Medicine, 25*, 285–292. doi:10.1023/A:1015384812283

LoBue, V. & Thrasher, C. (2015). The Child Affective Facial Expression (CAFE) set: Validity and reliability from untrained adults. *Frontiers in Psychology, 5,* 1532. doi:0.3389/fpsyg.2014.01532

Mammen, O., Kolko, D., & Pilkonis, P. (2002). Negative affect and parental aggression in child physical abuse. *Child Abuse & Neglect, 26,* 407–424. doi:10.1016/S0145-2134(02)00316-2

Mani, A., Mullainathan, S., Shafir, E., Zhao, J. (2013). Poverty impede cognitive function. *Science, 341,* 976–980. doi:10.1126/science.1238041

Mesman, J., Oster, H., & Camras, L. (2012). Parental sensitivity to infant distress: what do discrete negative emotions have to do with it?. *Attachment & Human Development, 14,* 337–348. doi:10.1080/14616734.2012.691649.

Milner, J. S. (1993). Social information processing and physical child abuse. *Clinical Psychology Review*, *13*, 275–294. doi:10.1016/0272-7358(93)90024-G

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. doi:10.1016/S0145-2134(02)00506-9

Mulder, T. M., Kuiper, K. C., van der Put, C. E., Stams, G. J. M., & Assink, M. (2018). Risk factors for child neglect: A meta-analytic review. *Child Abuse & Neglect, 77,*198–210. doi:10.1016/j.chiabu.2018.01.006

Murray, L., Halligan, S., & Cooper, P. J. (2010). Effects of postnatal depression on mother-infant interactions and child development. In G. Bremner & T. Wachs (Eds.), *Handbook of Infant Development* (2nd ed.; pp. 192–220). Oxford, U.K.: Wiley-Blackwell.

Mustillo, S. A., Dorsey, S., Conover, K., & Burns, B. J. (2011). Parental depression and child outcomes: The mediating effects of abuse and neglect. *Journal of Marriage and Family, 73*, 164–180. doi:10.1111/j.1741-3737.2010.00796.x

Neves, A. M., & Lopes, D. (2013). A negligência parental no contexto do mau trato infantil: Um contributo para a delimitação e definição do conceito e sua medida no âmbito da prevenção primária [Parental neglect in the context of child maltreatment: Contributions for conceptual definition and measuriment in primary prevention].In M. M. Calheiros & M. V. Garrido (Eds.), *Crianças em risco e perigo: Contextos, investigação e intervenção, Vol. 3* (pp. 145–190). Lisboa: Edições Sílabo.

Nummenmaa, L. & Calvo, M. G. (2015). Dissociation between recognition and detection advantage for facial expressions: A meta-analysis. *Emotion, 15*, 243–256. doi:10.1037/emo0000042

Palermo, R. & Coltheart, M. (2004). Photographs of facial expression: Accuracy, response times, and ratings of intensity. *Behavior Research Methods, Instruments, & Computers, 36*, 634–638. doi:10.3758/BF03206544

Pinderhughes, E. E., Nix, R., Foster, E. M., Jones, D., & The Conduct Problems Prevention Research Group (2007). Parenting in context: impact of neighborhood poverty, residential stability, public services, social networks, and danger on parental behaviors. *Journal of Marriage and the Family, 63*, 941–953. doi:10.1111/j.1741-3737.2001.00941.x

Prada, M., Garrido, M. V., Camilo, C., & Rodrigues, D. L. (2018). Subjective ratings and emotional recognition of children's facial expressions from the CAFE set. *PLoS ONE 13*(12): e0209644. doi:10.1371/journal.pone.0209644Raver et al., 2015

Rodriguez, C. M. (2018). Predicting parent-child aggression risk: Cognitive factors and their interaction with anger. *Journal of Interpersonal Violence, 33*, 359 –378. doi:10.1177/0886260516629386

Saylik, R., Raman, E., & Szameitat, A. J. (2018). Sex differences in emotion recognition and working memory tasks. *Frontiers in Psychology, 9*: 1072. doi:10.3389/fpsyg.2018.01072

Shah, A., Mullainathan, S., & Shafir, E. (2012). Some consequences of having too little. *Science, 338*, 682-685. doi: 10.1126/science.1222426

Sprengelmeyer, R., Perrett, D. I., Fagan, E. C., Cornwell, R. E., Lobmaier, J. S., Sprengelmeyer, A., … Young, A. W. (2009). The cutest little baby face: A hormonal link to sensitivity to cuteness in infant faces. *Psychological Science, 20*, 149–154. doi:10.1111/j.1467-9280.2009.02272.x

Stith, M. S., Liu, T. L., Davies, C., Boykin, E. L., Alder, M. C., Harris, J. F., ... Dees, J. E. M. E. G. (2009). Risk factors in child maltreatment: A meta-analytic review of the literature. *Aggression and Violent Behavior, 14*, 13–29. doi: 10.1016/j.avb.2006.03.006.

Stoltenborgh, M., Bakermans-Kranenburg, M. J., & van Ijzendoorn, M. H. (2013). The neglect of child neglect: A meta-analytic review of the prevalence of neglect. *Social Psychiatry and Psychiatric Epidemiology, 48,* 345–355. doi:10.1007/s00127-012-0549-y

Strathearn, L., Li, J., Fonagy, P., & Montague, P. R. (2008). What's in a smile? Maternal brain responses to infant facial cues. *Pediatrics, 122*, 40–51. doi:10.1542/peds.2007-1566

Straus, M. A., Hamby, S. L., Finkelhor, D., Moore, D. W., & Runyan, D. (1998). Identification of child maltreatment with the parent-child Conflict Tactics Scales: Development and psychometric data for a national sample of American parents. *Child Abuse & Neglect, 22*, 249–270. doi:10.1016/s0145-2134(97)00174-9

Swain, J. E. (2011). The human parental brain: In vivo neuroimaging. *Progress in Neuro-Psychopharmacology and Biological Psychiatry, 35*, 1242–1254. doi:10.1016/j.pnpbp.2010.10.017

Tabachnick, B. G., & Fidell, L. S. (2012). *Using multivariate statistics* (6th ed.). New York: Harper Collins.

Unkelbach, C., Fiedler, K., Bayer, M., Stegmüller, M., & Danner, D. (2008). Why positive information is processed faster: The density hypothesis. *Journal of Personality and Social Psychology, 95*, 36-49. doi:10.1037/0022-3514.95.1.36

van Nieuwenhuijzen, M., & Vriens, A. (2012). (Social) cognitive skills and social information processing in children with mild to borderline intellectual disabilities. *Research in Developmental Disabilities, 33*, 426–434. doi: 10.1016/j.ridd.2011.09.025.

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*, 154–162. doi:10.1037/a0036014

Webb, R., Ayers, S., & Endress, A. (2019). The City Infant Faces Database: A validated set of infant facial expressions. *Behavior Research Methods, 50,* 151–159. doi:10.3758/s13428-017-0859-9

Wechsler, D. (1997). *Wechsler Adult Intelligence Scale* (3rd ed.). San Antonio, TX: The Psychological Corporation.

GENERAL DISCUSSION

1. SUMMARY AND CONCLUSIONS

Child maltreatment has long been recognized as a serious and prevalent social problem (e.g., Kim, Wildeman, Jonson-Reid, & Drake, 2017), with multiple and long-term consequences for the child's development and for the society (e.g., Maguire et al., 2015). In the last decades, research on child maltreatment has been receiving substantial attention (Gabrielli & Jackson, 2019), mainly through socio-ecological approaches (e.g., Belsky & Jaffee, 2016). More recently, socio-cognitive models of maladaptive parenting (e.g., Sigel & McGillicuddy-DeLisi, 2002), centered in the parent-child interactions, have become increasingly prominent. Specifically, the Social Information Processing (SIP) model has suggested that abusive and neglectful parents may present biases or errors in the processing of information during these interactions (Crittenden, 1993; Milner, 1993, 2003).

Based on a socio-cognitive approach applied to child maltreatment, the main goal of the present work was to explore the information processing mechanisms associated with abusive and neglectful parental behavior, examining errors and biases in parents' preexisting cognitive schemas and perceptions of child's signals.

Departing from this overall goal, we started by identifying and systematizing the state of the art of the literature examining abusive/neglectful parents in their preexisting cognitive schemata and in subsequent stages of information processing. To this end, we conducted a set of meta-analyses of research exploring the role of parents' socio-cognitive variables in shaping child maltreatment using a random-effects approach (Camilo, Garrido, & Calheiros, 2019a). The results of these meta-analyses revealed that the overall effect sizes observed for the four cognitive stages of the model were significant and presented small to medium magnitude (ranging from $r = .189$ to $r = .316$). This pattern of results supports the general hypothesis that abusive and neglectful parents may incur biases or errors in processing child-related information during parent-child interactions. However, no significant differences were found between abuse and neglect.

Further, given that research on child maltreatment and parental cognitions has predominantly relied upon self and family reports, and observational methods, and that these methods are prone to multiple biases, we conducted a systematic review to identify the array of implicit measures used so far in the study of child abuse and neglect (Camilo, Garrido, & Calheiros, 2016). The results indicated that the majority of the studies identified were grounded in prominent implicit paradigms, such as emotion recognition or evaluative and conceptual priming, using computer-based reaction time tasks, psychophysiological reactivity, and

neuroimaging. Overall, studies using implicit measures to examine parental cognitions report the expected errors and biases in high-risk and abusive parents, but mixed results regarding parents' ability to recognize children's emotions. Again, studies conducted with neglectful parents were scarce.

Given the importance of the initial stages of information processing related to caregiving to the subsequent parental response, as indicated by the results of our meta-analytic review, we started by mapping maternal representations about parenting. Two studies were conducted to explore how cognitive representations about mothering are organized in a multi-dimensional semantic space, comparing mothers referred to child protection services and mothers with no referral to these services (Camilo, Garrido, Ferreira, & Calheiros, 2019). The results suggest that, overall, mothers tend to associate the maternal role to positive features, particularly those with no reference to child protection services. Using an unconstrained method, a two-dimensional structure of representations was obtained. This structure was in line with other theory-driven proposals, such as the framework proposed by Maccoby and Martin (1983), who defined parenting in an orthogonal structure of responsiveness and demandingness. Specifically, we observed a *responsiveness* dimension, referring to high/low parental sensitivity and adaptation to the child's signals, states, and needs; and a second dimension – *Status* for the referred and *Control* for the non-referred group – which is in line with the demandingness dimension, with referred mothers emphasizing external self-attributions of control (low control) and non-referred mothers focusing on internal self-attributions of control (high control). Overall, these results suggest that maladaptive parenting tends to be associated with less positive parental schemata, higher schemata rigidity and higher external attributions regarding parenting.

Additionally, and acknowledging the importance of using multiple sources of information to independently evaluate child abuse and child neglect, we conducted a set of validation studies. Specifically, we tested the structure and psychometric characteristics for a sample of 228 mothers (half recruited in child protection services agencies and half in schools and community services) of self-report - *Conflict Tactics Scale - Parent to Child* (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998), *Multidimensional Neglectful Behavior Scale – Parent Report* (Kantor, Holt, & Straus, 2003), and hetero-report - *Maltreatment Severity Questionnaire* (Calheiros, Silva, & Magalhães, 2019) instruments. The validation studies of these instruments revealed their acceptable fit to our study's data, supporting them as valid and

reliable measures to assess specific dimensions of maltreatment in the context of our sample of mothers.

Subsequently, we examined the association of parents' preexisting schemata, specifically parental attitudes, with self and hetero-reported child abuse and neglect (Camilo, Garrido, & Calheiros, 2019b). To this end, we developed an implicit measure of parental attitudes, using as stimulus materials the attributes related to parenting generated in the previous study. Additionally, we also translated and validated the measure of explicit attitudes, the *Adult-Adolescent Parenting Inventory–2.1 Form A* (Bavolek & Keene, 2010), which revealed adequate psychometric properties. Overall, the results supported the hypothesis that maladaptive parenting is related with more biased preexisting cognitive schemas, namely attitudes related to parenting, but mostly for neglect and particularly when hetero-reported. Moreover, the results observed with both the explicit and implicit measures of attitudes were convergent, with mothers presenting more inadequate explicit attitudes also exhibiting an overall lower performance in the implicit attitudes task.

Going forward in the SIP model, we intended to analyze parents' perceptions of child's signals, namely errors in recognizing emotions (stage 1 of the SIP model), as a function of child abuse and child neglect, both self and hetero-reported. To this end, we started by validating a dataset depicting children's facial expressions (Prada, Garrido, Camilo, & Rodrigues, 2018). In a subsequent study, referred and non-referred mothers completed an implicit valence classification task and a categorization task of children's photographs displaying several emotions. Overall, the results revealed that whereas more abusive mothers showed a lower performance only when recognizing negative emotions, more neglectful mothers demonstrated a lower overall ability in recognizing children's emotions (Camilo, Garrido, & Calheiros, 2019c).

Additionally, we were interested in exploring the role of intellectual functioning and poverty in social information processing associated with child abuse and neglect. In the models of parental attitudes, these variables were entered as control variables. While mothers' low intellectual functioning and low socioeconomic status were associated with maladaptive explicit attitudes, mothers' intellectual functioning was particularly important in the explanation of implicit attitudes. Intellectual functioning also moderated the association between errors in recognizing children's emotion valence and self-reported neglect.

In short, the results of the empirical studies suggest that maltreating mothers present errors and biases in their cognitive processing of childrearing related information, as proposed by the SIP model (Crittenden, 1993; Milner, 2003). Specifically, they show biased representations and attitudes about parenting, as well as errors in perceiving children's emotional signals. Additionally, these studies present a valuable methodological contribution in avoiding some of the problems associated with the single use of questionnaires of self-report and observational methods, both in the evaluation of maltreatment and parental cognitions.

Analyzing the differences between child abuse and child neglect, the results support the hypothesis that neglectful parenting is particularly associated with inadequate attitudes related to parenting and an overall low ability in recognizing children's emotions. Specifically, the SIP model applied to child neglect states that neglectful parents fail to respond to child's signals because they are not able to advance in the complex pattern of cognitive processing that precedes the parental response, suggesting that neglect is probably a product of an early interruption in cognitive processing (e.g., Crittenden, 1993). These parental inabilities are probably the result of a more simplistic schema that is used to respond to all parenting-related stimuli (Azar, Reitz, & Goslin, 2008). Neglectful parents are known to be under extreme psychological suffering, experiencing high levels of negative emotions that potentially increase their negative perceptions regarding their children (Dix, 1991). Neglectful parents are also likely to preconsciously exclude emotional information from cognitive perception, reducing their flexibility to respond to environmental demands (Crittenden, 1993), and to show less empathy towards others' emotional complexity (DeOliveira, Moran, & Pederson, 2005). Further, their often negative past experiences of victimization might lead them to learn associations between neutral stimuli or events and negative outcomes, distorting this kind of information in their cognitive processing of child-related information in adulthood (Crittenden, 1993). The results regarding abuse were not as resounding as expected. Specifically, and based on the results of our meta-analytic review, it was hypothesized that abusive parents would be more likely to have salient and readily accessible aggression-related information structures (characteristic of stage 0) (e.g., Hiraoka et al., 2014; Rodriguez, Silvia, & Gaskin, 2019) that would block their attention to positive cues (e.g., Crouch et al., 2010). However, our results suggest that more abusive mothers seem to present fewer biases in their implicit and explicit parental attitudes when compared with neglectful ones, and present difficulties only in recognizing negative emotions. These differences suggest that in contrast to neglectful parents, abusive parents are probably able to go through the cognitive processing stages, but present

distortions in a later stage that leads to an inadequate parental response (e.g., McElroy & Rodriguez, 2008; Slep & O'Leary, 2007). This argument finds support in studies suggesting that abusive parents engage in attentional processes and are likely to perceive the child's signals but subsequently make biased interpretations of those signals (e.g., Ateah & Durrant, 2005) and choose inadequate responses (e.g., Dadds, Mullins, McAllister, & Atkinson, 2003).

Importantly, the pattern of results observed was not consistent across the source of maltreatment reporting, namely for neglect. The overall pattern of non-significant results observed with self-reported abuse and neglect measures is likely the result from the well-known shortcomings of these measures (e.g., Lau, Valeri, McCarthy, & Weisz, 2006). Another possible interpretation of this difference is likely to rest on the different pathways of information processing in child abuse and neglect. Although presenting bias and errors, abusive parents seem to actually be able to process the child-related information (Milner, 2003), which makes them probably more aware of their own practices. In neglect, the caregiving-related information processing is allegedly interrupted and not completed (Crittenden, 1993). This idea is in line with the results suggesting an overall bias in the cognitive processing of caregiving related information. When reporting their behaviors, neglectful parents are also likely to present bias, and to have less insights about their own behaviors (e.g., Berthelot et al., 2015). Furthermore, the "visibility" of family interactions in neglectful families is known to be higher due to the multi-assistance that usually characterizes these families (e.g., Mulder, Kuiper, van der Put, Stams, & Assink, 2018). In turn, abuse is only noted in its severe forms, when children suffer physical injuries and marks, making the less severe abusive interactions non-visible to the professionals, and therefore unreported (Gilbert et al., 2009). Importantly, these results reinforce the significance of having multiple sources of information in the assessment of child maltreatment (Kaufman, Jones, Stieglitz, Vitulano, & Mannarino, 1994; Sierau et al., 2017) and are in line with the results of the meta-analysis revealing that studies using self-reports of maltreatment present lower effect sizes, when compared with child protection services (CPS) records.

Finally, we hypothesized that implicit measures would show higher sensitivity to the influence of abuse and neglect given the potential biases associated with self-report measures. However, the consistency between measures observed in our results suggests that our implicit and explicit measures were conceptually related (Hofmann, Gawronski, Gschwendner, & Schmitt, 2005). This pattern was already observed in previous studies applying implicit

paradigms to child maltreatment (e.g., Rabbitt & Rodriguez, 2019) that also found moderate correlations between implicit and explicit measures.

2. Limitations and Suggestions for Future Research and Intervention

Despite the contributions of this thesis to advance research on parental cognitions in the context of child maltreatment, some important limitations should be acknowledged and addressed in future studies.

The first limitation is conceptual in nature. Our empirical studies rest on the analytical distinction of the SIP components. Although this distinction might be crucial to clarify the model, these components are interdependent and mutually influenced (Milner, 1993, 2003). In order to examine the bi-directional influences within and between the SIP components, future studies should test the mediation path of the different SIP stages, and the SIP model as whole. Preliminary efforts have already been made regarding physical abuse risk, with encouraging results (e.g., Russa, Rodriguez, & Silvia, 2014).

Moreover, we also acknowledge shortcomings regarding the design of our studies. The SIP model states parental practices as an outcome of maladaptive cognitive processing of information (Milner, 2003). However, in the current studies, parental cognitions were considered dependent on child abuse and neglect. Given the cross-sectional nature of data collection with mothers revealing already abusive and neglectful practices, as well as the exploratory and correlational methods used to conduct data analysis, future research would benefit from using longitudinal designs (e.g., Rodriguez et al., 2019) in order to establish the pathways of information processing that lead to abusive and neglectful parental practices. Moreover, we cannot manipulate child maltreatment to conduct purely experimental studies. Thus, quasi-experimental designs, comparing maltreating and non-maltreating samples in the "online" interaction, manipulating the stimulus event (e.g., Crouch, Skowronski, Milner, & Harris, 2008), negative affect (e.g., Dopke, Lundahl, Dunsterville, & Lovejoy, 2003), or stress (e.g., Beckerman, van Berkel, Mesman, Huffmeijer, & Alink, 2019) would enable a better understanding of the underlying mechanisms of social information processing in parent-child interactions. Additionally, future research could also consider the conceptual differences of child abuse and child neglect in the design and stimulus materials used in the implicit tasks. For instance, stimuli related with child non-compliance events is likely to activate aggressive cognitive contents (e.g., Rabbitt & Rodriguez, 2019). However, given the different underlying

cognitive paths of abusive and neglectful parents, this activation may be observed in abusive parents but not in neglectful parents.

There are also limitations related to the samples. Since the motives for referrals were not controlled for the group of mothers recruited in CPS, these referrals could not be used as a source of information of child abuse and neglect. Specifically, we chose not to consider this criterion to recruit our sample given the substantial differences between academic definitions of child abuse and neglect and the subtypes of maltreatment described in the Portuguese law, which are allegedly used by case workers. Moreover, our samples were constituted only by mothers, as they are more readily accessible in the services. However, including fathers and comparing differences on cognitive information processing between mothers and fathers would also constitute an important contribution (e.g., Rodriguez, Smith, & Silvia, 2016). Finally, as the CPS agencies where the referred group of mothers were recruited are community-based services that intervene with families at the bottom of child protection pyramid (the cases that are more severe or that do not consent to this intervention are dealt with by the court), our sample presented relatively low means of child abuse and child neglect, both self and hereto-reported. This low variability might have masked some important effects.

Finally, in the current research, we considered the role of additional variables known to impact parental cognitions in the context of child maltreatment, namely intellectual functioning and poverty. In addition, individual variables of the parents namely those related to depression and anxiety, self-regulation, parental stress could be entered in the models as control variables or moderators, considering their potential influence on information processing (Milner, 2003). Additionally, parents' cognitive information processing difficulties can be related with the intergenerational transmission of abuse and neglect. Indeed, abusive and neglectful parents are likely to have been, in their childhood, victims of maltreatment experiences (Stith et al., 2009), with impacts on their socio-emotional development. The effects of these victimization processes are known to impair executive functioning (DePrince, Weinzierl, & Combs, 2009), with repercussions in adulthood and in their parental role. Thus, it would be very important to understand these cycles of maltreatment by evaluating parents' experiences of victimization during childhood. Moreover, given the importance of child's characteristics to the parent-child interaction (Begle, Dumas, & Hanson, 2010), variables such as gender and temperament of the child could also be controlled. For instance, it would be important to understand the causality path between children's disruptive behaviors and abuse, considering that child behavioral

problems have been associated with abuse (e.g., Ateah, & Durrant, 2005), but also stated as a consequence of abuse (e.g., Cicchetti & Toth, 2016).

Notwithstanding the abovementioned shortcomings, our findings are likely to contribute to a better understanding of parents' cognitions and to inform strategies for prevention and intervention in child maltreatment.

First, our findings emphasize the role of parental schemas and perceptions in child maltreatment. Therefore, they suggest that parenting programs should focus not only on the development of parenting skills but intervene at early stages of the social information processing (Milner, 2003). According to the SIP model (Crittenden, 1993; Milner, 2003), behavior change would be more significant if interventions consider preexisting schemata, perceptions (Stage 1), interpretations and evaluations (Stage 2). Based on behavior-oriented theories, parental interventions may influence change in these determinants (parents' preexisting schemas, as attitudes, beliefs, expectations, and perceptions of environmental cues) and identify the conditions under which a given method is most likely to be effective (Bartholomew, Parcel, Kok, & Gottlieb, 2006). Specifically, grounded on assumptions of broader theories such as social cognitive theories, information processing models, and theories of learning, methods for behavior change may help us to gain extra insight into effective interventions. For example, in order to increase parents' knowledge, methods such as *chunking* (acronyms used as "memory assistants"), *discussion* (listening to the learner to ensure that the correct schemas are activated), or *rehearsal* (elaborating and adding helpful information to the future situation) might be important to successfully conveying information (Kools, Ruiter, van de Wiel, & Kok, 2004). To specifically address attitude change methods such as *self* and *environmental reevaluation* (stimulation of both cognitive and affective appraisal of self and environment), *shifting perspective* (start from the perspective of the learner), *modeling* (reinforcement of the model) and *repeated exposure* (increasing the familiarity of a stimulus) (e.g., Petty, Barden, & Wheeler, 2002) might also be implemented. Further, *counter conditioning* (stimulus substitution, and available substitute behaviors), *implementation intentions* (specific plan to promote the initiation and efficient execution of goal-directed activity), and *environmental cues* (forming new cue-response links) (e.g., Abraham, Sheeran, & Johnston, 1998) also constitute promising methods to increase parents' attentional focus management, reducing the automaticity of their cognitions. Further, working directly on parenting skills and self-efficacy is also likely to enhance positive parental expectations about

their capabilities with direct impacts on their behaviors, through *modeling* (with a credible source, method, and channel), *guided practice* (demonstration, instruction, and enactment with feedback), *physiological and affective change* (interpret and manage emotional states), *reattribution training* (counseling unstable and external based attributions), and *planning of coping responses* (identifying high-risk situations and practicing coping response) (e.g., Kok et al., 1992).

Specific psychological interventions in maladaptive parenting have already been integrating strategies that target parenting schemata such as trauma-focused cognitive behavioral therapy (Cohen, Deblinger, & Mannarino, 2018), or combined parent-child cognitive behavioral therapy (Runyon, Deblinger, & Steer, 2010). Additionally, evidence-based parenting programs like Triple-P (Sanders, 2008) or Parent-Child Interaction Therapy (Eyberg & Robinson, 1982) grounded in cognitive-behavioral models, have been revealing promising results in preventing and reducing child maltreatment (e.g., Chaffin et al., 2004). However, considering that abusive and neglectful parents are different in their cognitive information processing, studies evaluating parenting interventions that distinguish child neglect from child abuse are still required (Camilo & Garrido, 2013). Indeed, most of the effectiveness studies conducted have been focusing on prevention and reduction of child maltreatment in general (e.g., Euser, Alink, Stoltenborgh, Bakermans-Kranenburg, & van IJzendoorn, 2015), and not specifically targeted for abuse and/or neglect. Moreover, increased attention should be given to parents with victimization experiences in their childhood, given the known intergenerational transmission of maladaptive schemas (e.g., Azar, Nix, & Makin-Byrd, 2005; Rodriguez, Silvia, Gonzalez, & Christl, 2018).

In addition to selective interventions, prevention strategies targeting maladaptive parental schemas can also be implemented. At a universal level of prevention, directed at the general population, our results about the prevalence of maladaptive cognitions in abusive and neglectful parenting can inform social marketing and community advocacy strategies, such as mass-media campaigns directly targeted to increase positive community attitudes towards parenting (Sanders, 2000). Additionally, and considering the influence of culture in parental cognitions that subsequently shape parenting practices (Bornstein, 2012), effective prevention strategies could focus on providing information about positive parenting, namely through broadcast, digital, outdoor or print media (e.g., Metzler, Sanders, Rusby, & Crowley, 2012). Moreover, primary prevention policies should also address the conceptual distinction between abuse and neglect. Indeed, as most prevention programs have been focused on abuse (Klevens

& Whitaker, 2007), the design of programs and strategies that address neglect specifically are still required.

Second, considering the reported additive effect of parents' low intellectual functioning and poverty particularly in neglect, specific interventions with these parents would also be important. Therefore, in addition to reducing stress sources associated with poverty with public policies such as direct cash transfers, and ensuring the provision of children's basic needs (e.g., going to doctor appointments, having food, attending school), interventions would be more effective if motivated by a multi-systemic approach (e.g., Negrão, Pereira, Soares, & Mesman, 2014). Specifically, intervening with these defiant families, without any sound cognitive interventions complementing a social protection resolution, is likely to perpetuate the cycles of poverty and victimization. Although emotional and cognitive functioning in adults are changeable (Crandall, Deater-Deckard, & Riley, 2015), this deeper intervention remains a challenge to the child protection systems. However, important avenues to prevention and intervention with more vulnerable families have already been explored, namely based on insights from neurocognitive science. Considering the importance of early experiences in mental health, executive function skills, and self-regulation capacities of children, interventions with parents to train specific strategies that protect the developing brains of children are likely to improve responsiveness, mutual action-and-interaction, and emotional connection in parent-child interactions (Shonkoff, 2011). These interventions focus on strengthening adult caregivers' capacities, particularly for parents with histories of early adversity themselves, while creating well-regulated caregiving environments that help children develop their own adaptive capacities. Moreover, services delivered in the preparation for childbirth are usually focused on the immediate skills required to properly feed and provide good hygiene to babies (e.g., Daly, 2007), while neglecting the preparation of expectant parents for the psychological and emotional needs of the babies. Expectant parents, especially the more vulnerable ones, would benefit from interventions targeting parenting knowledge structures related to caregiving, such as attitudes, beliefs, and expectations to improve parents' repertoire of high-quality parental responses to their future babies.

Finally, given the importance of considering maltreatment as a matter of child health and development, and the sophisticated expertise in both early childhood and adult mental health required to evaluate and intervene (National Scientific Council on the Developing Child, 2004), governmental agendas for family policies ought to include professional skill development in child protection systems. In line with ours and others' findings, and in addition to the core skills

typically required from professionals on child protection services such as case management, relationship building or communication skills (e.g., Forrester et al., 2019), specific skills regarding assessment and intervention in parental cognitions should also be considered. Further, and as highlighted in our own studies, risk assessment protocols and decision-making processes in child protection services should acknowledge the importance of using multiple methods of information collection (e.g., Schmidt, Banse, & Imhoff, 2015), and multiple sources of information (Ciccheti & Manly, 2001) to assess parental practices. Moreover, urgent efforts are needed to promote more proximal networks between the child welfare system and the early intervention system (Asawa, Hansen, & Flood, 2008). These multidisciplinary teams, who work closely with at risk children and their families, are in a privileged position to identify maladaptive parental cognitions and provide effective early support to build growth-promoting relationships and securing environments, preventing, reducing, or mitigating the consequences of significant adversity on the developing child (Shonkoff, 2011).

In conclusion, the findings of the current research program are likely to constitute important theoretical contributions to unravel parental cognitive information processing mechanisms underlying child maltreatment, namely child abuse and child neglect. This is particularly important given the scarcity of research on the specificities of child neglect (Stoltenborgh et al., 2015). Additionally, this research emphasizes the importance of using multiple methods of information collection in risk assessment protocols and in child maltreatment evaluation (e.g., Schmidt, Banse, & Imhoff, 2015). Moreover, the consideration of the influence of other determinants such as parents' intellectual functioning and socioeconomic status is aligned with emerging evidence suggesting that parents' executive functioning is critical to the development and maintenance of adequate parenting practices, especially when in poverty (for a review see Crandall et al., 2015). Finally, both the knowledge synthesis from the review articles and the findings from the empirical studies, as well as their resulting considerations, present a contribution to the still scant research about parental cognitions. These findings not only provide further support to the SIP model of child abuse and neglect, emphasizing the potential of socio-cognitive approaches in the evaluation and explanation of child-maltreatment, but they also provide inputs for prevention and intervention with maltreating parents.

4. REFERENCES

Abraham, C., Sheeran, P., & Johnston, M. (1998). From health beliefs to self-regulation: theoretical advances in the psychology of action control. *Psychology and Health, 13,* 569–591. doi:10.1080/08870449808407420

Ateah, C. A. & Durrant, J. E. (2005). Maternal use of physical punishment in response to child misbehavior: Implications for child abuse prevention. *Child Abuse & Neglect, 29*, 169–185. doi:10.1016/j.chiabu.2004.10.010

Asawa, L. E., Hansen, D. J., & Flood, M. F. (2008). Early childhood intervention programs: Opportunities and challenges for preventing child maltreatment. *Education and Treatment of Children, 31*, 73–110. doi:10.1353/etc.0.0021

Azar, S. T., Nix, R. L., & Makin-Byrd, K. N. (2005). Parenting schemas and the process of change. *Journal of Marital and Family Therapy, 31*, 45–58. doi:10.1111/j.1752-0606.2005.tb01542.x

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 doing intervention and prevention work. *Journal of Applied Developmental Psychology, 29*, 295–304. doi:10.1016/j.appdev.2008.04.009

Bartholomew, L. K., Parcel, G. S., Kok, G., & Gottlieb, N. (2006). *Planning health promotion programs: An intervention mapping approach* (2nd ed.). San Francisco: Jossey-Bass.

Bavolek, S. J., & Keene, R. G. (2010). *Adult-Adolescent Parenting Inventory AAPI-2.1: Administration and development handbook*. Park City, UT: Family Development Resources, Inc.

Beckerman, M., van Berkel, S. R., Mesman, J., Huffmeijer, R., & Alink, L. R. A. (2019). Are negative parental attributions predicted by situational stress? From a theoretical assumption toward an experimental answer. *Child Maltreatment*. doi:10.1177/1077559519879760

Begle, A. M., Dumas, J. E., & Hanson, R. F. (2010). Predicting child abuse potential: an empirical investigation of two theoretical frameworks. *Journal of Clinical Child and Adolescent Psychology, 39*, 208–219. doi:10.1080/15374410903532650

Belsky, J., & Jaffee, S. (2006). The multiple determinants of parenting. In D. Cicchetti & D. Cohen (Eds.), *Developmental psychopathology: Risk, disorder and adaptation* (2nd ed., Vol. 3., pp. 38–85). New York: Wiley.

Berthelot, N., Ensink, K., Bernazzani, O., Normandin, L., Luyten, P., & Fonagy, P. (2015). Intergenerational transmission of attachment in abused and neglected mothers: The role of trauma-specific reflective functioning. *Infant Mental Health Journal, 36*, 200–212. doi:10.1002/imhj.21499

Bornstein, M. H. (2012). Cultural approaches to parenting. *Parenting, 12*, 212–221. doi:10.1080/15295192.2012.683359

Chaffin, M., Silovsky, J. F., Funderburk, B., Valle, L. A., Brestan, E. V., Balachova, T., Jackson, S., Lensgraf, J., & Bonner, B. L. (2004). Parent-child Interaction Therapy with physically abusive parents: Efficacy for reducing future abuse reports. *Journal of Consulting and Clinical Psychology, 72*, 500–510. doi:10.1037/0022-006X.72.3.500

Calheiros, M. M., Silva, C. S., & Magalhães, E. (2019). Child Maltreatment Severity Questionnaire (MSQ) for professionals: Development, validity, and reliability evidence. *Assessment*. doi:10.1177/1073191119890030

Camilo, C., & Garrido, M. V. (2013). Desenho e avaliação de programas de desenvolvimento de competências parentais para pais negligentes: Uma revisão e reflexão [Design and evaluation of intervention programs for neglectful parents: A review and reflection]. *Análise Psicológica, 31*, 245–268. doi:10.14417/ap.697

Camilo, C., Garrido, M. V., & Calheiros, M. M. (2016). Implicit measures of child abuse and neglect: A systematic review. *Aggression and Violent Behavior, 29*, 43–54. doi:10.1016/j.avb.2016.06.002

Camilo, C., Garrido, M. V., & Calheiros, M. M (2019a). *The social information processing model in child abuse and neglect: A meta-analytic review*. Manuscript submitted for publication.

Camilo, C., Garrido, M. V., & Calheiros, M. M (2019b). *Parental attitudes in child maltreatment*. Manuscript submitted for publication.

Camilo, C., Garrido, M. V., & Calheiros, M. M (2019c). *Recognizing children's emotions in child abuse and neglect.* Manuscript submitted for publication.

Camilo, C., Garrido, M. V., Ferreira, M. B., & Calheiros, M. M. (2019). How does mothering look like: A multidimensional approach to maternal cognitive representations. *Journal of Family Issues, 40*, 2528–2552. doi:10.1177/0192513X19860171

Cicchetti, D., & Manly, J. (2001). Editorial: Operationalizing child maltreatment: Developmental processes and outcomes. *Development and Psychopathology, 13*, 755–757. doi:10.1017/S0954579401004011

Cicchetti, D., & Toth, S. L. (2016). Child maltreatment and developmental psychopathology: A multilevel perspective. In D. Cicchetti (Ed.), *Developmental psychopathology* (Vol. 3, pp. 457–512). New York, NY: Wiley.

Cohen, J. A., Deblinger, E., & Mannarino, A. P. (2018). Trauma-focused cognitive behavioral therapy for children and families. *Psychotherapy Research, 28*, 47–57. doi:10.1080/10503307.2016.1208375

Crandall, A., Deater-Deckard, K., & Riley, A. W. (2015). Maternal emotion and cognitive control capacities and parenting: A conceptual framework. *Developmental review, 36*, 105–126. doi:10.1016/j.dr.2015.01.004

Crittenden, P. (1993). An information-processing perspective on the behavior of neglectful parents. *Criminal Justice and Behavior, 20*, 27–48. doi:10.1177/0093854893020001004

Crouch, J. L., Milner, J. S., Skowronski, J. J., Farc, M. M., Irwin, L., & Neese, A. (2010). Automatic encoding of ambiguous child behavior in high and low risk for child physical abuse parents. *Journal of Family Violence, 25*, 73–80. doi:10.1007/s10896-009-9271-2

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. doi: 10.1016/j.chiabu.2007.11.002

Dadds, M. R., Mullins, M. J., McAllister, R. A., & Atkinson, E. (2003). Attributions, affect, and behavior in abuse-risk mothers: A laboratory study. *Child Abuse & Neglect, 27*, 21–45. doi:10.1016/S0145-2134(02)00510-0

Daly, M. (Ed) (2007). *Parenting in contemporary Europe: A positive approach*. Strasbourg, France: Council of Europe Publishing.

DeOliveira, C. A., Moran, G., & Pederson, D. R. (2005). Understanding the link between maternal adult attachment classifications and thoughts and feelings about emotions. *Attachment & Human Development, 7*, 153–170. doi:10.1080/14616730500135032

DePrince, A. P., Weinzierl, K. M., & Combs, M. D. (2009). Executive function performance and trauma exposure in a community sample of children. *Child Abuse & Neglect, 33,* 353–361. doi:10.1016/j.chiabu.2008.08.002

Dix, T. (1991). The affective organization of parenting: Adaptive and maladaptive processes. *Psychological Bulletin, 110,* 3–25. doi:10.1037/0033-2909.110.1.3

Dopke, C. A., Lundahl, B. W., Dunsterville, E., & Lovejoy, M. C. (2003). Interpretations of child compliance in individuals at high-and low-risk for child physical abuse. *Child Abuse & Neglect, 27,* 285–302. doi:10.1016/S0145-2134(03)00007-3

Euser, S., Alink, L. R., Stoltenborgh, M., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2015). A gloomy picture: A meta-analysis of randomized controlled trials reveals disappointing effectiveness of programs aiming at preventing child maltreatment. *BMC Public Health, 15,* 1068. doi:10.1186/s12889-015-2387-9

Eyberg, S. M., & Robinson, E. A. (1982). Parent–child interaction therapy: Effects on family functioning. *Journal of Clinical Child Psychology, 11,* 130–137. doi:10.1080/15374418209533076

Forrester, D., Westlake, D., Killian, M., Antonopolou, V., McCann, M., Thurnham, A., ... & Hutchison, D. (2019). What is the relationship between worker skills and outcomes for families in child and family social work?. *The British Journal of Social Work,* bcy126, doi:10.1093/bjsw/bcy126

Gabrielli, J., & Jackson, Y. (2019). Innovative methodological and statistical approaches to the study of child maltreatment: Introduction. *Child Abuse & Neglect, 87,* 1–4. doi:10.1016/j.chiabu.2018.12.001

Gilbert, R., Widom, C. S., Browne, K., Fergusson, D., Webb, E., & Janson, S. (2009). Burden and consequences of child maltreatment in high-income countries. *Lancet, 373,* 68–81. doi:10.1016/S0140-6736(08)61706-7

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. doi:10.1016/j.chiabu.2014.07.004

Hofmann, W., Gawronski, B., Gschwendner, T., Le, H., & Schmitt, M. (2005). A meta-analysis on the correlation between the implicit association test and explicit self-report

measures. *Personality and Social Psychology Bulletin, 31,* 1369–1385. https://doi.org/10.1177/0146167205275613

Kantor, G. K., Holt, M., & Straus, M. A. (2003). *The parent-report Multidimensional Neglectful Behavior Scale.* Unpublished manuscript, Family Research Laboratory, University of New Hampshire, Durham, NH.

Kaufman, J., Jones, B., Stieglitz, E., Vitulano, L., & Mannarino. A. P. (1994). The use of multiple informants to assess children's maltreatment experiences. *Journal of Family Violence, 9,* 227–248. doi:10.1007/BF01531949

Kim, K., Mennen, F., & Trickett, P. K. (2017). Patterns and correlates of co-occurrence among multiple types of child maltreatment. *Child & Family Social Work, 22,* 492– 502. doi:10.1111/cfs.12268

Klevens, J., & Whitaker, D. J. (2007). Primary prevention of child physical abuse and neglect: Gaps and promising directions. *Child Maltreatment, 12,* 364–377. doi:10.1177/1077559507305995

Kok, G., Den Boer, D. J., De Vries, H., Gerards, F., Hospers, H. J., & Mudde, A. N. (1992). Self-efficacy and attribution theory in health education. In R. Schwarzer (Ed.), *Self-efficacy: Thought control of action* (pp. 245–262). Washington: Hemisphere.

Kools, M., Ruiter, R. A., van de Wiel, M. W., & Kok, G. (2004). Increasing readers' comprehension of health education brochures: A qualitative study into how professional writers make texts coherent. *Health Education and Behavior, 31,* 720–740. doi:10.1177/1090198104263340

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. doi:10.1016/j.chiabu.2005.11.009

Maccoby, E. E., & Martin, J. A. (1983). Socialization in the context of the family: Parent-child interaction. In P. Mussen (Ed.), *Handbook of Child Psychology* (Vol.4, pp. 1–110). New York: Wiley

Maguire, S. A., Williams, B., Naughton, A. M., Cowley, L. E., Tempest, V., Mann, M. K., ... & Kemp, A. M. (2015). A systematic review of the emotional, behavioural and cognitive features exhibited by school-aged children experiencing neglect or emotional abuse. *Child Care Health & Development, 41,* 641–653. doi:10.1111/cch.12227

McElroy, E. M., & Rodriguez, C. M. (2008). Mothers of children with externalizing behavior problems: Cognitive risk factors for abuse potential and discipline style and practices. *Child Abuse & Neglect, 32*, 774–784. doi:10.1016/j.chiabu.2008.01.002

Metzler, C. W., Sanders, M. R., Rusby, J. C., & Crowley, R. N. (2012). Using consumer preference information to increase the reach and impact of media-based parenting interventions in a public health approach to parenting support. *Behavior Therapy, 43*, 257–270. doi:10.1016/j.beth.2011.05.004

Milner, J. S. (1993). Social information processing and physical child abuse. *Clinical Psychology Review, 13*, 275–294. doi:10.1016/0272-7358(93)90024-G

Milner, J. (2003). Social information processing in high-risk and physically abusive parents. *Child Abuse & Neglect, 27*, 7–20. doi:10.1016/s0145-2134(02)00506-9

Mulder, T. M., Kuiper, K. C., van der Put, C. E., Stams, G. J. M., & Assink, M. (2018). Risk factors for child neglect: A meta-analytic review. *Child Abuse & Neglect, 77,*198–210. doi:10.1016/j.chiabu.2018.01.006

National Scientific Council on the Developing Child (2004). *Young children develop in an environment of relationships: Working paper no. 1*. Retrieved from www.developingchild.harvard.edu.

Negrão, M., Pereira, M., Soares, I., & Mesman, J. (2014). Enhancing positive parent–child interactions and family functioning in a poverty sample: A randomized control trial. *Attachment & Human Development, 16*, 315–328. doi:10.1080/14616734.2014.912485

Petty, R. E., Barden, J., & Wheeler, S. C. (2002). The elaboration likelihood model of persuasion: Health promotions that yield sustained behavioral change. In R. J. DiClemente, R. A. Crosby, & M. C. Kegler (Eds.), *Emerging theories in health promotion practice and research* (pp. 71–99). San Francisco: Jossey-Bass.

Prada, M., Garrido, M. V., Camilo, C., & Rodrigues, D. L. (2018). Subjective ratings and emotional recognition of children's facial expressions from the CAFE set. *PLoS ONE 13*(12): e0209644. doi:10.1371/journal.pone.0209644

Prinz, R. J., Sanders, M. R., Shapiro, C. J., Whitaker, D. J., & Lutzker, J. R. (2009). Population-based prevention of child maltreatment: the U.S. Triple p system population trial. *Prevention Science, 10*, 1–12. doi:10.1007/s11121-009-0123-3

Rabbitt, S. M., & Rodriguez, C. M. (2019). Assessing parental attributions through an implicit measure: Development and evaluation of the noncompliance IAT. *Journal of Child and Family Studies, 28,* 894–905. doi:10.1007/s10826-018-01315-2

Rodriguez, C. M., Silvia, P. J., & Gaskin, R. E. (2019). Predicting maternal and paternal parent-child aggression risk: Longitudinal multimethod investigation using social information processing theory. *Psychology of Violence, 9,* 370–382. doi:10.1037/vio0000115

Rodriguez, C. M., Silvia, P. J., Gonzalez, S., & Christl, M. E. (2018). Disentangling the cycle: Potential mediators and moderators in the intergenerational transmission of parent–child aggression. *Child Maltreatment, 23,* 254–268. doi:10.1177/1077559518767571

Rodriguez, C. M., Smith, T. L., & Silvia, P. J. (2016). Multimethod prediction of physical parent-child aggression risk in expectant mothers and fathers with social information processing theory. *Child Abuse & Neglect, 51*, 106–119. doi:10.1016/j.chiabu.2015.10.028

Runyon, M. K., Deblinger, E., & Steer, R. A. (2010). Group cognitive behavioral treatment for parents and children at-risk for physical abuse: An initial study. *Child & Family Behavior Therapy, 32,* 196–218. Doi: 10.1080/07317107.2010.500515

Russa, M.B., Rodriguez, C.M. and Silvia, P.J. (2014), Frustration influences impact of history and disciplinary attitudes on physical discipline decision making. *Aggressive Behavior, 40,* 1–11. doi:10.1002/ab.21500

Sanders, M. R. (2000). Community-based parenting and family support interventions and the prevention of drug abuse. *Addictive Behaviors, 25,* 929–942. doi:10.1016/S0306-4603(00)00128-3

Sanders, M. R. (2008). Triple P-Positive Parenting Program as a public health approach to strengthening parenting. *Journal of Family Psychology, 22,* 506–517. doi:10.1037/0893-3200.22.3.506

Schmidt, A. F., Banse, R., & Imhoff, R. (2015). Indirect measures in forensic contexts. In T. M. Ortner & F. J. R. van de Vijver (Eds.). *Behavior-based assessment in Psychology: Going beyond self-report in the personality, affective, motivation, and social domains* (pp. 173–194). Göttingen: Hogrefe.

Shonkoff, J. P. (2011). Protecting brains, not simply stimulating minds. *Science, 333,* 982–983. doi:10.1126/science.1206014

Sierau, S., Brand, T., Manly, J. T., Schlesier-Michel, A., Klein, A. M., Andreas, A., … White, L. O. (2017). A multisource approach to assessing child maltreatment from records, caregivers, and children. *Child Maltreatment, 22,* 45–57. doi:10.1177/1077559516675724

Sigel, I. E., & McGillicuddy-De Lisi, A. V. (2002). Parent beliefs are cognitions: The dynamic belief systems model. In M. H. Bornstein (Ed.), *Handbook of parenting: Being and becoming a parent* (Vol. 3, pp. 485-508). Mahwah, NJ: Lawrence Erlbaum.

Slep, A. M. S., & O'Leary, S. G. (2007). Multivariate models of mothers' and fathers' aggression toward their children. *Journal of Consulting and Clinical Psychology, 75,* 739–751. doi:10.1037/0022-006X.75.5.739

Stith, M. S., Liu, T. L., Davies, C., Boykin, E. L., Alder, M. C., Harris, J. F., ... Dees, J. E. M. E. G. (2009). Risk factors in child maltreatment: A meta-analytic review of the literature. *Aggression and Violent Behavior, 14,* 13–29. doi:10.1016/j.avb.2006.03.006

Stoltenborgh, M., Bakermans-Kranenburg, M. J., Alink, L. R. A., & van IJzendoorn, M. H. (2015). The prevalence of child maltreatment across the globe: Review of a series of meta-analyses. *Child Abuse Review, 24,* 37–50. doi:10.1002/car.2353

Straus, M. A., Hamby, S. L., Finkelhor, D., Moore, D. W., & Runyan, D. (1998). Identification of child maltreatment with the parent-child Conflict Tactics Scales: Development and psychometric data for a national sample of American parents. *Child Abuse & Neglect, 22,* 249–270. doi:10.1016/s0145-2134(97)00174-9

APPENDICES

APPENDIX A. SUPPLEMENTARY MATERIAL OF THE PAPER *THE SOCIAL INFORMATION PROCESSING MODEL IN CHILD ABUSE AND NEGLECT: A META-ANALYTIC REVIEW* [CHAPTER I].

Supplementary material

Appendix A

Included Studies and Main Characteristics

Author, year	Country of data collection	Participants	Type of sample	*N*	Type of maltreatment	Cognitive variables assessed
Asla et al., 2011	Spain	Mothers/ Fathers	Community-based	144	Abuse	Errors in emotion recognition
Ateah & Durrant, 2005	Canada	Mothers	Community-based	110	Abuse	Value in physical punishment Unrealistic expectations about children's development Negative affect Evaluations of wrongness Attributions of negative intent Inadequate disciplinary goals Lack adequate parenting techniques
Azar & Rohrbeck, 1986	USA	Mothers	Referred to CPS	30	Abuse	Unrealistic expectations about children's development
Azar et al., 1984	USA	Mothers	Referred to CPS	30	Abuse/ Neglect	Unrealistic expectations about children's development Deficits in problem-solving skills
Azar et al., 2012	USA	Mothers	Referred to CPS	72	Neglect	Unrealistic expectations about children's development Attributions of negative intent Deficits in problem-solving skills
Azar et al., 2016	USA	Mothers	Referred to CPS	62	Abuse	Unrealistic expectations about children's development Attributions of negative intent Deficits in problem-solving skills
Azar et al., 2017	USA	Mothers	Referred to CPS	145	Neglect	Unrealistic expectations about children's development Attributions of negative intent Deficits in problem-solving skills
Balge & Milner, 2000	USA	Mothers	Community-based	32	Abuse	Errors in emotion recognition

Beckerman et al., 2017	The Netherlands	Mothers	Community-based	53	Abuse	Evaluations of wrongness
Beckerman et al., 2018	The Netherlands	Mothers/ Fathers	Community-based	210	Abuse	Evaluations of wrongness
Bradley & Peters, 1991	Canada	Mothers	Referred to CPS	32	Abuse	Negative affect Errors in encoding children's behavior Attributions of controllability
Caselles & Milner, 2000	USA	Mothers	Referred to CPS	60	Abuse	Evaluations of wrongness Expectations of child compliance Lack of adequate parenting techniques Inadequate appraisals of appropriateness of disciplinary choices
Chilamkurti & Milner, 1993	USA	Mothers	Community-based	48	Abuse	Evaluations of wrongness Expectations of child compliance Lack of adequate parenting techniques Inadequate appraisals of appropriateness of disciplinary choices
Crouch et al., 2012	USA	Mothers/ Fathers	Referred to CPS	70	Abuse	Accessibility of negative schemata
Dadds et al., 2003	Australia	Mothers	Referred to CPS	60	Abuse	Negative affect Errors in encoding children's behavior Attributions of internality Lack of adequate parenting techniques
De Paúl et al., 2006a	Spain	Non-parents	Community-based	250	Abuse	Lack of adequate parenting techniques
De Paúl et al., 2006b	Spain	Mothers	Community-based	95	Abuse	Lack of adequate parenting techniques
De Paúl et al., 2008	Spain	Mothers	Referred to CPS	96	Abuse/ Neglect	Lack of empathy
Dopke & Milner, 2000	USA	Mothers	Community-based	50	Abuse	Evaluations of wrongness Negative attributions Expectations of child compliance Lack of adequate parenting techniques
Dopke et al., 2003	USA	Non-parents	Community-based	28	Abuse	Errors in interpreting child's behavior Lack of adequate parenting techniques

	USA	Mothers	Community-based	36	Abuse	Negative affect Errors in encoding children's behavior Errors in interpreting child's behavior Lack of adequate parenting techniques
During & McMahon, 1991	Canada	Mothers	Referred to CPS	46	Abuse	Errors in emotions recognition Errors in encoding children's behavior
Edwards et al., 2005	USA	Mothers	Referred to CPS	48	Neglect	Negative affect
Ellis & Milner, 1981	USA	Mothers/ Fathers	Referred to CPS	72	Abuse	Locus of control
Farc et al., 2008	USA	Mothers/ Fathers	Community-based	88	Abuse	Accessibility of negative schemata
Francis & Wolfe, 2008	Canada	Fathers	Referred to CPS	49	Abuse	Lack of empathy Errors in emotions recognition
Frodi & Lamb, 1980	USA	Mothers	Referred to CPS	28	Abuse	Hyperreactivity to child-related stimuli Negative affect
Gaines et al., 1978	USA	Mothers	Referred to CPS	240	Abuse/ Neglect	Unrealistic expectations about children's development
Graham et al., 2001	USA	Mothers	Referred to CPS	47	Abuse	Errors in encoding children's behavior Negative attributions
Hansen et al., 1989	USA	Mothers/ Fathers	Referred to CPS	29	Abuse/ Neglect	Errors in encoding children's behavior Deficits in problem-solving skills
Haskett et al., 2003	USA	Mothers/ Fathers	Referred to CPS	118	Abuse	Unrealistic expectations about children's development Errors in encoding children's behavior Attributions of negative intent
Haskett et al., 2006	USA	Mothers/ Fathers	Referred to CPS	155	Abuse	Unrealistic expectations about children's development Attributions of negative intent
Kelley et al., 1990	USA	Mothers/ Fathers	Referred to CPS	62	Abuse	Lack of adequate parenting techniques
Kropp & Haynes, 1987	USA	Mothers	Referred to CPS	40	Abuse	Errors in emotions recognition
Larrance & Twentyman, 1983	N/A	Mothers	Referred to CPS	30	Abuse/ Neglect	Negative attributions

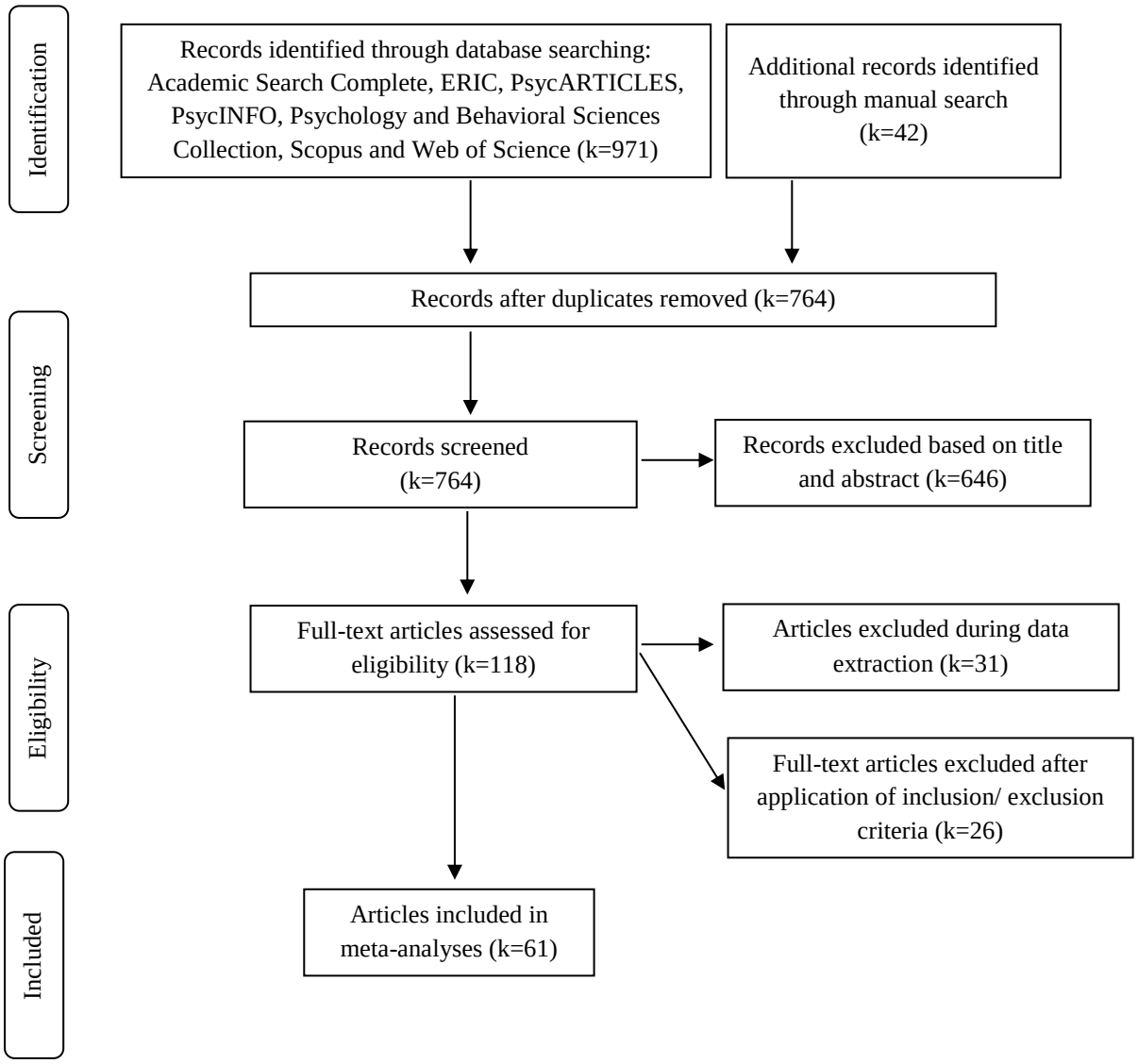
Letourneau, 1981	USA	Mothers	Referred to CPS	60	Abuse	Lack of empathy Lack of adequate parenting techniques
Mammen et al., 2003	USA	Mothers/ Fathers	Referred to CPS	52	Abuse	Unrealistic expectations about children's development Attributions of controllability
McCarthy et al., 2017	USA	Mothers/ Fathers	Community-based	100	Abuse	Errors in encoding children's behavior
McElroy & Rodriguez, 2008	USA	Mothers	Community-based	73	Abuse	Lack of empathy Unrealistic expectations about children's development Locus of control Intolerance towards child's behavior
Milner et al., 1995	USA	Mothers/ Fathers	Community-based	20	Abuse	Lack of empathy
Miragoli et al., 2018	Italy	Mothers/ Fathers	Community-based	518	Abuse	Errors in encoding children's behavior
Montes et al., 2001	Spain	Mothers	Community-based	38	Abuse	Negative affect Evaluations of wrongness Negative attributions Lack of adequate parenting techniques
Nix et al., 1999	USA	Mothers	Community-based	277	Abuse	Negative attributions
Pérez-Albéniz & de Paúl, 2003	Spain	Mothers/ Fathers	Community-based	74	Abuse	Lack of empathy
Pérez-Albéniz & de Paúl, 2004	Spain	Mothers/ Fathers	Community-based	45	Abuse	Lack of empathy
Pérez-Albéniz & de Paúl, 2005	Spain	Non-parents	Community-based	80	Abuse	Negative affect
Pérez-Albéniz & de Paúl, 2006	Spain	Non-parents	Community-based	95	Abuse	Negative affect
Rodrigo et al., 2011	Spain	Mothers	Referred to CPS	28	Neglect	Lack of empathy
Rodriguez, 2010	USA	Mothers/ Fathers	Community-based	363	Abuse	Locus of control Unrealistic expectations about children's development

Rodriguez, 2018	USA	Mothers	Community-based	110	Abuse	Value of physical punishment Errors in encoding children's behavior Negative attributions
Rodriguez & Richardson, 2007	USA	Mothers/ Fathers	Community-based	115	Abuse/ Neglect	Lack of empathy Locus of control Unrealistic expectations
Rodriguez & Tucker, 2015	USA	Mothers	Community-based	95	Abuse	Lack of empathy Negative attributions
Rodriguez et al., 2016a	Spain	Mothers/ Fathers/ Non-parents	Referred to CPS	70	Abuse	Lack of empathy Value of physical punishment Errors in emotions recognition Negative attributions
Rodriguez et al., 2016b	USA	Non-parents	Community-based	354	Abuse	Lack of empathy Value of physical punishment Negative affect Negative attributions Expectations of child compliance Lack of adequate parenting techniques
Rosenberg & Reppucci, 1983	USA	Mothers	Referred to CPS	24	Abuse	Negative attributions
Russa et al., 2014	USA	Non-parents	Community-based	330	Abuse	Value of physical punishment Lack of adequate parenting techniques
Slep & O'Leary, 2007	USA	Mothers/ Fathers	Community-based	106	Abuse	Value of physical punishment Attributions of negative intent
Stringer & La Greca, 1985	USA	Mothers	Referred to CPS	95	Abuse	Errors in encoding children's behavior
Wang, Wang, & Xing, 2018	China	Mothers/ Fathers	Community-based	1596	Abuse	Value of physical punishment
Webster-Stratton, 1985	USA	Mothers	Referred to CPS	40	Abuse	Errors in encoding children's behavior
Wiehe, 1986	USA	Mothers/ Fathers	Referred to CPS	64	Abuse	Lack of empathy Locus of control
Wood-Shuman & Cone, 1986	USA	Mothers	Referred to CPS	25	Abuse	Errors in encoding children's behavior

Note. *N* = total number of participants; USA = United States of America; N/A = not available.

Appendix B

Flow Diagram



Appendix C

Coding Scheme

In case of missing values insert ‘9999’

Bibliographical information

1. StudyID (= unique number for each study)
2. Authors of study
3. Title of study
4. Year of publication

Sample characteristics

1. Type of participants (Mothers & fathers=M/F / Only mothers=M / Only fathers=F / Non-parents=NP)
2. Type of sample (Community-based=C / Referred to CPS=R)
3. Range age of children
4. Sample size of abusive/neglectful participants or at high-risk of
5. Sample size of non-abusive/neglectful participants or at low-risk of
6. Total sample size

Study characteristics

1. Country in which the study was conducted (US / Europe / Other)
2. In case of other country, specify:
3. Design of the study (Experimental or quasi-experimental / Correlational)
4. Assessment context (Community services / laboratory / Other)
5. In case of other context, specify:

Variables

1. Unique effect size ID
2. Type of maltreatment (Abuse / Neglect)
3. Type of measure of maltreatment (CPS-records / Self-report / Hetero-report / Combined)
4. In case of self- or hetero-report, specify the instrument:

5. Cognitive variable label (e.g., beliefs, expectations. attributions; see Appendix D for examples)
6. SIP stage (see Appendix D)
7. Type of assessment of cognitive variable (Self-report / Observational / Implicit)
8. Instrument of assessment of cognitive variables

Results

1. Pearson product-moment correlation coefficient (*r*)

Appendix D

Classification of SIP cognitive stages

(According to Milner 1993, 2003)

Preexisting schemata

- Beliefs about children and child rearing: global-beliefs (related to all children), specific-beliefs (related to their children); parenting attitudes; value of physical punishment; child development expectations
- Person-specific schemata: self-efficacy; control expectancies; locus of control orientation; empathy
- Affective schemata: moods; negative affect (anger, hostility, anxiety, and depression); distress; hyperreactivity to child-related stimulus

Stage 1: Perceptions

- Attention and selective attention: awareness of children's behavior; encoding child-related information; cue detection accuracy; notice of minor changes; likelihood to observe noncompliant child behaviors; distinguish different types of child transgressions; stimulus discrimination abilities; errors in recognition of children´s emotional expressions

Stage 2: Interpretations and evaluations

- Attributions: hostile intent; attributional differences; evaluations of wrongness;
- Expectations of compliance: predictions of child compliance following child transgressions and subsequent parental discipline techniques

Stage 3: Information integration and response selection

- Mitigating information: use of situational information in their evaluation of children's behavior; awareness of mitigating information
- Repertoire of parental responses: parenting skills; problem-solving skills; knowledge of parenting techniques; ability to creatively generate appropriate child management techniques; availability of response choices

Appendix E

References included in meta-analyses

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. doi:10.1016/j.chiabu.2011.05.010

Ateah, C. A., & Durrant, J. E. (2005). Maternal use of physical punishment in response to child misbehavior: Implications for child abuse prevention. *Child Abuse & Neglect, 29*, 169–185. doi:10.1016/j.chiabu.2004.10.010

Azar, S. T., & Rohrbeck, C. A. (1986). Child abuse and unrealistic expectations: Further validation of the Parent Opinion Questionnaire. *Journal of Consulting and Clinical Psychology, 54*, 867–868. doi:10.1037//0022-006X.54.6.867

Azar, S. T., Robinson, D. R., Hekimian, E., & Twentyman, C. T. (1984). Unrealistic expectations and problem-solving ability in maltreating and comparison mothers. *Journal of Consulting and Clinical Psychology, 52*, 4, 687–691. doi:10.1037/0022-006X.52.4.687

Azar, S. T., Stevenson, M. T., & Johnson, D. R. (2012). Intellectual disabilities and neglectful parenting: Preliminary findings on the role of cognition in parenting risk. *Journal of Mental Health Research in Intellectual Disabilities, 5*, 94–129. doi:10.1080/19315864.2011.615460

Azar, S. T., Miller, E. A., McGuier, D. J., Stevenson, M. T., O'Donnell, E., Olsen, N., & Spence, N. (2016). Maternal social information processing and the frequency and severity of mother-perpetrated physical abuse. *Child Maltreatment, 21*, 308–316. doi:10.1177/1077559516668047

Azar, S. T., McGuier, D. J., Miller, E. A., Hernandez-Mekonnen, R., & Johnson, D. R. (2017). Child neglect and maternal cross-relational social cognitive and neurocognitive disturbances. *Journal of Family Psychology, 31*, 8–18. doi:10.1037/fam0000268

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*, 1289–1298. doi:10.1016/S0145-2134(00)00188-5

Beckerman, M., van Berkel, S. R., Mesman, J., & Alink, L. R. A. (2017). The role of negative parental attributions in the associations between daily stressors, maltreatment history, and harsh and abusive discipline. *Child Abuse & Neglect, 64,* 109–116. doi:10.1016/j.chiabu.2016.12.015

Beckerman, M., van Berkel, S. R., Mesman, J., & Alink, L. R. A. (2018). Negative parental attributions mediate associations between risk factors and dysfunctional parenting: A replication and extension. *Child Abuse & Neglect, 81,* 249–258. doi:10.1016/j.chiabu.2018.05.001

Bradley, E., J., & Peters, R. D. (1991). Physically abusive and nonabusive mothers' perceptions of parenting and child behavior. *American Journal of Orthopsychiatry, 61,* 455–460. doi:10.1037/h0079263

Caselles, C. E., & Milner, J. S. (2000). Evaluations of child transgressions, disciplinary choices, and expected child compliance in a no-cry and a crying infant condition in physically abusive and comparison mothers. *Child Abuse & Neglect, 24,* 477–491. doi:10.1016/S0145-2134(00)00115-0

Chilamkurti, C., & Milner, J. S. (1993). Perceptions and evaluations of child transgressions and disciplinary techniques in high- and low-risk mothers and their children. *Child Development, 64,* 1801–1814. doi:10.1111/j.1467-8624.1993.tb04214.x

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. doi:10.1016/j.chiabu.2012.04.004

Dadds, M. R., Mullins, M. J., McAllister, R. A., & Atkinson, E. (2003). Attributions, affect, and behavior in abuse-risk mothers: A laboratory study. *Child Abuse & Neglect, 27,* 21–45. doi:10.1016/S0145-2134(02)00510-0

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. doi:10.1002/ab.20123

De Paúl, J., Asla, N., Pérez-Albéniz, A., & Cádiz, B., T. G. (2006). Impact of stress and mitigating information on evaluations, attributions, affect, disciplinary choices, and

expectations of compliance in mothers at high and low risk for child physical abuse. *Journal of Interpersonal Violence, 21,* 1018–1045. doi:10.1177/0886260506290411

De Paúl, J., Pérez-Albéniz, A., Guibert, M., Asla, N., & Ormaechea, A. (2008). Dispositional empathy in neglectful mothers and mothers at high risk for child physical abuse. *Journal of Interpersonal Violence, 23*, 670–684. doi:10.1177/0886260507313532

Dopke, C. A., & Milner, J. S. (2000). Impact of child noncompliance on stress appraisals, attributions, and disciplinary choices in mothers at high and low risk for child physical abuse. *Child Abuse & Neglect, 24*, 493–504. doi:10.1016/S0145-2134(00)00110-1

Dopke, C. A., Lundahl, B. W., Dunsterville, E., & Lovejoy, M. C. (2003). Interpretations of child compliance in individuals at high and low-risk for child physical abuse. *Child Abuse & Neglect, 27*, 285–302. doi:10.1016/S0145-2134(03)00007-3

During, S. M., & McMahon, R. J. (1991). Recognition of emotional facial expressions by abusive mothers and their children. *Journal of Clinical Child Psychology, 20*, 132–139. doi:10.1207/s15374424jccp2002_4

Edwards, A., Shipman, K., & Brown, A. (2005). The socialization of emotional understanding: A comparison of neglectful and non-neglectful mothers and their children. *Child Maltreatment, 10*, 293–304. doi:10.1177/1077559505278452

Ellis, R. H., & Milner, J. S. (1981). Child abuse and locus of control. *Psychological Reports, 48,* 507–510. doi:10.2466/pr0.1981.48.2.507

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. doi:10.1016/j.chiabu.2007.06.001

Francis, K. J., & Wolfe, D. A. (2008). Cognitive and emotional differences between abusive and non-abusive fathers. *Child Abuse & Neglect, 32*, 1127–1137. doi:10.1016/j.chiabu.2008.05.007

Frodi, A., & Lamb, M. (1980). Child abusers' responses to infant smiles and cries. *Child Development, 51,* 238–241. doi:10.2307/1129612

Gaines, R., Sandgrund, A., Green, A. H., & Power, E. (1978). Etiological factors in child maltreatment: A multivariate study of abusing, neglecting, and normal mothers. *Journal of Abnormal Psychology, 87*, 531–540. doi:10.1037/0021-843X.87.5.531

Graham, S., Weiner, B., Cobb, M., & Henderson, T. (2001). An attributional analysis of child abuse among low-income African American mothers. *Journal of Social and Clinical Psychology, 20,* 233–257. doi:10.1521/jscp.20.2.233.22263

Hansen, D. J., Pallotta, G. M., Tishelman, A. C., Conaway, L. P., & MacMillan, V. M. (1989). Parental problem-solving skills and child behavior problems: A comparison of physically abusive, neglectful, clinic, and community families. *Journal of Family Violence, 4,* 353–368. doi:10.1007/BF00978576

Haskett, M. E., Scott, S. S., Grant, R., Ward, C. S., & Robinson, C. (2003). Child-related cognitions and affective functioning of physically abusive and comparison parents. *Child Abuse & Neglect, 27,* 663–686. doi:10.1016/S0145-2134(03)00103-0

Haskett, M. E., Scott, S. S., Willoughby, M., Ahern, L., & Nears, K. (2006). The Parent Opinion Questionnaire and child vignettes for use with abusive parents: Assessment of psychometric properties. *Journal of Family Violence, 21,* 137–151. doi:10.1007/s10896-005-9010-2

Kelley, M. L., Grace, N., & Elliott, S. N. (1990). Acceptability of positive and punitive discipline methods: Comparisons among abusive, potentially abusive, and nonabusive parents. *Child Abuse & Neglect, 14,* 219–226. doi:10.1016/0145-2134(90)90032-O

Kropp, J., & Haynes, M. (1987). Abusive and nonabusive mothers' ability to identify general and specific emotion signals of infants. *Child Development, 58,* 187–190. doi:10.2307/1130300

Larrance, D. T., & Twentyman, C. T. (1983). Maternal attributions and child abuse. *Journal of Abnormal Psychology, 92,* 449–457. doi:10.1037/0021-843X.92.4.449

Letourneau, C. (1981). Empathy and stress: How they affect parental aggression. *Social Work, 26,* 383–389.

Mammen, O., Kolko, D., & Pilkonis, P. (2003). Parental cognitions and satisfaction: Relationship to aggressive parental behavior in child physical abuse. *Child Maltreatment, 8,* 288–301. doi:10.1177/1077559503257112

McCarthy, R. J., Skowronski, J. J., Crouch, J. L., & Milner, J. S. (2017). Parents' spontaneous evaluations of children and symbolic harmful behaviors toward their child. *Child Abuse & Neglect, 67,* 419–428. doi:10.1016/j.chiabu.2017.02.005

McElroy, E. M., & Rodriguez, C. M. (2008). Mothers of children with externalizing behavior problems: Cognitive risk factors for abuse potential and discipline style and practices. *Child Abuse & Neglect, 32,* 774–784. doi:10.1016/j.chiabu.2008.01.002

Milner, J. S., Halsey, L. B., & Fultz, J. (1995). Empathic responsiveness and affective reactivity to infant stimuli in high- and low-risk for physical child abuse mothers. *Child Abuse & Neglect, 19,* 767–780. doi:10.1016/0145-2134(95)00035-7

Miragoli, S., Balzarotti, S., Camisasca, E., & Blasio, P. D. (2018). Parents' perception of child behavior, parenting stress, and child abuse potential: Individual and partner influences. *Child Abuse & Neglect, 84,* 146–156. doi:10.1016/j.chiabu.2018.07.034

Montes, M. P., De Paúl, J., & Milner, J. S. (2001). Evaluations, attributions, affect, and disciplinary choices in mothers at high and low risk for child physical abuse. *Child Abuse & Neglect, 25,* 1015–1036. doi:10.1177/0886260506290411

Nix, R. L., Pinderhughes, E. E., Dodge, K. A., Bates, J. E., Pettit, G. S., & McFadyen-Ketchum, S. A. (1999). The relation between mothers' hostile attribution tendencies and children's externalizing behavior problems: The mediating role of mothers' harsh discipline practices. *Child Development, 70,* 896–909. doi:10.1111/cdev.1999.70.issue-4

Pérez-Albéniz, A., & De Paúl, J. (2003). Dispositional empathy in high- and low-risk parents for child physical abuse. *Child Abuse & Neglect, 27,* 769–780. doi:10.1016/S0145-2134(03)00111-X

Pérez-Albéniz, A., & De Paúl, J. (2004). Gender differences in empathy in parents at high- and low-risk of child physical abuse. *Child Abuse & Neglect, 28,* 289–300. doi:10.1016/j.chiabu.2003.11.017

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. doi:10.1002/ab.20067

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. doi:10.1002/ab.20142

Rodrigo, M. J., León, I., Quiñones, I., Lage, A., Byrne, S., & Bobes, M. A. (2011). Brain and personality bases of insensitivity to infant cues in neglectful mothers: An event-related

potential study. *Development and Psychopathology, 23*, 163–176. doi:10.1017/S0954579410000714

Rodriguez, C. M. (2010). Personal contextual characteristics and cognitions: Predicting child abuse potential and disciplinary style. *Journal of Interpersonal Violence, 25*, 315–335. doi:10.1177/0886260509334391

Rodriguez, C. M. (2018). Predicting parent-child aggression risk: Cognitive factors and their interaction with anger. *Journal of Interpersonal Violence, 33*, 359 –378. doi:10.1177/0886260516629386

Rodriguez, C. M., & Richardson, M. J. (2007). Stress and anger as contextual factors and preexisting cognitive schemas: Predicting parental child maltreatment risk. *Child Maltreatment, 12*, 325–337. doi:10.1177/1077559507305993

Rodriguez, C. M., & Tucker, M.C. (2015). Predicting maternal physical child abuse risk beyond distress and social support: Additive role of cognitive processes. *Journal of Child and Family Studies, 24*, 1780–1790. doi:10.1007/s10826-014-9981-9

Rodriguez, C. M., Smith, T. L., & Silvia, P. J. (2016a). Multimethod prediction of physical parent–child aggression risk in expectant mothers and fathers with Social Information Processing theory. *Child Abuse & Neglect, 51*, 106–119. doi:10.1016/j.chiabu.2015.10.028

Rodriguez, C. M., Smith, T. L., & Silvia, P. J. (2016b). Parent–child aggression risk in expectant mothers and fathers: A multimethod theoretical approach. *Journal of Child and Family Studies, 25*, 3220–3235. doi:10.1007/s10826-016-0481-y

Rosenberg, M. S., & Reppucci, N. D. (1983). Abusive mothers: Perceptions of their own and their children's behavior. *Journal of Consulting and Clinical Psychology, 51*, 674–682. doi:10.1037/0022-006X.51.5.674

Russa, M. B., Rodriguez, C. M, & Silvia, P. J. (2014). Frustration influences impact of history and disciplinary attitudes on physical discipline decision making. *Aggressive Behavior, 40*, 1–11. doi:10.1002/ab.21500

Slep, A. M. S., & O'Leary, S. G. (2007). Multivariate models of mothers' and fathers' aggression toward their children. *Journal of Consulting and Clinical Psychology, 75*, 739–751. doi:10.1037/0022-006X.75.5.739

Stringer, S. A., & La Greca, A. M. (1985). Correlates of child abuse potential. *Journal of Abnormal Child Psychology, 13*, 217–226. doi:10.1007/BF00910643

Wang, F., Wang, M., & Xing, X. (2018). Attitudes mediate the intergenerational transmission of corporal punishment in China. *Child Abuse & Neglect, 76*, 34–43. doi:10.1016/j.chiabu.2017.10.003

Webster-Stratton, C. (1985). Comparison of abusive and nonabusive families with conduct-disordered children. *American Journal of Orthopsychiatry, 55*, 59–69. doi:10.1111/j.1939-0025.1985.tb03421.x

Wiehe, V. R. (1987). Empathy and locus of control in child abusers. *Journal of Social Service Research, 9*, 17–30. doi:10.1300/J079v09n02_02

Wood-Shuman, S., & Cone, J. D. (1986). Differences in abusive, at-risk for abuse, and control mothers' descriptions of normal child behavior. *Child Abuse & Neglect, 10*, 397–405. doi:10.1016/0145-2134(86)90015-3

APPENDIX B. MODELS FROM THE CONFIRMATORY FACTOR ANALYSES OF THE PREVIOUS VALIDATION STUDIES [CHAPTERS II AND III].

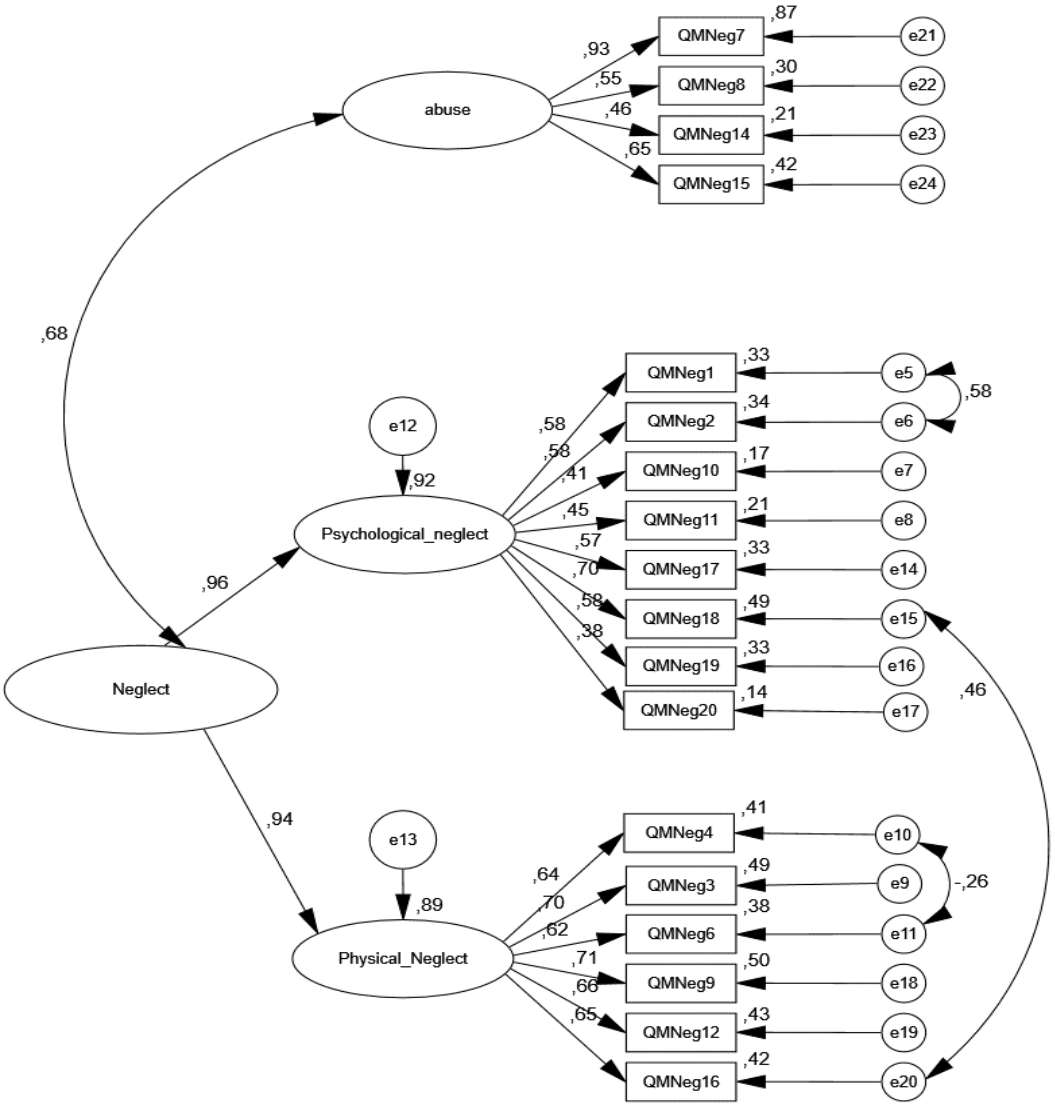


Figure 1. Standardized factor structure of the *Maltreatment Severity Questionnaire* (MSQ; Calheiros, Silva, & Magalhães, 2019).

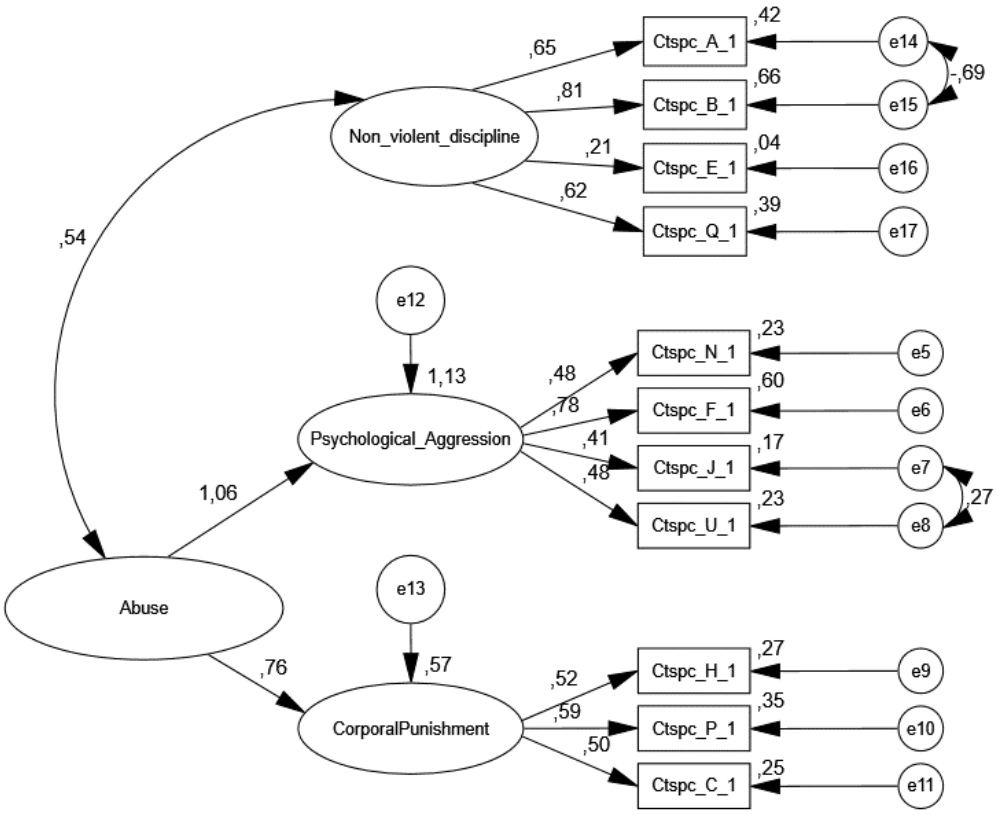


Figure 2. Standardized factor structure of the *Conflict Tactics Scale - Parent to Child* (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998).

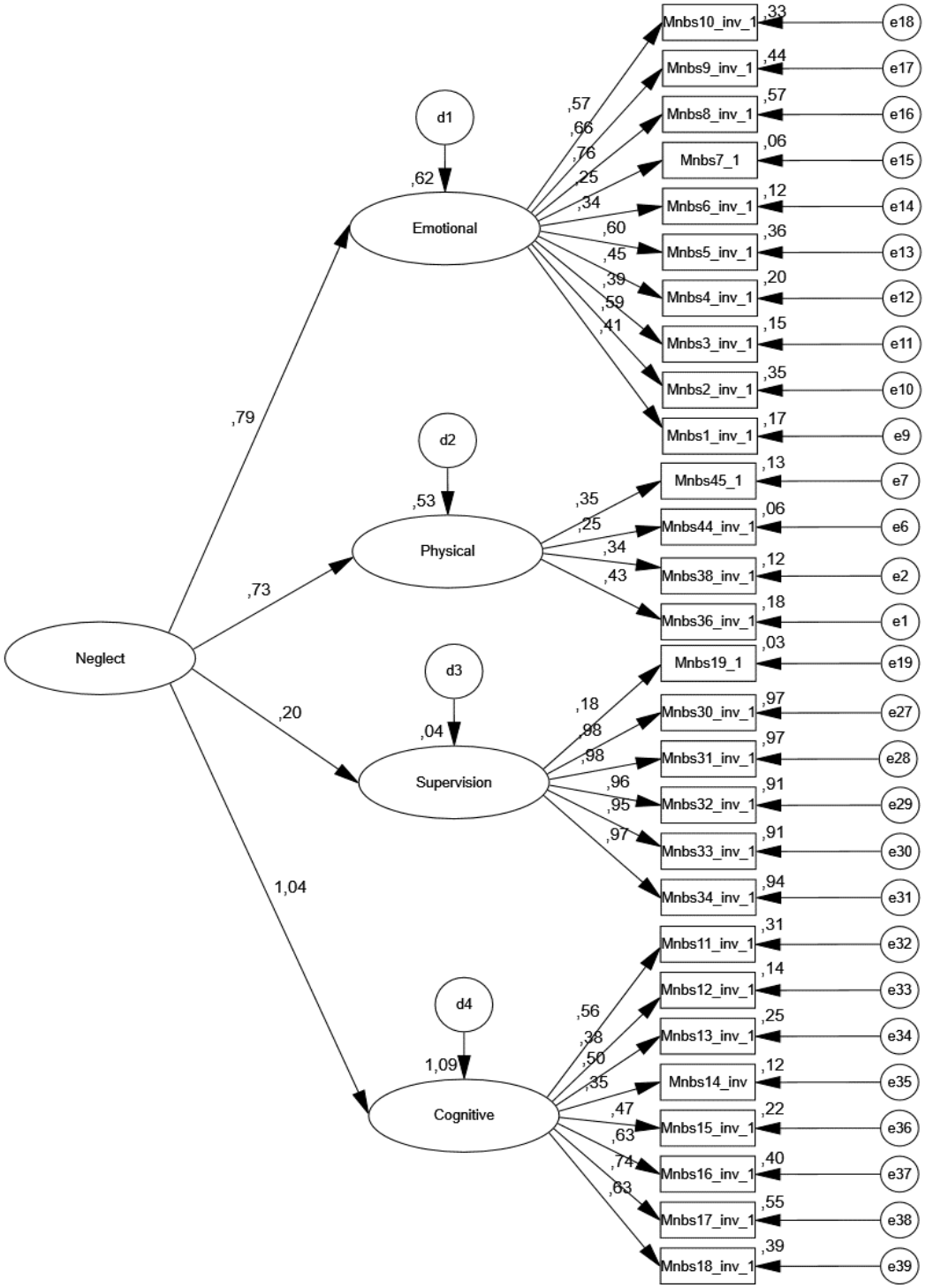


Figure 3. Standardized factor structure of the *Multidimensional Neglectful Behavior Scale – Parent Report* (MNBS; Kantor, Holt, & Straus, 2003).

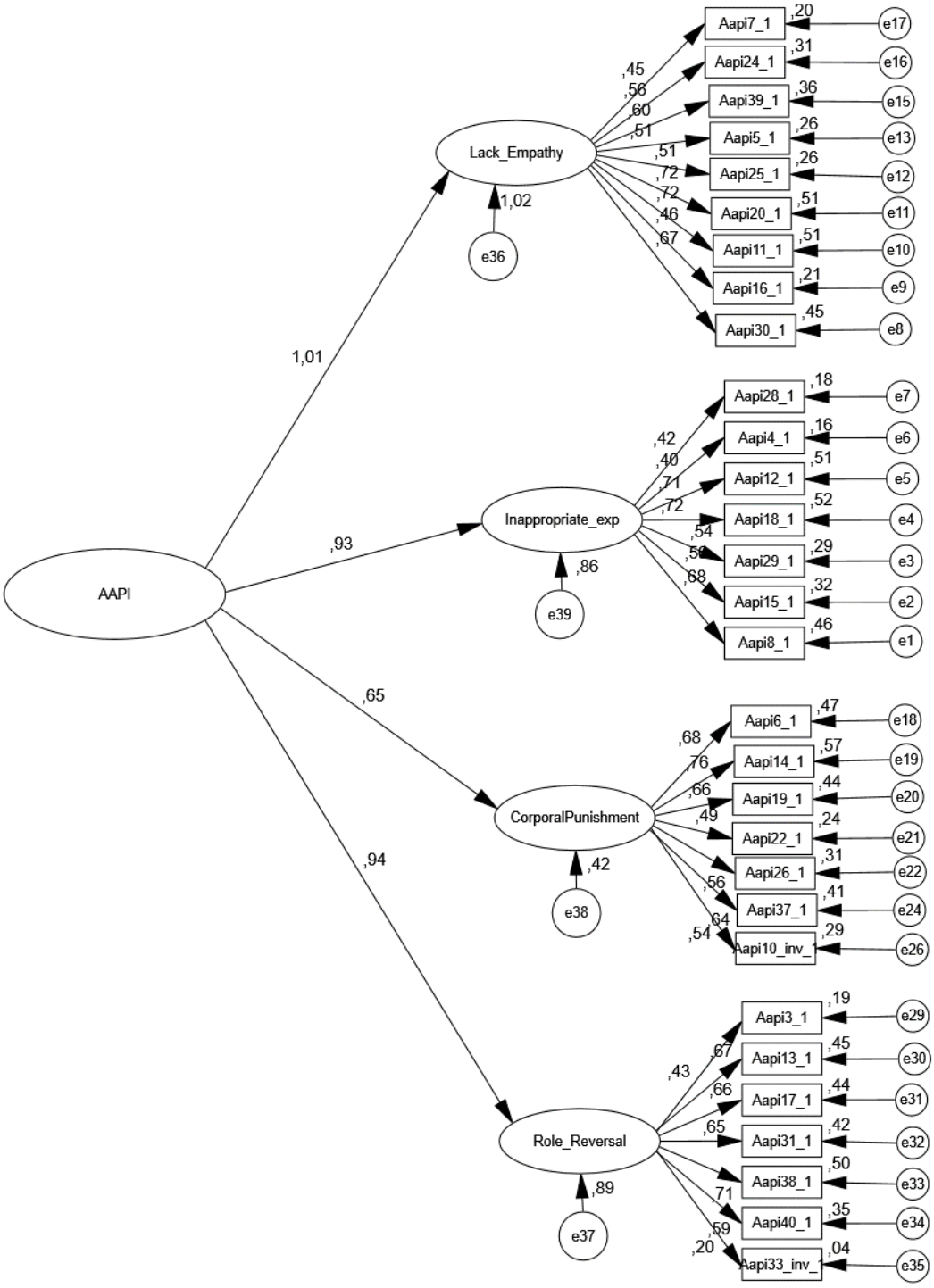


Figure 4. Standardized factor structure of the *Adult-Adolescent Parenting Inventory–2.1 Form A* (AAPI; Bavolek & Keene, 2010).