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**The Role of Parental Emotion Reactivity and Regulation in Child Maltreatment and  
Maltreatment Risk: A Meta-Analytic Review**

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### Abstract

The prevalence and impact of child maltreatment make the scientific investigation of this phenomenon a matter of vital importance. Prior research has examined associations between problematic patterns of parents' emotion reactivity and regulation and child maltreatment and maltreatment risk. However, the strength and specificity of these relationships is not yet clear. To address this, we conducted a systematic literature search of four databases from inception through February 2021 to identify studies that reported these relationships. Our resulting meta-analysis of maltreatment involved parents of children who are up to 18 years of age ( $k = 46$ , encompassing 6,669 parents). Our focus was the magnitude of the difference in levels of emotion reactivity and regulation between parents who maltreat or are at risk of maltreating and parents who do not maltreat their children or are not at risk of maltreating their children. As expected, results from meta-analyses using robust variance estimation indicated significantly higher problems with reactivity and regulation in maltreating parents / parents at risk ( $r = 0.40$ ,  $k = 140$ ; 95% CI [0.34, 0.45]), indicating that maltreating / at risk parents were more likely to have overall worse measures of reactivity and regulation. In comparison to non-maltreating parents, maltreating / at risk parents experience more negative emotions, display more negative emotion behavior, and are more dysregulated. These effects were fairly stable with little to no remaining heterogeneity. The current review concludes with a theoretical framework outlining the role of emotion reactivity and regulation in multiple risk factors of maltreatment, aiming to guide future study in this area.

*Keywords:* emotion regulation, child maltreatment, meta-analysis, parent-child relationship

## **The Role of Parental Emotion Reactivity and Regulation in Child Maltreatment and Child Maltreatment Risk: A Meta-Analytic Review**

Since the introduction of the term *battered child syndrome* in the 1960s (Kempe, Silverman, Steele, Droegemueller, & Silver, 1962) and the term *child maltreatment* in the 1970s (Forsyth et al., 1972), there has been extensive research on this topic. Indeed, in 2020 alone, 400 publications included the term “child maltreatment” in the title, with additional 1,200 publications with the terms “child abuse” or “child neglect”.<sup>1</sup> Child maltreatment has been defined in this literature as “any act or series of acts of commission or omission by a parent or other caregiver that results in harm, the potential for harm, or threat of harm to a child” (Leeb, Paulozzi, Melanson, Simon, & Arias, 2008, p. 11). The canonical division of child maltreatment distinguishes among four subtypes: physical abuse, neglect, emotional maltreatment, and sexual abuse (Barnett, Manly, & Cicchetti, 1993; Cicchetti & Toth, 2005), although some theoretical and empirical literature distinguishes between sexual abuse and other forms of maltreatment (e.g., Belsky, 1993; Lavi, Katz, Ozer, & Gross, 2019). While the division between types of maltreatment is common, many have addressed the commonalities between the subtypes in conceptualization of definitions (e.g., measurement based on actions of perpetrator, effects on child or both) or use of measurement tools (Cicchetti & Toth, 2005). As such, child maltreatment can be treated as a meta-construct that represents core elements within abuse and neglect.

In examining the predictors of maltreatment, one focus has been emotion reactivity and regulation of parents in maltreating families or parents at risk of maltreating (e.g., Kim & Cicchetti, 2010; Shields & Cicchetti, 2001). To date, studies have shown great variability in the magnitude of the relationships between these parental emotional processes and the occurrence and risk of maltreatment. The goal of the present study is to clarify the role of emotion reactivity and regulation in child maltreatment via a meta-

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<sup>1</sup> Based on the Google Scholar database, retrieved on June 18, 2021.

analysis of studies of maltreating families. More specifically, we aim to compare the magnitude of emotion reactivity and emotion regulation between parents who maltreat / are at risk of maltreating and parents who do not maltreat their children. Establishing whether—and if so, how—parental emotion reactivity and regulation are dysfunctional is important for at least three reasons. First, our results could supply a clear account regarding these processes in maltreating / at risk parents, and meaningfully add to studies focusing on reactivity and regulation in normative parenting (Rutherford, Wallace, Laurent, & Mayes, 2015). Second, clarifying the link between emotion reactivity and regulation and child maltreatment could contribute a new element to the transdiagnostic approach (Sloan & Kring, 2009). The transdiagnostic approach addresses the underlying emotional processes in psychopathology; we would like to present an addition to this approach, suggesting that emotional processes might underlie a cluster of behaviors and conditions (Felitti et al., 1998), one of which being child maltreatment. This suggestion is presented in the final section of the paper—*an emotion regulation perspective of child maltreatment*. Third, our results could have significant practical implications, guiding identification of maltreatment and (primary and secondary) interventions with this population of parents.

Before undertaking this analysis, in the first section, we address three introductory questions: (1) What are emotion reactivity and emotion regulation? (2) How are these constructs distinguished from each other? and (3) How are these constructs distinguished from other, closely related constructs? Next, we review four theoretical parenting models that supply a potential pathway from parental emotion reactivity/regulation to the propensity to maltreat. Once this context is established, we then meta-analytically review studies examining levels of emotion reactivity and emotion regulation in maltreating / at risk and non-maltreating parents. Lastly, we integrate the results of our meta-analytic review with the theoretical predictions and introduce an emotion regulation model of child maltreatment as a guide for further research.

## Fundamental Issues

### Emotion Reactivity and Emotion Regulation

*Emotion reactivity* comprises the loosely coupled changes in subjective feeling, behavior, and physiology that occur when people attend to a situation that they evaluate as significant in light of their goals; emotions can be characterized by valence (negative vs. positive) and intensity (strong vs. weak) (Gross & Jazaieri, 2014; Gross & Thompson, 2007). For example, anger might be felt as an irritation, be expressed by the grinding of teeth, and be accompanied by changes in heart rate (Smith, 1994). *Emotion regulation* is defined as the way individuals influence which emotions they have, when they have them, and how they experience and express them (Gross, 1998). Emotion regulation may take the form of selecting or modifying situations where emotions might be activated, deploying attention to the emotion-triggering aspects in the situation, changing the meaning that the potentially emotion-eliciting situation might have, and controlling and/or changing the behavioral manifestation of the emotion (Gross & Thompson, 2007). Physiology

The current study focuses on parents' emotion reactivity and emotion regulation and their independent relationships with child maltreatment. We note that the distinction between emotion reactivity and emotion regulation has been a subject of ongoing scientific debate. Some approaches to the study of emotion support the value of this distinction, other approaches do not (Gross & Feldman Barrett, 2011). Even those models that view emotion reactivity and emotion regulation as a continuous process and not mechanistically distinct, however, treat the distinction as descriptively useful. Thus, while deep consideration of this debate (Bridgett, Burt, Edwards, & Deater-Deckard, 2015; Nigg, 2017) is beyond the scope of our study, our approach in considering each independently is aligned with the prior literature. Further, emotion regulation has been differentiated from other regulatory processes. Emotion regulation is meaningfully differentiated from self-regulation [the volitional processes involved in the control of affect, attention, and behavior (Eisenberg, Hofer, Sulik, & Spinrad, 2014)], effortful

control [the ability of executive attention, including inhibiting and activating responses, planning and detecting errors (Rothbart & Bates, 2006)] and executive functioning [effortful deployment of attention, integration of information and planning (Eisenberg et al., 2014)]. The current study addressed processes that, in previous literature, have been regarded as primarily encompassing emotion reactivity and emotion regulation (e.g., Lavi et al., 2019).

### **Theoretical Models of Parental Emotion Reactivity/Regulation and Child Maltreatment**

To provide the theoretical context for our meta-analytic investigation, we provide a brief overview of four key models relevant to emotion reactivity and regulation of maltreating parents. These models establish a theoretical foundation for the claim that there should be a link between parental dysfunctional emotion reactivity/regulation and child maltreatment. While not exhaustive, this outline is aimed to generate an understanding of the theoretical grounds describing the links between these three constructs: reactivity, regulation, and maltreatment. In Table 1, we present an outline of the four models we present and summarize the predictions consistent with them.

#### **Anger and Mismatch in Emotions**

The first model describes a range of parental behaviors, most represent various facets of abusing or neglecting behaviors. Dix's model (1991) suggests that ineffective parenting is characterized by inadequate emotion (hypo-reactivity to positive emotions), extreme emotion (hyper-reactivity to negative emotions), or a mismatch of emotions between parent and child (e.g. child expressing fear and parent expressing enjoyment, child expressing happiness and parent expressing disappointment). Parental negative emotions—anger in particular—are posited as having a deleterious impact on parent-child relations. Anger is conceptualized as leading the parent to react to the child with intrusiveness or disengagement. In addition, anger might narrow the attention of the parent, leading the parent to be unable to attend to stimuli other than the anger-provoking stimuli. This narrowing could impact the

parent's cognitive ability and leads the parent to express his or her anger via actions that intimidate and lead to further emotional dysregulation of the child (Denham et al., 2000; Lavi et al., 2019). Dix's model (1991) was one of the first to propose that high levels of negative emotions—particularly anger—could lead to an elevated propensity to maltreat.

### **Emotional Cutoff and Emotion Regulation**

The second major theoretical model targeting emotions in families was presented by Bowen et al. (Bowen, 1993; Kerr & Bowen, 1988). Bowen addressed familial relationships that are characterized by disengagement and emotional distancing. This conceptualization extends the perspective on parental emotions from a focus mainly on anger to a consideration of a range of emotions. In Bowen's theorizing, the role of parental emotion regulation—the parent's ability to control his or her emotions—is addressed. Bowen proposes that the ability of people to regulate emotions is related to their differentiation of the self, i.e., the balance between closeness and separateness individuals have in their meaningful relationships (Bowen, 1993; Ferrera, 2003). Bowen's theory suggests a link between this balance and the parent's ability to handle his or her emerging emotion (i.e., emotion reactivity) and to operate thoughtfully under stress while simultaneously supporting autonomy and connection in relationships (Bowen, 1993). Differentiation of the self is suggested as a crucial aspect of parenthood, one that includes the need to regulate emotions, to handle stressful situations, and to avoid fear of forming close family relationships (Bowen, 1993; Skowron, Cipriano-Essel, Benjamin, Pincus, & Van Ryzin, 2013; Titelman, 1998).

Extensions of Bowen's theory contribute to the understanding of maltreatment by describing how parental dysregulation of emotions and stress could lead to interference in the ability to parent, possibly resulting in maltreatment (Smith, 1998, 2003). Specifically, the risk for child maltreatment might increase when the family is subject to overwhelming stress that pushes family members beyond their abilities. When faced with stress, parental emotion reactivity would potentially lead to a tendency to



respond to the child with aversive control, avoidance, and emotional cutoff—behaviors that represent hypo-reactivity of emotions and dysfunctional emotion regulation. Thus, in contrast to Dix (1991), which focuses on the involvement of anger in maltreatment risk, Bowen (1993) focuses on disengagement and emotional distancing.

### **Expectations of the Child, Negative Emotions, and Physical Abuse**

Focusing mainly on physical abuse risk, social information processing theory provides a broader outlook on emotional processes, framing emotions as embedded components within cognitive schemata the parent holds (Milner, 1993, 2000, 2003). These parental schemata include a constellation of beliefs regarding the child and their own abilities as parents, and expectations of the child and of themselves as parents. The emotional components of the schemata are conceptualized as originating from emotions experienced during previous events involving parenting. In parenting situations, social information theory describes that the cognitive schemata are activated, including their emotional components. Child maltreatment is a plausible scenario when parents have unrealistic beliefs about and/or expectations of their child. An example of such expectation could be a desire of the child to organize himself independently in the mornings, or to eat neatly, at a relatively young age; parents might also expect the child to display positive affect at all times, and not accept any negative emotion in the child. Parents might have unrealistic expectations of themselves as well (e.g., expecting themselves to be attentive and patient at all times). In maltreating families, due to previous experiences of the parents, the embedded emotional components within the schemata might constitute mainly negative emotions of sadness, anger, hostility, and fear. This process results in elevated levels of maltreating risk. For example, a memory of an especially stressful morning would lead to parental hostility in future mornings. This hyper-reactivity to negative emotions (e.g., hostility) occurs when the parenting schemata are activated and this activation hinders the ability to parent and to attend to the child's needs (Milner, 1993, 2000, 2003). Thus, a resulting pattern might be that the parents are unable to react to the child's behaviors and

displays of emotions in a manner that reflects attention and/or caring. The activation of anger, hostility and fear might lead to abusing parental behaviors.

### **Distortions of Mental Processing of Information, Emotion Regulation, and Neglect**

Turning to child neglect, Crittenden (1993, 1999) emphasizes the stages of emotion regulation in neglecting families. The general model of emotion regulation includes several stages that progress with time, beginning with the selection and/or modification of the situation the person is in, continuing with attentional deployment, and ending with controlling and/or changing the behavioral manifestation of the emotion (Gross & Thompson, 2007). Crittenden (1999) proposes that neglect could be the consequence of dysfunction in the attentional deployment phase of emotion regulation, thus focusing on the early stages of regulatory processes. The processes Crittenden describe represent an inability of the parent to direct attention in a beneficial manner. Neglecting parents may fail to deploy attention toward the child and perceive the needs of the child or perceive these needs accurately. Specifically, the parent may (1) not perceive the cues from the child; (2) perceive the cues but believe they do not require a response; or (3) regard the cues as needing a response, but then select a response the parent cannot enact (Crittenden, 1993, 1999). For instance, upon entry to a new day care, an infant may signal to the parent that she needs some more emotional support. The maltreating parent does not perceive this need of the child, or, when she or he perceives it, does not regard this signal as something that needs a specific response from the parent.

### **Integration of Theoretical Models**

Each of the models presented addresses a specific element in the parenting role, or a specific scenario that often occurs during parenting. The models each provide a comprehensive explanation of this element; in our brief review of the four theories above, we address only issues that relate to emotion reactivity or emotion regulation within these models, showing their potential link with maltreatment or maltreatment risk. It is important to note that it is plausible that the dysfunctional patterns of emotion

reactivity and emotion regulation may have originated in the parents' own childhood experiences. Indeed, having experiences of maltreatment during childhood leads to dysfunctional emotion reactivity and emotion regulation in adulthood (Lavi et al., 2019). Although these antecedents are beyond the scope of our study, they will be addressed briefly in the discussion.

The models address both dispositional tendencies of the parent and reactions of the parents to stressful occurrences. A parent with a tendency towards experiencing and expressing low levels of positive affect and/or high negative affect might tend to react to the child with intrusiveness or with disengagement (Dix, 1991)—behaviors that in their extreme would be indicative of maltreating behaviors (abusing or neglecting, respectively). A specific tendency to feel and express anger could have consequences for the parent's cognitive processing—with the parent's cognitive processing narrowing (Dix, 1991). This might lead to angry and intimidating behaviors towards the child (Dix, 1991), resulting again in risk of abuse. Crittenden's (1993, 1999) model also addressed day-to-day occurrences in the parent-child relationship. Her model suggests that the disregard of the child's needs by the parent (constituting a bias in the attentional deployment stage of the emotion regulation process) has the potential to lead to child neglect.

While these models account for the regular day-to-day life of families, other models addressed reactivity and regulation in times of stress. Parents with heightened reactivity to negative affect could react to stress with behaviors that would constitute higher maltreatment risk: Aversive control, avoidance, and emotional cutoff (Bowen, 1993; Smith, 1998, 2003). Parents with schemas that include unrealistic expectations of self and of child might react to stress with a range of negative emotions (specifically, anger, sadness, hostility, and fear). Activation of these emotions, as part of the schema that includes unrealistic expectations, constitutes a risk of child abuse (Milner, 1993, 2000, 2003).

To summarize, while these models address different parenting elements, their integration provides us with a comprehensive view of the parent, during day-to-day parenting and during stressful times. A

tendency of the parent towards negative emotions could become risk factor for maltreatment via the path of parental behaviors of intrusiveness, disengagement, and cognitive narrowing of parent attention (Dix, 1991), and via parental aversive control, avoidance, and emotional cutoff (Bowen, 1993; Smith, 1998, 2003). Reactivity to high levels of negative emotions is presented as an outcome of the activation of a schema that includes unrealistic expectations of self and child (Milner, 1993, 2000, 2003). Lastly, dysregulation—in the form of ineffective attentional deployment—is presented as resulting in heightened risk of neglect (Crittenden, 1993, 1999).

### **Research Questions and Hypotheses**

The theoretical models presented above emphasize two pathways between emotion reactivity and regulation and the parent's propensity to maltreat. First, strategies of emotional distancing (i.e., hypo-reactivity to emotions and to anger, or inability to perceive the needs of the child) may put parents at risk for maltreating their children. Second, unrealistic expectations of children lead parents to be hyper-reactive to negative emotions, which also constitute a risk for maltreatment. Informed by these theoretical perspectives, we expect that, in comparison to non-maltreating parents, maltreating parents / parents at risk of maltreating will show hyper-reactivity to negative emotions, hypo-reactivity to positive emotions, and emotion dysregulation in their communication with their child (see Table 1 for specific theoretical rationale and Table 2 for an outline of categories, major constructs and concepts used in our analysis). While the theories outlined above can draw predictions specific to sub-types of maltreatment (i.e., abuse vs. neglect), we will outline hypotheses addressing maltreatment in general, due to limitations in the scope of current empirical literature. Differences between sub-types of maltreatment will be explored as follow-up analyses, dependent on levels of heterogeneity of the effect sizes.

Our first hypothesis (Hypothesis 1) is that in comparison to non-maltreating parents, maltreating parents / parents at risk of maltreating will show hyper-reactivity to negative emotions and hypo-reactivity to positive emotions. We will explore the link between child maltreatment / maltreatment risk

and emotion reactivity, with the latter including these major constructs: behavior, experience, and physiology. The specific constructs of emotional reactivity is justified by the weak coupling among the various components of an emotional response (Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005).

Our second hypothesis (Hypothesis 2) is that in comparison to non-maltreating parents, maltreating parents / parents at risk of maltreating will show dysregulation of emotion. We will also explore the strength of the link between child maltreatment / maltreatment risk and emotion regulation, with the latter including these major constructs: dysregulation, coping, problem solving, and impulsivity. The specific constructs of emotion regulation are in alignment with the constructs examined in the literature.

## Methods

### Identification of Articles in Sample

The flow diagram for review and selection of papers is presented in Appendix A. Articles were identified through computerized searches of four databases: *PsycINFO*, *ERIC*, *Social Work* and *PubMed* using the search host of ProQuest<sup>2</sup>. Our search words were highly inclusive, to maximize the chances of locating relevant papers, and included three major constructs: reactivity, emotion regulation<sup>3</sup>, and child maltreatment. The search phrase used for the four databases was: (“child maltreatment” OR “maltreating parent” OR “maltreating mother” OR “maltreating father” OR “abusing parent” OR “abusive parent” OR “neglecting parent” OR “neglectful parent” OR “abusing mother” OR “abusive mother” OR “neglecting mother” OR “neglectful mother” “abusing father” OR “abusive father” OR “neglecting father” OR “neglectful father” OR “maltreated child” OR “maltreated children” OR “abused child” OR “neglected child” OR “abused children” OR “neglected children” OR “child abuse” OR “child neglect” OR “child physical abuse” OR “child physical neglect” OR “child emotional abuse” OR “child

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<sup>2</sup> A sample search using Google Scholar was conducted. Reviewing the first 100 results indicated that all relevant articles from that search were located via the database search.

<sup>3</sup> In this paper, we use the terms “emotion regulation” to refer successful emotion regulation, and “emotion dysregulation” to refer to the inability to use efficient regulation strategies or an inefficient use of such strategies.

emotional neglect” OR “child psychological abuse” OR “child psychological neglect” OR “maltreated children” OR “maltreated child” ) AND (emotion OR affect OR “emotion generation” OR “emotion regulation” OR “affect regulation” OR “affect dysregulation” OR “self-regulation” OR “emotion dysregulation” OR “emotion regulatory” OR “self control” OR “mood regulation” OR “situation selection” OR “situation modification” OR “attention deployment” OR attention OR “cognitive change” OR “response modulation” OR coping OR “problem solving” OR “emotion focused coping” OR “problem focused coping” OR impulsivity OR hyper-reactivity OR hyperreactivity OR aggression OR anger OR “anger regulation” OR “emotional arousal” OR depression OR guilt OR sadness OR anxiety OR arousal OR stress OR fear OR “heart rate” OR RSA OR “respiratory sinus arrhythmia” OR Vagal OR “skin conductance”).

This search resulted in a pool of 8,010 titles/abstracts. In addition to searching these databases, we scanned the reference lists of papers that were included in the meta-analysis and conducted a focused search of prominent authors by scanning publications of authors who had two or more studies that was included. This stage added 59 titles/abstracts to the pool of possible titles/abstracts. Dissertations and reports were included. Of this pool of studies, 895 titles/abstracts were included in more than one database and thus were excluded. We closed the database search in February 2021. The resulting list of papers included 7,174 titles/abstracts.

The research team reviewed the pool of papers in two steps, followed by a third step of coding the included studies. All steps were conducted by the first author and two research assistants, with the two research assistants reviewing at least 20 percent of the data in each step, for reliability calculations. First, the team examined titles and abstracts to identify relevant articles. Based on this step, 6,433 titles/abstracts were excluded because they did not include the relevant variables, included only sexual abuse and not any other sub-type of child maltreatment, or did not examine the relationships between child maltreatment and reactivity and regulation.

Reliability of the two screening steps and the coding was verified by conducting an independent second screening and coding of 20 percent of the papers. This second screening and coding were done by two Masters-level students. In screening based on titles and abstract, there was a 100 percent agreement in papers to be included, while the Masters' students included more papers in comparison to the first author.

In the second step, the full-text eligibility screening, the remaining 742 papers were examined closely by reviewing the whole paper according to the inclusion criteria detailed below. In this step, 696 papers were excluded, leaving 46 papers, which were included in the meta-analysis.

Reliability of these two steps (eligibility and coding) was conducted similarly to the previous step, with at least 20 percent of all records double coded for reliability calculation. An 80.05 percent agreement in full-text eligibility screening was obtained, with disagreements re-reviewed and agreement achieved. Here also, the Masters' students included more papers in comparison to the first author. Reliability of coding was between .69 and 1.00 (mean reliability of .92) with 83% of reliability levels above .98 (Cohen's Kappa was calculated for nominal measures and Interclass correlation for continuous measures).

A detailed account of the stages of the literature screening, and the outline of the exclusion criteria in the full-text eligibility step, appear in the Prisma diagram in Appendix A.

To provide articles appropriate to test our hypotheses about emotion reactivity and regulation in maltreating parents, we defined multiple inclusion and exclusion criteria. First, the paper had to examine the relationships between emotion reactivity/regulation of the maltreating parent and child maltreatment, with the age of the target child or children falling between 0 and 18 (415 papers excluded). We excluded studies that examined the relation between maltreatment and child's emotion reactivity/regulation, with no indication of the parent's emotional reactivity/regulation, or that utilized an experimental manipulation that preceded the measurement of emotion reactivity / regulation (as the focus of the

current exploration is emotion reactivity / regulation in natural parent-child interaction and not in response to an experimental manipulation that is dislocated from context; Studies that have a computerized assessment of emotion reactivity/regulation were included as do not entail manipulation of the parent-child relationship, but rather have a more direct measurement of these emotional processes).” (219 papers excluded). We then excluded papers that used only qualitative methods and provided no quantitative effect sizes (18 excluded), and if articles were derived from the same sample and variables (in these cases, we included the most recent article in the analyses, 16 papers excluded). Lastly, we excluded papers who did not report sufficient statistical data and did not supply such data upon requests (28 papers excluded). The number of studies that met criteria for inclusion in the meta-analysis was 46.

### **Sample of Studies**

Most of the 46 independent studies that met the inclusion criteria consisted of multiple analyses, yielding 140 separate effect sizes. As described in detail below, we primarily conducted random effects meta-analysis using robust variance estimation (Hedges, Tipton, & Johnson, 2010; Tanner-Smith & Tipton, 2014), to address the statistical dependence of multiple within-study effect sizes. Table 3 lists studies included in the synthesis.

### **Variables Coded from Each Study**

The research team coded data on 15 variables from each study. The first four variables were used for the meta-analytic statistical calculation and 11 variables were coded for descriptive purposes. Major variables are reported in the correlation table in Appendix B.

***Variables used for the statistical calculations:*** (1) Sub-type of child maltreatment (physical abuse, emotional maltreatment, neglect, sexual abuse<sup>4</sup>); (2) Category of outcome: emotion reactivity and

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<sup>4</sup> Studies that solely examined sexual abuse were excluded in the current study. However, it was coded from eligible studies when the study was eligible for the meta-analysis due to having other sub-types of child maltreatment. Sensitivity analysis will be presented to examine results excluding studies with sexual abuse.



emotion regulation; (3) Major constructs of the outcome (Reactivity: behavior, experience, physiology; Regulation: general dysregulation, coping, problem solving and impulsivity); (4) Effect size of the relationships between emotion reactivity and regulation and child maltreatment.

***Variables for descriptive purposes:*** (5) Gender of children (percentage of males and females); (6) Average age of children (in years); (7) Gender of parents (percentage of males and females); (8) Average age of parents (in years); (9) Scale or procedure used to indicate maltreatment (the various measures of maltreatment are outlined in Appendix C); (10) Source of maltreatment data (self-report or substantiated cases); (11) Maltreatment scale is a standardized scale; (12) Scale used to measure emotion reactivity or emotion regulation (the various measures of emotion reactivity and regulation are outlined in Appendix C); (13) Source of emotion reactivity and regulation data (professional, self-report, combination of several sources, physiological measure); (14) Emotion reactivity or regulation scale is a standardized scale (for example, the 16PF (Cattell, Eber, & Tatsuoka, 1970)); and (15) Design (cross-sectional, longitudinal).

***Variables coded for methodological quality.*** Each study was rated on methodological quality, on a scale of 0 to 4, with the following indicators adding a point:  $n$  larger than 70 = 1 (representing the 35<sup>th</sup> percentile of samples sizes in the current analysis – a percentile that would exclude the smallest 35 percent studies); maltreatment levels based on substantiated measure of maltreatment = 1; emotion reactivity/regulation levels based on professional report or physiological measurement = 1; and use of standardized tools = 1. As no longitudinal studies were reported, this variable was not included. Rating of studies appears in Table 3.

### **Measurement of Maltreatment**

Multiple measures were used to assess child maltreatment perpetrations. Of the 46 studies reviewed, 19 studies included substantiated reports of maltreatment (see Appendix C for list of papers). The other studies included parental self-report regarding levels of maltreatment, utilizing four known scales. First,

the Child Abuse Potential Inventory [CAPI, (Milner, 1986), in 24 studies] which is screening tool for physical child-abuse, aims to assist workers to detect physical child abuse. Second, the Adult-Adolescent Parenting Inventory-2 [AAPI-2, (Bavolek & Keene, 2001), in four studies], examines attitudes related to harsh or neglectful parenting, and includes beliefs held by abusive parents. Third, the Parent-Child Conflict Tactics Scale [CTS-PC, (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998), in three studies] measures the occurrence of psychological and physical maltreatment and neglect. Lastly, the Maltreatment Classification System [MCS, (Barnett et al., 1993), in one study] is aimed to classify data obtained from Child Protective Services reports in a systematic fashion, while addressing type and severity of maltreatment and frequency of CPS reports.

As can be seen, many of the reviewed studies used an assessment that regards maltreatment in general, while not taking into the sub-types of maltreatment and examining maltreatment occurrence and maltreatment risk. In many cases, statistical data according to sub-types or sub-scales of maltreatment was not provided. This strategy limited our ability to draw conclusions regarding maltreatment sub-types. In addition, this underscores the tendency, in the literature, to address both child maltreatment perpetration and child maltreatment risk.

### **Measurement of emotion reactivity and emotion regulation**

Measurement of emotion reactivity and emotion regulation was done using self-report of the parent (75.00%), observational data (11.40%), diagnostic / structured interviews / computer task (6.90%) and a physiological measure (6.80%). List of measures and the studies that have used them appears in Appendix C.

As can be seen in Table 2, the measurement of emotion reactivity and emotion regulation reflect the conceptualization of these constructs (as outlined by Gross, 1998; Gross & Thompson, 2007). Emotion reactivity includes behaviors indicative of aggression (verbal and/or physical hostility and violence toward others), angry behavior (showing annoyance and irritation), and behaviors showing affect:

negative (e.g., hostility, sadness, and disappointment) and positive (e.g., joy, happiness, and satisfaction). Reports of experiences of emotion reactivity include experiences of anger (the feeling of annoyance and irritation) and of affect: negative or positive (subjective feelings of hostility, sadness, disappointment – for negative affect; joy, happiness, satisfaction – for positive affect). The physiological element of emotion reactivity includes bodily responses indicative of changes in arousal. Emotion reactivity includes dysfunctions on the continuum of the emotion reactivity process, namely, dysfunctional coping and dysfunctional problem solving. In addition, studies have reported general dysregulation (that includes the inability to regulate emotions in a constructive way) and impulsivity (the general difficulty in controlling emotions).

### **Coding of Effect Sizes**

We used correlation effect sizes, adjusted to Fisher's  $Z$ , to index the relationships between levels of emotion reactivity and regulation for parents who did/did not maltreat their children. All effect sizes were coded in a unified direction such that positive values (greater than 0) indicated that maltreatment was associated with worse outcomes, i.e., higher negative emotion reactivity, lower positive emotion reactivity, and higher emotion dysregulation (i.e., lower emotion regulation).

In studies where the relationships between emotion reactivity and regulation and maltreatment was examined, but the statistical data given were not sufficient (e.g., regression coefficients from multiple regression), the authors of the paper were contacted with a request for the missing data. Twenty-three such papers fall in this category, with no additional information supplied by the authors, and thus were not included in the study.

All effect sizes calculations were derived using STATA (StataCorp., 2017). The studies presented in this meta-analysis represent a wide range of constructs and research designs. Conventional meta-analytic techniques assume the statistical independence of effect sizes included within any given analysis, which means that only one effect size per study should be included in any meta-analytic synthesis (Rosenthal,

1994). Therefore, we used random effects robust variance estimation (RVE) to address the within-study dependencies in our meta-analysis. In the RVE analysis we used the default value of  $\rho = 0.80$  and conducted sensitivity analyses to see whether varying the value of  $\rho$  resulted in different outcomes; it did not, and so we present all the RVE results using the default  $\rho$  value.

Finally, we were interested in examining a set of possible moderators that were of interest a priori: parent's age, parent's gender, child's age, sub-type of maltreatment (abuse, neglect or mixed), whether or not the outcome was self-reported, whether or not children reported to have been also sexually abused, whether or not the study was a US-based study, whether the study reported correlational data (vs. group comparison of maltreating and non-maltreating parents), and the use of Child Abuse Potential Inventory (Milner, 1986) (one of the more frequent questionnaires used, measuring child physical abuse risk). In most meta-analyses, the effect size indexes the relationship between two variables: variable x (here, emotion reactivity / regulation) and variable y (here, child maltreatment / maltreatment risk). Therefore, in a meta-analysis framework, any third variable (z, here for example sub-type of maltreatment) used to predict the magnitude of the effect size is typically called a moderator (i.e., z is hypothesized to moderate the relation between x and y). Moderator analysis was conducted by estimating the aggregated effect size, while correlating the effect size and the potential moderator. Specifically, the effect sizes are regressed on the moderators. This was done all the while taking into account the nested characteristic of the data, i.e., including multiple effect sizes from the same study (Tanner-Smith & Tipton, 2014).

### **Publication Bias Analysis**

We used a contour enhanced funnel plot and conducted an RVE meta-regression of the standard error against the effect size to explore the possibility of small study bias, or the potential for the meta-analysis results to be biased due to the omission of studies with small sample sizes and null/negative results. The funnel plots were asymmetrical (i.e., there were few included studies with small sample sizes and null findings), indicating possible small study bias, yet the regression models overall as well as

separately for reactivity and regulation models were not significant. Thus, these results suggest the potential for small study bias in the effect sizes included in the maltreating parent's meta-analysis, such that the magnitude of this mean effect size may be slightly upwardly biased (but the effect is nonetheless still significant and large in magnitude). The funnel plots are presented in Figure 1 and the meta-regression models are presented in Table 6.

## Results

Prior to presenting the results main sections, descriptive data of studies included are described in Table 4 and will be addressed. A total of 6,669 parents were assessed in studies included in our meta-analysis, with a mean number of families in each study being 128.25 ( $SD = 150.07$ , *range*: 30 to 1,019). Mean age of parent-participants was 32.53 (*mean SD* = 5.84) in each study.

The mean age of children whose parents were the target of these studies was 5.76 ( $SD = 2.85$ ). Most studies were conducted in the US (69.57%), with studies conducted also in Australia, Canada, Germany, Israel, Italy, Netherlands, New Zealand, Puerto Rico, and Spain. All studies were cross-sectional. Of the 46 papers located, three were published during the 1980s, eight during the 1990s, 17 in the 2000s, and 18 in the 2010s and 2020s (until February 2021).

As can be seen in Table 5, the pooled effect size for the relationships between maltreatment status (maltreating vs. non-maltreating) and parental emotion reactivity and regulation, across 140 effect sizes, was  $r = 0.40$  (95% CI [0.34, 0.45]), indicating that maltreating parents were more likely to have overall worse measures of reactivity and regulation. Homogeneity analyses indicated that the set of effect sizes was primarily homogenous:  $\tau^2 = .06$ . This effect size is consistent with the pooled effect for the different subgroups of outcome types, including the 34 studies reporting reactivity ( $r = 0.40$ , 95% CI [0.33, 0.47]) and the 19 studies reporting regulation ( $r = 0.36$ , 95% CI [0.26, 0.45]).

Within *reactivity*, the 18 studies reporting *experience* had the largest pooled effect size ( $r = 0.45$ , 95% CI [0.36, 0.54]), followed by the 18 studies of *behavior* ( $r = 0.43$ , 95% CI [0.33, 0.53]), and the

three studies of *physiology* ( $r = 0.15$ , 95% CI [-0.20, 0.47]). Because there were so few studies examining physiology, the statistical significance of the mean effect might not be trustworthy. The effect size of behaviors indicative of negative affect and experiences of negative affect was  $r = 0.43$  (95% CI [0.34, 0.50]); the effect size of behaviors indicative of positive affect and experiences of positive affect was  $r = 0.45$  (95% CI [0.23, 0.63]).

General *emotion regulation* had an effect size of 0.42 (95% CI [0.26, 0.55]). *Coping* had an effect size of 0.21 (95% CI [0.04, 0.36]); *problem-solving* had an effect size of 0.19 (95% CI [-0.15, 0.49]); both effect sizes were slightly different and much lower than the main effect,  $r = 0.36$  (95% CI [0.26, 0.55]). *Impulsivity* had a relatively large effect size of 0.46 (95% CI [0.28, 0.60]), yet due to low degrees of freedom, these results should be reviewed with caution.

***Moderator and sensitivity analyses.*** Given the relative lack of heterogeneity across the models and the number of studies available, only five bivariate meta-regression analyses for the reactivity outcomes ( $k = 34$ ) were conducted using only the variables that we, a priori, regarded as potentially influential. Among these variables, the moderator analysis included only those that were also correlated with either the type of outcome and/or the effect size value (see Appendix B for correlation matrix). Other variables of interest, such as parent's age, parent's gender, and child's age, were not examined as moderators as they were not correlated with type of outcome and/or the effect size value. Regulation outcomes were relatively homogeneous, and thus did not have sufficient variance to enable examination of moderators. Therefore, moderation analysis was conducted for the reactivity outcomes only.

Variables examined as moderators were: sub-type of maltreatment (abuse, neglect or mixed), whether or not the outcome was self-reported, whether or not children reported to have been also sexually abused, whether or not the study was a US-based study, whether the study reported correlational data (vs. group comparison of maltreating and non-maltreating parents), and the use of Child Abuse Potential Inventory (a scale measuring maltreatment risk and not maltreating behaviors)

(Milner, 1986) (one of the more frequent questionnaires used, measuring child physical abuse risk).

None of these were significant moderators (Type of maltreatment,  $b = 0.09$ , 95% CI [-0.13, 0.32]; Self-report,  $b = -0.04$ , 95% CI [-0.21, 0.12]; USA,  $b = -0.08$ , 95% CI [-0.31, 0.15]; Sexual abuse,  $b = 0.14$ , 95% CI [-0.36, 0.64]; Correlation,  $b = 0.03$ , 95% CI [-0.13, 0.19]; CAPI,  $b = 0.06$ , 95% CI [-0.10, 0.21]) (see Table 6).

Importantly, these results indicate that there are no significantly different results as dependent on sub-type of maltreatment. Also, these results indicate that the relation between emotion reactivity/regulation and maltreating behaviors is similar to the relationship between emotion reactivity/regulation and risk of maltreating behaviors.

## Discussion

In this study, we meta-analytically examined the magnitude of the relationships between parents' emotion reactivity and regulation and maltreatment / maltreatment risk of their children. In the sections that follow, we first review the results of the meta-analysis, and then place these results in context by presenting a broader framework for understanding the role of emotion reactivity and regulation. The latter will present an emotion regulation perspective of child maltreatment / maltreatment risk that will take the results of this study a step further and suggest future study directions.

### Emotion Reactivity and Regulation in Maltreatment and Maltreatment Risk

Maltreating parents and parents at risk of maltreating showed higher levels of negative emotion reactivity and lower levels of positive emotion reactivity in comparison to non-maltreating parents, with moderate sized effects<sup>5</sup>. Maltreating parents / at risk parents displayed more behaviors congruent with negative affect and with the subjective experience of negative affect and fewer behaviors congruent with positive affect and with the subjective experience of positive affect. Our results are consistent with

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<sup>5</sup> References to sizes of effects are based on Cohen's index (1988) and refers to the correlation transformation of the effect sizes appearing in Table 5.

theoretical perspectives discussed earlier (Dix, 1991; Milner, 2003) that suggest that maltreating parents will show negative affect hyper-reactivity and positive affect hypo-reactivity. This expectation was supported by our results indicating that maltreating parents behave in a manner indicative of high levels of negative emotions and low levels of positive emotions – results showing moderate effect sizes. In addition, maltreating parents / at risk parents report higher frequency of experiencing negative emotions and lower frequency of experiencing positive emotion, in comparison to non-maltreating parents. Our results are consistent with and extend prior research indicating that the strongest risk factor for physical abuse and of neglect is anger/hyper-reactivity of the parent (Stith et al., 2009). Anger/ hyper-reactivity/ physiological reactivity is also the highest risk factor for emotional abuse (Black, Slep, & Heyman, 2001).

These prior studies of reactivity as maltreatment risk, however, did not distinguish between the experiential, behavioral, and physiological aspects of emotion. Our results provide a more specific synthesis of the extant empirical literature, indicating that maltreating parents / parents at risk of maltreating have dysfunctional emotional reactivity patterns; these patterns are subjectively experienced by parents and are behaviorally apparent to the trained observers and clinicians rating their behavior. In addition, maltreating parents are significantly different than non-maltreating parents when examining negative and positive affect separately. Practically, our results indicate that such emotional patterns, indicated by parents in self-report measures or by practitioners in observations, could be a good starting point for designing tools of identification and treatment. Lastly, our results indicate a significant gap in the literature, as very few studies ( $k = 3$ ) examined the physiological responses of emotions in this population of parents. Understanding the nature of physiological regulatory processes associated with parenting at-risk could suggest mechanisms for explaining greater behavioral reactivity in maltreating parents and inform interventions aimed at preventing the negative interactive styles characteristic of maltreating parents.



In our second set of meta-analyses, we examined the emotion regulation of maltreating / at risk parents and non-maltreating parents. Results of our analysis reveals that, in comparison to non-maltreating parents, maltreating / at risk parents are indeed emotionally dysregulated. Results show that, in comparison to non-maltreating parents, maltreating / at risk parents have higher levels of emotion dysregulation and higher levels of dysfunctional coping styles (dysregulation:  $r = .42$ , 95% CI [.26,.55],  $k = 9$ ; dysfunctional coping styles:  $r = .21$ , 95% CI [.04,.36],  $k = 5$ ). Effect sizes of the dysregulation are moderate in magnitude and are small in magnitude for coping.

A moderation analysis was conducted. First, it is interesting to note that most relations did not have sufficient variance to explore moderation. Second, when moderation analysis was conducted, the moderators examined were not significant. This result indicates that the core relation between emotion reactivity/regulation and maltreatment/maltreatment risk is not dependent on type of maltreatment (abuse vs neglect). Also, this relation is not different when considering maltreating behaviors and maltreatment risk. This possibly indicates persons who are at risk of maltreatment are potentially also maltreating their children (and are thus not only at risk, but rather are maltreating). In addition, this result might represent similarities in emotional processes between maltreating parents and parents at risk of maltreating.

Our results concerning emotion regulation align with and extend past meta-analytic reviews that demonstrate that physically abusive parents show poor coping (Stith et al., 2009). Further, our analyses add to these results by demonstrating that this pattern might also include impulsivity and other manifestations of dysregulation. Further studies are needed to corroborate these conclusions, due to the small number of studies targeting impulsivity and problem solving. Our results correspond with expectations based on theoretical literature emphasizing parenting and emotions. Particularly, our expectation for dysregulation in the maltreating / at risk parent group was based on Bowen's theory (Bowen, 1993; Smith, 2003) that proposed that the inability of parents to regulate their emotions is a

significant risk for maltreatment.

Overall, our findings build upon and extend the results of prior reviews and meta-analytical studies in two major ways. First, previous meta-analyses focused on risk factors for child maltreatment, examining a variety of factors across the microsystem, such as factors pertaining to the child and family characteristics (Black, Heyman, & Slep, 2001; Black, Slep, et al., 2001; Stith et al., 2009). Our analysis addresses parental micro-level factors with the aim of generating understanding of the emotional processes that characterize maltreating parents. Second, our results are consistent with prior meta-analytic studies (Stith et al., 2009), which found that the strongest risk factor for physical abuse and of neglect is anger/hyper-reactivity of the parent. It is interesting to note that our exploration – as well as the above mentioned previous meta-analyses – address the occurrence of emotion reactivity and regulation in the natural, home environment. Recent meta-analytic explorations that have targeted reactions of parents in experimental settings (e.g., hearing babies cry or watching videos of crying babies) indicated that, in a laboratory context, parents do not show alterations in sympathetic stress reactivity (Reijman et al., 2016).

Our analysis extends previous results by addressing the multiple dimensions within emotion reactivity and within emotion regulation separately, thus providing a more specific account of the maltreatment-emotion reactivity/regulation link. Also, it can be noted that our results show, in general, larger effect sizes than previous meta-analyses [e.g., reports on risk factors for physical abuse ranging between correlations of .07 to .39; the highest micro-level risk factor (anger/hyper reactivity) having an effect size of .34 (Stith et al., 2009)].

Our results also complement previous reviews targeting normative parenting. For example, in a recent review, Rutherford et al. (2015) notes the crucial role of emotion regulation to parenthood. The current study, while focusing on maltreatment—the extreme end of dysfunctional parenting—demonstrates the detrimental consequences of deficiencies in emotion reactivity and emotion regulation. Our analysis

adds a significant component to previous literature by indicating the specific elements of emotion reactivity and dysregulation that are linked with maltreatment: hyper-reactivity to negative affect and hypo-reactivity to positive affect (manifested in behavior and subjective experience of the affect) and dysregulation of emotions. The size of these effects is mostly moderate-high in size, indicating the strength of these relations.

It is important to note that the relation between emotion reactivity / regulation and child maltreatment might indicate two plausible causal pathways: (1) parental dysfunctional emotion reactivity / regulation leads to a higher propensity to maltreat; and (2) occurrences of maltreatment lead to parental dysfunctional emotion reactivity / regulation. It is also plausible that these relations are bi-directional and feed into each other. The current exploration – while indicating the existence and strength of these relations – is limited in its ability to contribute to this debate.

This evidence is conceptually relevant with respect to dysfunctional pathways initiated by maltreatment and potentially practically informative for the design of identification and intervention tools that target the emotional mechanisms linked to maltreatment.

### **Implications for Emotion Reactivity and Regulation and Child Maltreatment:**

#### **An Emotion Regulation Perspective of Child Maltreatment**

This study raises crucial questions regarding the relationships between dysfunctional reactivity and regulation, on the one hand, and other risk factors for child maltreatment, on the other. Current literature frames risk factors such as psychopathology, unemployment, and marital violence as linked to the occurrence of child maltreatment (Black, Heyman, et al., 2001; Black, Slep, et al., 2001; Felitti et al., 1998; Stith et al., 2009). In light of our findings, we suggest that the next empirical step would be to examine whether dysfunctional emotion reactivity and regulation are an *underlying cause* of the associations between these diverse risk factors and child maltreatment. The current meta-analysis results give indication as to the links between emotion reactivity / regulation and child maltreatment and do not

indicate causal links. We regard these results as a first step, that might inform further exploration as to the role of these parental emotional processes. To support this call for further study, below we consider four known parent-focused maltreatment risk factors and present the theoretical and empirical links between these risk factors and emotion reactivity/regulation. Our perspective is schematically presented in Figure 2.

**Quality of social relations.** Various indicators of poor quality of social relations of the parents have been described as linked with high maltreatment risk (Black, Heyman, et al., 2001; Black, Slep, et al., 2001; Stith et al., 2009). Emotion regulation is closely related to quality of social relations. The emotion regulation strategy people tend to use influences their social relations; for example, the use of suppression and reappraisal strategies are differentially related to how well-liked a person is—as reported by the person and by others (Gross, 2002). Emotion dysregulation is further linked to other forms of violent family relations such as domestic violence (Babcock, Jacobson, Gottman, & Yerington, 2000) and poor parenting skills (Maliken & Katz, 2013). Emotion reactivity/regulation is also a prominent factor in being unemployed. Emotion regulation is related to work satisfaction and intentions to quit employment (Cote & Morgan, 2002): Suppression of unpleasant emotions decreases job satisfaction, which in turn increases intentions to quit. For example, certain jobs require “emotional labor” of engaging in regulation with the public or others such that the ability to sustain employment is related to the capacity to regulate emotions (Grandey, Fisk, & Steiner, 2005).

**Criminality and anti-social tendencies.** Maltreating parents have been reported to display other forms of criminality and anti-social tendencies in addition to maltreatment (Black, Heyman, et al., 2001; Black, Slep, et al., 2001; Stith et al., 2009). Emotion reactivity and regulation have been theoretically and empirically linked with criminality and anti-social tendencies. For instance, impulsivity is described as one of the criteria of antisocial personality disorder in the Diagnostic and Statistical Manual (DSM) 5<sup>th</sup> edition (American Psychiatric Association, 2013). Neurological examinations show relationships

among violence, impulsive aggression, and emotion dysregulation (Davidson, Putnam, & Larson, 2000). Anti-social behavior could result from a difficulty in handling negative emotions (Wall, Pearce, & McGuire, 2011), with longitudinal data showing negative emotionality as relating to onset, formation, and acceleration of antisocial behaviors and delinquency (Lahey & Waldman, 2005). Antisocial behavior could also be related to dysregulation of emotions (Zamble & Quinsey, 2001) and avoidance as a strategy of dealing with aversive emotions (Wall et al., 2011).

**Substance abuse.** Maltreating parents have been reported to have substance abuse problems (Black, Heyman, et al., 2001; Black, Slep, et al., 2001; Stith et al., 2009). Emotion reactivity/regulation deficiencies are associated with substance abuse. According to a “self-medication” frame, people who abuse or are dependent on substances use them in their struggle to manage experiences that are emotionally overwhelming, difficult to identify, communicate, or control, such as anger or rage (e.g., Greenspan, 1977; Khantzian, 1987; Krystal, 1975)). Empirically, substance abusers have been reported to be more dysregulated, less able to self-soothe, and behaviorally unstable (Horowitz, Overton, Rosenstein, & Steidl, 1992; Krystal, 1997).

**Psychopathology.** Maltreating parents have been reported to have higher levels of psychopathology, especially psychological difficulties that are emotion-related (Black, Heyman, et al., 2001; Black, Slep, et al., 2001; Stith et al., 2009). Gross and Jazaieri (2014) claim that dysfunctional reactivity and regulation could underlie psychopathology. The transdiagnostic approach to the etiology of psychopathology makes similar claims, stating that disorders can be categorized according to underlying mechanisms that cut across current DSM disorders (Sloan & Kring, 2009). A comprehensive empirical review (Aldao, Nolen-Hoeksema, & Schweizer, 2010) further demonstrated consistent relationships between regulation strategies and psychopathology.

These findings suggest that the above-mentioned maltreatment risk factors share a common feature: they all involve problems with emotion reactivity and regulation. We suggest that emotion reactivity and

regulation are core features of emotional processing. We suggest, as well, that high levels of reactivity to negative emotions, low reactivity to positive emotions, and difficulty regulating emotions are factors that deeply impact a person's life on multiple levels. The results of our meta-analysis indicate that these emotional factors are linked to a high propensity to maltreat. Our brief review of theoretical and empirical data pertaining to other risk factors linked to maltreatment raises the possibility that these specific risk factors might result from difficulties in emotion reactivity and regulation.

Importantly, the perspective presented above is only a first step in conceptualizing these links. Following up on this first step would require at least two additional steps. First, we suggest a more in-depth empirical exploration of this model. This might be achieved by assessing these constructs and utilizing procedures such as network analysis or structural equation modeling. Such analyses might answer questions that relate to the connections between these emotional constructs, ascertaining whether a combination of difficulties in emotional processing might explain a propensity to maltreat. Second, recognizing that this perspective is schematic, we suggest incorporating additional relations among these constructs. Such relations might represent cascades of impacts, as reported recently in the child maltreatment literature (Handley, Russotti, Rogosch, & Cicchetti, 2019). For example, emotion regulation might indeed impact social relations, however, these social relations might in turn impact child maltreatment. Another example is the link between experiences of maltreatment and development of dysfunctions in emotion reactivity / regulation (Lavi et al., 2019). While beyond the scope of the present analysis, we display examples of such cascades and inter-relations as dashed lines in Figure 2b.

### **Strengths and Limitations**

As noted above, there is still much debate regarding the distinction between some forms of reactivity and regulation (Gross & Feldman Barrett, 2011). Usage of physiological measures is one of the ways to distinguish between the two processes; yet the current meta-analysis indicates that there is a relatively low number of studies utilizing such measures as indicators of reactivity or regulation in a

non-experimental setting ( $k = 3$ ). Using mainly self-report measures, the extent of current literature renders us less able to make definite conclusions as to the distinctions between reactivity and regulation. Our results call for further utilization of physiological measures and a triangulation of self-report measures together with measures obtained by other sources.

Although the interest in parental reactivity and regulation spans more than three decades, we found that relatively few rigorous studies examining these relationships have been conducted: e.g., few studies employed a longitudinal design or used professional assessment of maltreatment. The relatively small number of studies included in our analysis partly represents the difficulty locating and approaching this population of families, i.e., families with a substantiated child maltreatment case or parents who agree to participate in a study addressing their parenting quality. Similarly, this reflects the difficulty obtaining professional data on this sensitive population.

In addition, it should be noted that no longitudinal studies were identified for inclusion: To our knowledge, a study design in which examining emotional reactivity and regulation of parents is followed by later examination of maltreating behaviors has not been published. The model that guided the current study asserts that the emotional processes of reactivity and regulation are core processes that characterize the person, prior to becoming a parent. However, given the correlational nature of these data, it is also possible that maltreatment leads to changes in emotion reactivity and/or regulation, and we would advocate, following our results, for utilization of designs that will supply answers to this debate.

The present study conducted several meta-analytic investigations of emotion reactivity and emotion regulation in maltreating families. Our major question was: In comparison to non-maltreating families, do parents in maltreating families exhibit dysfunctions in emotion reactivity and emotion regulation? The results found here were consistent with our predictions based in theoretical literatures emphasizing the role of parental dispositions towards extreme affect and maltreatment risk. These theories stressed

that a particular set of emotions might be especially harmful: anger, hostility, and fear (Bowen, 1993; Dix, 1991; Milner, 2003; Smith, 2003). Others highlighted the harsh consequences of parents' inability to control their emotions (Bowen, 1993; Crittenden, 1999; Smith, 2003).

Our results underscore the need to examine, more closely and with greater specificity, the multiple qualitatively different categories of child maltreatment. More nuanced investigation could lead to better understanding of the mechanisms that connect the emotion processes of reactivity and regulation to maltreating behaviors of the parent. Future studies addressing parents' levels of reactivity and regulation and the various sub-types of maltreatment—while addressing the differentiation between abuse and neglect—would generate such nuanced knowledge.

The increase in the number of studies over the decades indicates a growing interest in emotion reactivity and regulation of maltreating parents, as well as growing specificity in the theorizing of emotion reactivity, emotion regulation, and child maltreatment. It is important to note that a non-negligible number of studies ( $k = 23$ ) did not report sufficient data to be included in our analysis – although the reported study did include the relevant constructs. While reflecting the interest in the relationship between these emotional processes and maltreatment, the relatively large number of studies with missing statistical data underscores the need for more methodical statistical presentation of the results.

We also note that the current state of the literature precluded our examination of intervening factors that might moderate or otherwise influence the relationships between emotion reactivity/regulation and maltreatment. Such factors include child age, severity of the maltreatment or its chronicity; these factors have not been consistently reported to a sufficient degree to analyze here. Factors such as culture, type of maltreatment and gender (of parent and of child) have been reported as descriptive characteristics of the study, but not in a manner that would enable separate analysis according to these constructs. Similarly, resources that might serve as protective factors for parents and families such as positive



relationship with grandparents or community support were not studied frequently enough in the literature to include in this meta-analysis and would be important to consider in future research. Addressing intervening factors would have practical implications insofar as it may inform better-targeted interventions for parents at risk and for children who have been maltreated. Treatment programs could benefit from this understanding, targeting an enhancement of protective factors and thus affecting adaptive parental behaviors. Furthermore, future studies should examine the possibility that one core driver of many of the acknowledged risk factors for child maltreatment may be dysfunctional parental patterns of emotional reactivity and regulation.

### **Concluding Comment**

Our analyses indicate that, in comparison to non-maltreating parents, maltreating parents are more likely to feel and show negative emotions, less likely to feel and show positive emotions, and are more likely to be emotionally dysregulated. These results have implications for understanding challenges faced by parents with these emotional characteristics. We suggest that these emotional patterns might be related to other significant maltreatment risk factors. Our results can be used to help shape guidelines for policy makers and practitioners when contemplating parenting programs, including primary and secondary interventions. Parenting can be viewed on a continuum, from a positive, healthy parenting, through poor, dysfunctional or neglectful parenting, to abusive parenting (Wolfe & McIsaac, 2011). We suggest that our results provide an initial indication of the importance of parental emotion reactivity and regulation to family life and child development.

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Table 1

*Theories of emotion reactivity and emotion regulation of maltreating parents*

Theory	Major concept	Main emotion reactivity and regulation factors addressed
(1) Anger and mismatch in emotions (Dix, 1991)	Parental anger as predictor of parent-child relationship difficulties and elevated levels of propensity to maltreat	Hypo-reactivity of positive emotions Hyper-reactivity to negative emotions, specifically to anger
(2) Emotional cutoff and emotion regulation (Bowen, 1993; Smith, 1998, 2003)	At times of stress, parents react with aversive control, avoidance, and emotional cutoff, which lead to heightened maltreatment risk	Hypo-reactivity to emotions Emotion dysregulation
(3) Expectations of the child, negative emotions, and physical abuse (Milner, 2003)	Parents who physically abuse their children have a schema that includes unrealistic expectations from their child and negative emotions of sadness, anger, hostility, and fear	Hyper-reactivity to negative emotions
(4) Distortions of mental processing of information, emotion regulation and neglect (Crittenden, 1999)	Neglecting parents have dysfunctional attention deployment tendencies and do not perceive the needs of the child	Emotion dysregulation

Table 2

*Major constructs of emotion reactivity and emotion regulation and the concepts they include*

Category	Major construct Included concepts	Description of included concepts	
Emotion reactivity	Behavior	Usually based on observations	
	<ul style="list-style-type: none"> <li>▪ Aggression and antisocial behavior</li> <li>▪ Anger</li> </ul>	Behaviors indicative of verbal and/or physical hostility and violence toward others (not the child) Behaviors indicative of annoyance and irritation	
	<ul style="list-style-type: none"> <li>▪ High negative affect</li> <li>▪ Low positive affect</li> </ul>	Behaviors indicative of emotions such as hostility, sadness, and disappointment Behaviors indicative of emotions such as joy, happiness, satisfaction	
	Experience		
	<ul style="list-style-type: none"> <li>▪ Anger</li> <li>▪ High negative affect</li> <li>▪ Low positive affect</li> </ul>	Subjective feeling of annoyance and irritation Subjective feelings such as hostility, sadness, and disappointment Subjective feelings such as joy, happiness, satisfaction	
	Physiology		
	<ul style="list-style-type: none"> <li>▪ Physiological reactivity</li> </ul>	Bodily responses indicative of changes in arousal	
	<hr/>		
	Emotion regulation		
	<ul style="list-style-type: none"> <li>▪ General dysregulation</li> <li>▪ Dysfunctional coping</li> <li>▪ Dysfunctional problem solving</li> <li>▪ Impulsivity</li> </ul>	Attempts to change emotions and/or regulate emotions in a constructive way Difficulty controlling emotions	

*Note.* Description of constructs based on reviewed papers.



Table 3

*Studies in meta-analysis*

Study	Parent gender	Abuse vs neglect	Emotion reactivity / regulation category	N	Fisher's z	SE
(Bousha & Twentyman, 1984) [2]	Mthr	A	Rea-B-Agrs	36	0.78	0.21
			Rea-B-Agrs	36	0.98	0.20
	Mthr	N	Rea-B-Agrs	36	0.38	0.23
			Rea-B-Agrs	36	0.22	0.23
(Cataldo, 1997) [2]	Mthr	A	Dys-PS	37	0.05	0.16
			Dys-PS	37	0.08	0.16
			Dys-PS	37	0.27	0.16
			Dys-PS	37	0.48	0.16
			Imp	37	0.49	0.16
(Conyngham, 2003) [1]	Mthr	A	Rea-E-Aff	36	0.45	0.16
			Rea-E-Aff	36	0.64	0.15
(Crouch et al., 2018) [2]	Both	A	Dys-Phy	48	0.11	0.14
			Dys-Phy	48	0.15	0.14
			Dys-Phy	48	0.29	0.14
			Dys-Phy	48	0.33	0.14
(Crowe & Zeskind, 1992) [2] <sup>a</sup>	Both	A	Dys-Phy	30	0.24	0.18
			Dys-Phy	30	0.28	0.18
			Dys-Phy	30	0.29	0.18
(Dadds, Mullins, McAllister, & Atkinson, 2003) [3]	Mthr	A	Rea-B-Aff	60	0.15	0.13
			Rea-B-Aff	60	0.78	0.11
			Rea-E-Aff	60	0.15	0.13
			Rea-E-Aff	60	0.53	0.12
			Rea-E-Ang	60	0.39	0.12
(De Bellis et al., 2001) [4]	Fthr	M	Rea-B-Agrs	99	0.51	0.17
	Mthr	M	Rea-B-Agrs	99	1.19	0.35
			Rea-E-Aff	99	1.06	0.26
(Deyoung, 1994) [3]	Mthr	A	Rea-B-Agrs	272	0.32	0.10
			Imp	272	0.62	0.09
			Imp	272	0.69	0.09
(Dittrich et al., 2018) [2]	Mthr	A	Dys-dys	114	0.40	0.09
(Edwards, Shipman, & Brown, 2005) [2]	Mthr	N	Rea-E-Aff	48	0.51	0.14
(Finzi-Dottan & Harel, 2014) [2]	Both	N	Dys-dys	213	0.83	0.07
(Francis & Wolfe, 2008) [2]	Fthr	A	Rea-B-Ang	48	0.51	0.14
			Rea-E-Ang	48	0.32	0.14
			Rea-E-Ang	48	0.42	0.14
(Graham, Weiner, Cobb, & Henderson, 2001) [2]	Mthr	A	Rea-E-Ang	47	0.48	0.14
(Henschel, de Bruin, & Möhler, 2014) [2]	Mthr	A	Imp	87	0.58	0.11
(Johnson, 1996) [2]	Mthr	A	Rea-E-Aff	30	-0.16	0.18
			Rea-E-Aff	30	0.28	0.18

Study	Parent gender	Abuse vs neglect	Emotion reactivity / regulation category	N	Fisher's z	SE
			Rea-E-Aff	30	0.29	0.18
			Rea-E-Aff	30	0.32	0.18
			Rea-E-Aff	30	0.35	0.18
			Rea-E-Aff	30	0.42	0.18
			Rea-E-Aff	30	0.46	0.17
(Koenig, Cicchetti, & Rogosch, 2000) [3]	Mthr	A	Rea-B-Aff	89	0.11	0.15
			Rea-B-Aff	89	0.16	0.15
			Rea-B-Aff	89	0.24	0.15
	Mthr	N	Rea-B-Aff	89	0.18	0.14
			Rea-B-Aff	89	0.10	0.14
			Rea-B-Aff	89	0.23	0.14
(Laud, 1997) [2] <sup>a</sup>	Mthr	A	Rea-E-Aff	477	0.85	0.05
(Lesnik-Oberstein, Koers, & Cohen, 1995) [3]	Mthr	A	Rea-B-Agrs	172	0.24	0.08
			Rea-B-Agrs	172	0.32	0.07
			Rea-B-Aff	172	0.37	0.07
(Lowell & Renk, 2017) [2]	Mthr	A	Rea-E-Aff	158	0.59	0.08
			Dys-Cop	158	0.06	0.08
			Dys-dys	158	0.21	0.08
			Dys-dys	158	0.31	0.08
			Dys-dys	158	0.66	0.08
(Maughan & Cicchetti, 2002) [3]	Mthr	A	Rea-B-Agrs	139	0.33	0.11
		N	Rea-B-Agrs	139	0.26	0.12
(McGinn, 2014) [1]	Fthr	A	Rea-E-Aff	31	0.09	0.18
			Rea-E-Aff	31	0.53	0.17
(Miller & Azar, 2019) [1]	Fthr	M	Dys-PS	61	0.05	0.13
(Miragoli, Milani, Di Blasio, & Camisasca, 2020) [2]	Fthr	A	Dys-dys	110	0.39	0.10
			Dys-dys	110	0.41	0.10
			Dys-dys	110	0.31	0.10
			Dys-dys	110	0.27	0.10
			Dys-dys	110	0.35	0.10
			Dys-dys	110	0.22	0.10
	Mthr	A	Dys-dys	186	0.20	0.07
			Dys-dys	186	0.59	0.07
			Dys-dys	186	0.63	0.07
			Dys-dys	186	0.63	0.07
			Dys-dys	186	0.39	0.07
			Dys-dys	186	0.12	0.07
(Oates, Forrest, & Peacock, 1985) [3]	Mthr	A	Rea-B-Agrs	71	0.33	0.12
			Imp	71	0.30	0.12
(Oldershaw, Walters, & Hall, 1989) [3]	Mthr	A	Rea-B-Aff	116	1.40	0.58
			Rea-B-Aff	116	2.49	0.58
(Pidgeon & Sanders, 2009) [3]	Mthr	M	Rea-B-Ang	82	0.73	0.10
			Rea-B-Ang	82	1.26	0.09

Study	Parent gender	Abuse vs neglect	Emotion reactivity / regulation category	N	Fisher's z	SE
			Rea-B-Ang	82	1.38	0.09
			Rea-E-Ang	82	0.98	0.09
(Plate et al., 2019) [3]	Both	A	Rea-B-Ang	1019	0.23	0.03
(Powers et al., 2020) [2]	Mthr	A	Dys-dys	105	0.81	0.10
(Robinson et al., 2009) [3]	Mthr	M	Rea-B-Ang	123	0.39	0.09
			Rea-B-Aff	123	0.53	0.08
(Rodriguez & Green, 1997) [2]	Both	A	Rea-B-Ang	39	0.85	0.17
			Rea-B-Ang	84	0.47	0.11
(Rodriguez & Richardson, 2007) [2]	Both	A <sup>1</sup>	Rea-B-Ang	115	0.28	0.09
	Both	A <sup>2</sup>	Rea-B-Ang	115	0.42	0.09
	Both	A <sup>3</sup>	Rea-B-Ang	115	0.54	0.09
	Both	N	Rea-B-Ang	115	0.19	0.09
(Rodriguez, 2006) [2]	Mthr	A	Rea-E-Ang	80	0.47	0.11
(Rodriguez, 2008) [2]	Both	A	Rea-B-Ang	90	0.58	0.11
(Rodriguez, 2009) [2]	Mthr	A	Dys-Cop	77	-0.18	0.12
			Dys-Cop	77	-0.17	0.12
			Dys-Cop	77	-0.05	0.12
			Dys-Cop	77	0.07	0.12
			Dys-Cop	77	0.13	0.12
			Dys-Cop	77	0.22	0.12
			Dys-Cop	77	0.38	0.12
			Dys-Cop	77	0.48	0.12
(Rodriguez, 2010) [2]	Both	A	Rea-B-Ang	363	0.34	0.05
			Rea-E-Aff	363	0.48	0.05
			Dys-Cop	363	0.10	0.05
			Dys-Cop	363	0.28	0.05
(Rodriguez, Gracia, & Lila, 2016) [2]	Fthr	A	Rea-B-Ang	70	0.21	0.12
			Imp	70	0.38	0.12
(Rodriguez, Russa, & Kircher, 2015) [3] <sup>a</sup>	Both	M	Rea-E-Aff	112	0.28	0.10
(Rodriguez, Silvia, & Pu, 2018) [2]	Fthr	M	Dys-Cop <sup>4</sup>	141	0.24	0.09
			Dys-Cop <sup>4</sup>	141	0.48	0.09
			Dys-dys <sup>4</sup>	141	0.38	0.09
			Dys-dys <sup>4</sup>	141	0.45	0.09
	Mthr	M	Dys-Cop <sup>4</sup>	178	0.16	0.08
			Dys-Cop <sup>4</sup>	178	0.48	0.08
			Dys-dys <sup>4</sup>	178	0.26	0.08
			Dys-dys <sup>4</sup>	178	0.51	0.08
(Rodriguez, Smith, & Silvia, 2016) [2] <sup>a</sup>	Fthr	A	Dys-dys	84	0.39	0.11
	Fthr	M	Dys-dys	84	0.17	0.11
	Mthr	A	Dys-dys	108	0.35	0.10
	Mthr	M	Dys-dys	108	0.15	0.10
(Rodriguez, Wittig, & Silvia, 2020) [2]	Fthr	A	Rea-E-Aff	151	0.16	0.08
			Rea-E-Aff		0.09	0.08

Study	Parent gender	Abuse vs neglect	Emotion reactivity / regulation category	N	Fisher's z	SE
			Dys-dys		0.28	0.08
			Dys-dys		0.35	0.08
	Mthr	A	Rea-E-Aff	201	0.30	0.07
			Rea-E-Aff		0.20	0.07
			Dys-dys		0.31	0.07
			Dys-dys		0.17	0.07
(Shipman & Zeman, 2001) [2]	Mthr	A	Dys-Cop	50	0.39	0.14
(Shipman, 1990) [2]	Mthr	A	Rea-E-Aff	40	0.44	0.15
(Skowron & Platt, 2005) [2] <sup>a</sup>	Both	A	Dys-PS	210	0.26	0.07
(Smith, Cross, Winkler, Jovanovic, & Bradley, 2014) [2]	Mthr	A	Rea-E-Aff	83	0.24	0.11
	Mthr	A	Dys-dys	83	0.20	0.11
(Springer, 2001) [2]	Both	A	Rea-E-Ang	114	0.49	0.09
(Wells, Skowron, Scholtes, & DeGarmo, 2019) [4]	Mthr	A	Dys-Phy	221	0.04	0.14
		A	Dys-Phy	221	0.06	0.12
		N	Dys-Phy	221	0.06	0.10

Methodological quality indicated in square brackets, on a scale of 0 to 4, with each one of these indicators adding a point: n larger than 70; maltreatment measurement is not based on self-report; emotion reactivity/regulation measurement is not based on self-report; and use of standardized tools.

Mthr = Mother; Fthr = Father; A = abuse; N = Neglect; M = Mixed; <sup>a</sup> Participants do not have children yet: child maltreatment risk; Rea-B-Ang = Reactivity - Behavior-Anger, Rea-B-Aff = A Reactivity - Behavior - High NA or Low PA; Rea-E-Ang = A Reactivity - Experience-Anger; Rea-E-Aff = Reactivity-Experience-Affect; Dys-Reg = Dysregulation-Regulation; Dys-Cop = Dysregulation-Coping; Dys-PS = Dysregulation - Problem Solving; Dys-Pys = Dysregulation-Physiology; Ipm = Impulsivity; Strg = Strategies; RSA = Respiratory Sinus Arrhythmia; Ver=verbal; Phy=physical; <sup>1</sup> Physical abuse; <sup>2</sup> Emotional abuse; <sup>3</sup> Physical abuse risk; <sup>4</sup> ES computed with two CM scales.

Table 4

*Descriptive data for included studies*

	Descriptive statistics			
	Min.	Max.	Mean	SD
Total N of families per study	30	1019	128.25	150.07
Mean parents' age	19.14	44.66	32.53	5.84
Mean children's age	1.50	11.40	5.76	2.85
Parents' gender			Frequency	Percent
Both fathers and mothers			11	23.91
Fathers			7	15.22
Mothers			28	60.87
Geographical location			Frequency	Percent
Australia			3	6.52
Canada			3	6.52
Germany			2	4.35
Israel			1	2.17
Italy			1	2.17
Netherlands			1	2.17
New Zealand			1	2.17
Puerto Rico			1	2.17
Spain			1	2.17
US			32	69.57

Table 5

*Effect sizes by category, and by major constructs*

	ES	(k)	Fisher's z	dfs	P value	LL	UL	Tau2	Rho <sup>a</sup>	Corr.	LL	UL
All outcomes combined	140	(46)	0.42	43.64	<0.0001	0.35	0.49	0.06	0.80	0.40	0.34	0.45
Reactivity	81	(34)	0.43	31.71	<0.0001	0.35	0.51	0.06	0.80	0.40	0.33	0.47
Behavior	39	(18)	0.46	15.89	<0.0001	0.33	0.59	0.06	0.80	0.43	0.32	0.53
Experience	32	(18)	0.49	16.59	<0.0001	0.37	0.61	0.06	0.80	0.45	0.36	0.54
Physiology <sup>b</sup>	10	(3)	0.15	1.80	0.19	-0.20	0.51	0.00	0.80	0.15	-0.20	0.47
Negative affect <sup>c</sup>	45	(26)	0.46	23.94	<0.0001	0.36	0.55	0.07	0.80	0.43	0.34	0.50
Positive affect <sup>d</sup>	14	(8)	0.49	6.24	<0.01	0.24	0.73	0.06	0.80	0.45	0.23	0.63
Regulation	59	(19)	0.37	17.87	<0.0001	0.27	0.48	0.05	0.80	0.36	0.26	0.45
Dysregulation	31	(9)	0.44	7.99	<0.001	0.27	0.62	0.06	0.80	0.42	0.26	0.55
Coping <sup>b</sup>	16	(5)	0.21	3.89	0.03	0.04	0.38	0.03	0.80	0.21	0.04	0.36
Prob. solving <sup>b</sup>	6	(3)	0.19	1.69	0.12	-0.15	0.54	0.01	0.80	0.19	-0.15	0.49
Impulsivity <sup>b</sup>	6	(5)	0.49	3.84	<0.01	0.29	0.70	0.01	0.80	0.46	0.28	0.60

Notes. ES = number of effect sizes. *k* = number of studies.

<sup>a</sup> *Rho* was assumed at the default value and then sensitivity analysis was carried out for alternate levels. This additional analysis was consistent.

<sup>b</sup> Degrees of freedom <4, thus the associated *p*-value is unstable.

<sup>c</sup> Negative affect including anger, behavior, and experience.

<sup>d</sup> Positive affect, behavior, and experience.

Table 6

*Moderator analysis for reactivity outcomes and assessment of small study bias as proxy for publication bias*

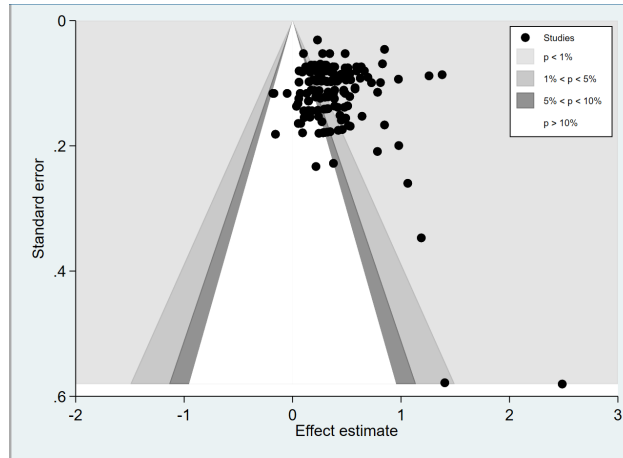
<b>Effect Modifier</b>	<b>ES</b>	<b>(K)</b>	<b>b</b>	<b>SE</b>	<b>dfs</b>	<b>P value</b>	<b>LL 95% CI</b>	<b>UL 95% CI</b>	<b>Constant</b>	<b>(dfs)</b>	<b>Tau<sup>2</sup></b>
Maltreatment type <sup>a</sup>	81	(34)	0.09	0.09	5.65	0.35	-0.13	0.32	0.40	(26.72)	0.06
Self-Report	81	(34)	-0.04	0.08	30.74	0.60	-0.21	0.12	0.45	(15.92)	0.06
USA <sup>b</sup>	81	(34)	-0.08	0.11	15.12	0.47	-0.31	0.15	0.48	(8.29)	0.06
Sexual abuse <sup>c</sup>	81	(34)	0.14	0.13	2.18	0.38	-0.36	0.64	0.42	(28.94)	0.06
Correlation	81	(34)	0.03	0.08	28.51	0.72	-0.13	0.19	0.41	(17.87)	0.06
CAPI	81	(34)	0.06	0.08	27.92	0.47	-0.10	0.21	0.40	(18.60)	0.05
<b>Small study bias</b>											
Overall	140	(46)	1.17	1.13	5.56	0.34	-1.65	3.99	0.29	(8.66)	0.07
Reactivity	81	(34)	1.45	1.12	4.68	0.25	-1.48	4.39	0.26	(7.45)	0.07
Regulation	59	(19)	-1.69	1.89	7.06	0.40	-6.15	2.77	0.54	(7.25)	0.06

*Notes.* ES = number of effect sizes. *k* = number of studies;

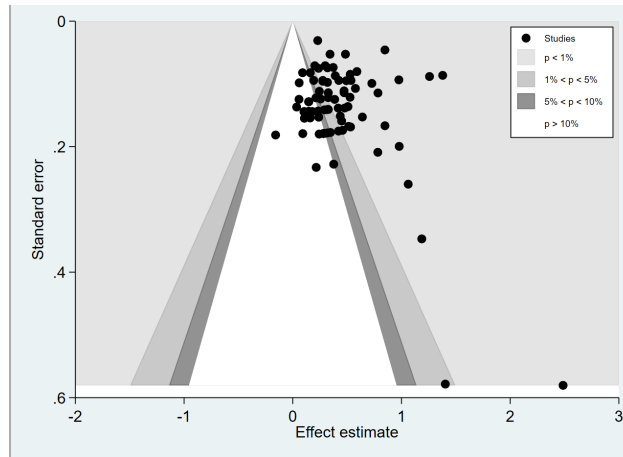
<sup>a</sup> Maltreatment type: 0=Abuse; 1= Neglect; 2=Mixed;

<sup>b</sup> Study conducted in the USA = 1;

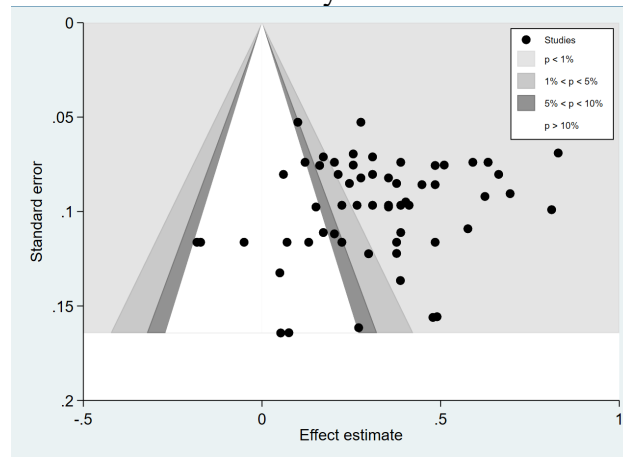
<sup>c</sup> Degrees of freedom <4, thus the associated *p*-value is unstable.



a. Overall outcomes



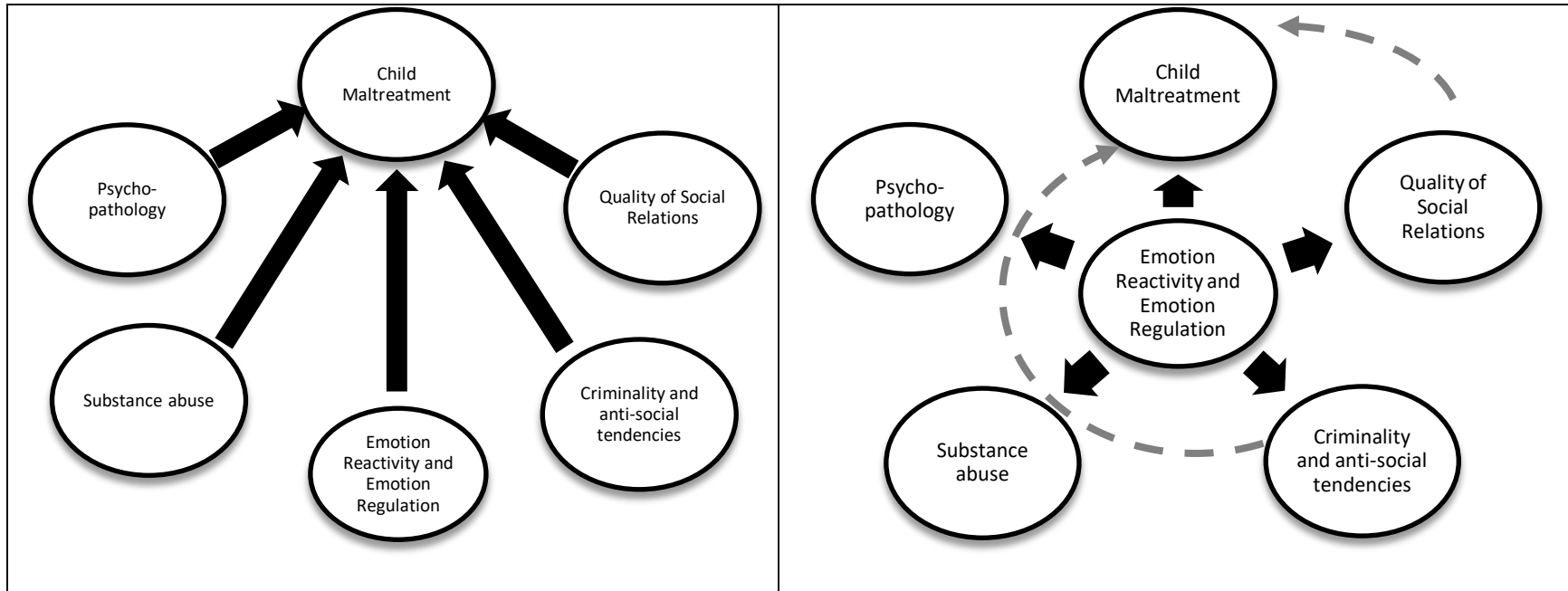
b. Reactivity outcomes



c. Regulation outcomes

Figure 1. Funnel plot of effect sizes.





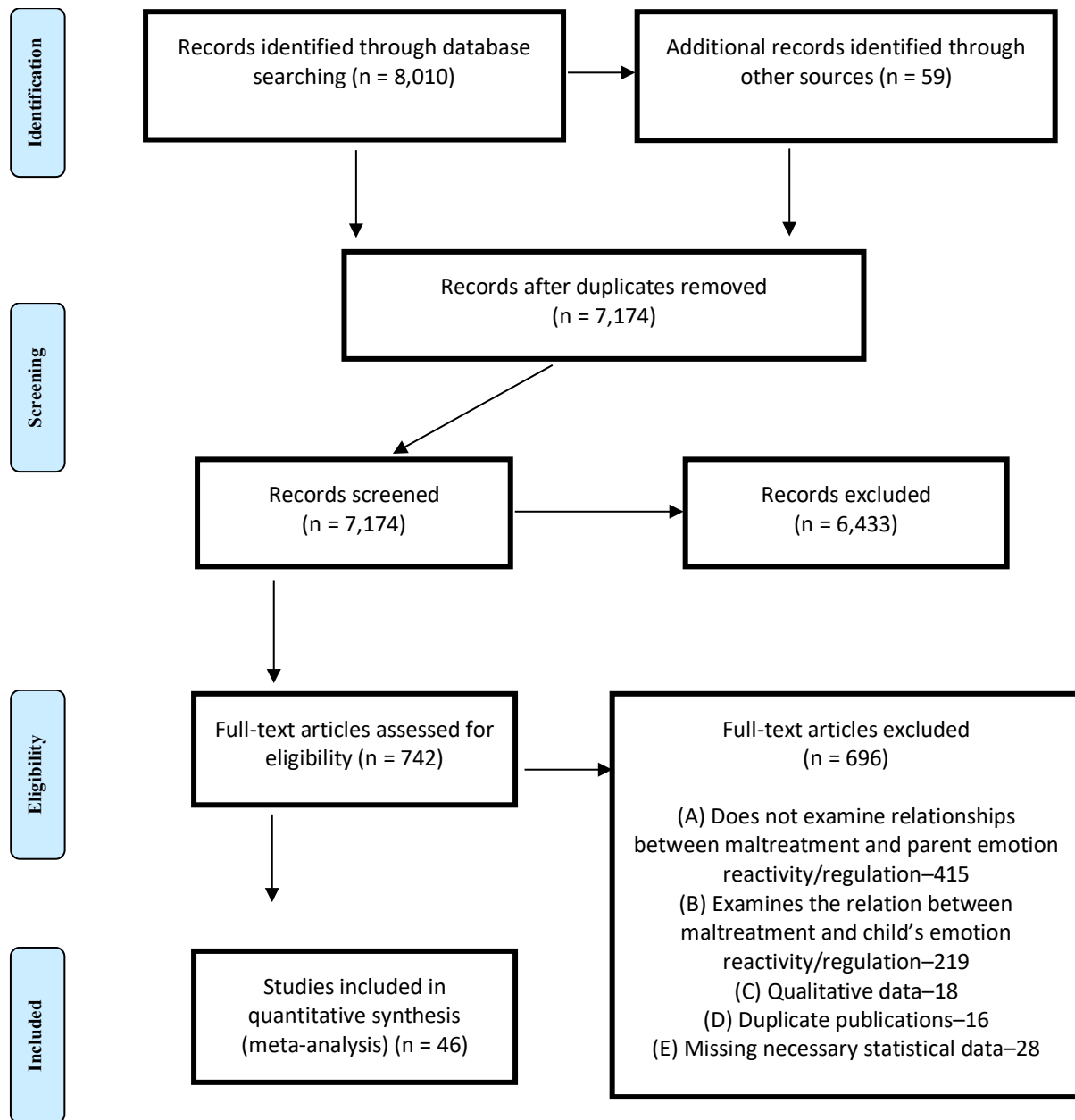
**A. Traditional model of child maltreatment risk factors**

**B. Suggested model of the emotion reactivity and emotion regulation basis of child maltreatment and related phenomena**

*Figure 2. An Emotion Regulation Perspective of Child maltreatment*

**Appendix A**

Prisma diagram mapping the location and inclusion of studies



Flow diagram for location of papers, based on the Prisma guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009).

**Appendix B**

## Correlation Matrix

	1	2	3	4	5	6	7	8	9
1) Outcome category	1								
2) z	-0.22*	1.00							
3) Maltreatment type	-0.08	0.18*	1.00						
4) Parent gender	0.01	-0.10	-0.06	1.00					
5) Maltreatment self-reported	0.44*	-0.23*	-0.10	0.40*	1.00				
6) Percentage of mothers	-0.13	0.13	-0.08	-0.55*	-0.24*	1.00			
7) Percentage of fathers	0.14	-0.13	0.08	0.55*	0.24*	-1.00*	1.00		
8) Families have children	0.06	-0.14	-0.07	0.12	0.31*	-0.23*	0.23*	1.00	
9) Geographical location	0.24*	-0.38*	-0.02	0.11	0.45*	-0.03	0.03	0.16	1.00
10) Sexual abuse included	-0.20*	0.19*	0.38*	-0.09	-0.25*	0.03	-0.03	-0.08	0.09
11) Correlational study	0.37*	-0.17*	-0.04	0.32*	0.89*	-0.26*	0.26*	0.34*	0.41*
12) CAPI	0.34*	-0.10	-0.29*	0.27*	0.68*	-0.14	0.14	0.06	0.16
13) Parent age	0.15	0.02	-0.21*	0.29*	0.14	-0.38*	0.38*	-0.37*	0.01
14) Parent age SD	-0.03	-0.05	-0.11	0.40*	0.20*	-0.28*	0.28*	-0.16	0.11
15) Child age	0.09	0.12	-0.18	0.18	-0.05	-0.11	0.11	-0.39*	0.18
16) Child age SD	-0.24*	0.12	-0.30*	-0.01	-0.44*	0.16	-0.16	-0.39*	-0.03
17) Percentage of boys	-0.09	-0.07	-0.08	0.60*	-0.07	-0.05	0.03	<0.01	0.09

	10	11	12	14	15	16	17	18
1) Outcome category								
2) z								
3) Maltreatment type								
4) Parent gender								
5) Maltreatment self-reported								
6) Percentage of mothers								
7) Percentage of fathers								
8) Families have children								
9) Geographical location								
10) Sexual abuse included	1.00							
11) Correlational study	-0.23*	1.00						
12) CAPI	-0.22*	0.67*	1.00					
13) Parent age	-0.12	0.11	0.23*	1.00				
14) Parent age SD	-0.02	-0.03	0.21*	0.43*	1.00			
15) Child age	0.25*	-0.05	0.05	0.79*	0.39*	1.00		
16) Child age SD	0.09	-0.40*	-0.19	0.12	-0.09	0.49*	1.00	
17) Percentage of boys	-0.04	-0.06	-0.08	0.36*	0.40*	0.40*	0.12	1.00

\*  $p < .05$ .

*Note:* Outcome category: Reactivity-Behavior-Aggression, Reactivity-Behavior-Anger, Reactivity-Behavior-High negative affect, Reactivity-Behavior-Low positive affect, Reactivity-Experience-Anger, Reactivity-Experience-High negative affect, Reactivity-Experience-Low positive affect, Reactivity-Physiology, Dysregulation-Regulation, Dysregulation-Coping, Dysregulation-Problem Solving, Dysregulation-Impulsivity;  
Maltreatment self-report: no=0, yes=1; Families have children: yes=0, no=1; Sexual abuse included: no sexual abuse=0; has sexual abuse=1; Correlational study: no=0, yes=1; CAPI: no=0; yes=1; Papers by Rodriguez: no=0, yes=1.

## Appendix C

Measures of child maltreatment, emotion reactivity, and emotion regulation used by reviewed studies

Scale	Scale reference	Used in study
<b>Maltreatment scales</b>		
AAPI-2 - Adult-Adolescent Parenting Inventory-2	(Bavolek & Keene, 2001)	(Rodriguez et al., 2015) (Rodriguez, Smith, et al., 2016) (Rodriguez et al., 2018) (Rodriguez et al., 2020)
BCAPI - Brief Child Abuse Potential Inventory	(Ondersma, Chaffin, Mullins, & LeBreton, 2005)	(Miller & Azar, 2019)
CAPI - Child Abuse Potential Inventory	(Milner, 1986)	(Conyngham, 2003) (Crouch et al., 2018) (Crowe & Zeskind, 1992) (Dadds et al., 2003) (Dittrich et al., 2018) (Finzi-Dottan & Harel, 2014) (Henschel et al., 2014) (Laud, 1997) (Lowell & Renk, 2017) (Miragoli et al., 2020) (Powers et al., 2020) (Rodriguez & Green, 1997) (Rodriguez, 2006) (Rodriguez & Richardson, 2007) (Rodriguez, 2008) (Rodriguez, 2009) (Rodriguez, 2010) (Rodriguez, Gracia, et al., 2016) (Rodriguez, Smith, et al., 2016) (Rodriguez et al., 2020) (Rodriguez et al., 2018) (Skowron & Platt, 2005) (Smith et al., 2014) (Springer, 2001)
CTS-PC - Parent-Child Conflict Tactics Scale <sup>6</sup>	(Straus et al., 1998)	(McGinn, 2014)

<sup>6</sup> The CTS has two version, the one cited here is the version measuring violence against a partner in a dating or marital relationship (Straus, 2007).

Scale	Scale reference	Used in study
		(Plate et al., 2019) (Rodriguez & Richardson, 2007)
MCS - Maltreatment Classification System	(Barnett et al., 1993)	(Wells et al., 2019)
Welfare report / substantiated maltreatment cases (exclusively or in addition to other measures)	None	(Bousha & Twentyman, 1984) (Cataldo, 1997) (Dadds et al., 2003) (De Bellis et al., 2001) (Deyoung, 1994) (Edwards et al., 2005) (Francis & Wolfe, 2008) (Graham et al., 2001) (Johnson, 1996) (Koenig et al., 2000) (Lesnik-Oberstein et al., 1995) (Maughan & Cicchetti, 2002) (McGinn, 2014) (Oates et al., 1985) (Oldershaw et al., 1989) (Pidgeon & Sanders, 2009) (Robinson et al., 2009) (Shipman, 1990) (Shipman & Zeman, 2001)
<b>Reactivity - Behavior</b>		
<b>Aggression</b>		
16PF - 16 Personality Factor Test	(Cattell et al., 1970)	(Oates et al., 1985)
CTS - Conflict Tactics Scale <sup>7</sup>	(Straus, 1979)	(Lesnik-Oberstein et al., 1995) (Maughan & Cicchetti, 2002)
FHRDC - Family History-Research Diagnostic Criteria-aggression	(Andreasen, Rice, Endicott, Reich, & Coryell, 1986)	(De Bellis et al., 2001)
IL - Interactional Language	(Baldwin & Ward, 1973)	(Bousha & Twentyman, 1984)
PRF-E - Personality Research Form-E	(Jackson, 1974)	(Deyoung, 1994)
<b>Anger</b>		
BDHI - Buss-Durkee Hostility Inventory	(Buss & Durkee, 1957)	(Rodriguez, 2010)
P-CIP - Parent-child interaction procedure	(Crowell & Feldman, 1988; Heller et al., 1998)	(Robinson et al., 2009)

<sup>7</sup> The CTS has two version, the one cited here is the version measuring maltreatment of a child by parents (Straus, 2007).

Scale	Scale reference	Used in study
STAXI - State-Trait Anger Expression Inventory	(Spielberger, 1988)	(Rodriguez & Green, 1997) (Rodriguez & Richardson, 2007) (Rodriguez, 2008) (Rodriguez, Gracia, et al., 2016)
STAXI-2 - State-Trait Anger Expression Inventory-2	(Spielberger, 1998)	(Francis & Wolfe, 2008) (Pidgeon & Sanders, 2009) (Plate et al., 2019)
<b>High Negative Affect</b>		
BO - Behavioral Observations	(Oldershaw, Walters, & Hall, 1986)	(Oldershaw et al., 1989)
CBAT-FOS - Child behavior attribution test	(Sanders, Dadds, & Bor, 1989)	(Dadds et al., 2003)
CCS - Cleanup coding systems	(Kochanska & Aksan, 1995; Kochanska, Aksan, & Koenig, 1995)	(Koenig et al., 2000)
HDHQ - Hostility and Direction of Hostility Questionnaire	(Caine, Foulds, & Hope, 1967)	(Lesnik-Oberstein et al., 1995)
<b>Low Positive Affect</b>		
BO - Behavioral Observations	(Oldershaw et al., 1986)	(Oldershaw et al., 1989)
CBAT-FOS - Child behavior attribution test	(Sanders et al., 1989)	(Dadds et al., 2003)
CCS - Cleanup coding systems	N/A	(Koenig et al., 2000)
P-CIP - parent child interaction procedure	(Crowell & Feldman, 1988; Heller et al., 1998)	(Robinson et al., 2009)
<b>Reactivity–Experience</b>		
<b>Anger</b>		
ACMB - Attributions about Child Misbehavior	(Graham et al., 2001)	(Graham et al., 2001)
ASQ - Ambiguous Situation Questionnaire	(Springer, 2001)	(Springer, 2001)
CBAT - Child behavior attribution test	(Dadds et al., 2003)	(Dadds et al., 2003)
STAXI - State-Trait Anger Expression Inventory	(Spielberger, 1988)	(Rodriguez, 2006)

<b>Scale</b>	<b>Scale reference</b>	<b>Used in study</b>
STAXI-2 - State-Trait Anger Expression Inventory-2	(Spielberger, 1998)	(Francis & Wolfe, 2008) (Pidgeon & Sanders, 2009)
<b>High Negative Affect</b>		
BDHI - Buss-Durkee Hostility Inventory	(Buss & Durkee, 1957)	(Rodriguez, 2010)
CBAT - Child behavior attribution test	(Dadds et al., 2003)	(Dadds et al., 2003)
DES-IV - Differential Emotions Scale - IV	(Blumberg & Izard, 1985; Izard, Dougherty, Bloxom, & Kotsch, 1974)	(Edwards et al., 2005) (Shipman, 1990)
ERQ - Emotional Reaction Questionnaire Batson	(Batson & Coke, 1981; Batson, Duncan, Ackerman, Buckley, & Birch, 1981; Batson, O'Quin, Fultz, Vanderplas, & Isen, 1983)	(Johnson, 1996)
FDS - Frustration Discomfort Scale	(Harrington, 2005)	(Rodriguez et al., 2020)
FHRDC - Family History-Research Diagnostic Criteria–negative affect	(Andreasen et al., 1986)	(De Bellis et al., 2001)
FIT - Frustration Intolerance Task	(McElroy & Rodriguez, 2008)	(Rodriguez et al., 2015)
MAACL-R - Multiple Affect Adjective Checklist - Revised	(Zuckerman, Lubin, & Rinck, 1983)	(Johnson, 1996)
NAS - Negative affect scale	(Stokes & Levin, 1990)	(Laud, 1997)
PANAS - Positive and Negative Affect Schedule	(Watson, Clark, & Tellegen, 1988)	(Conyngham, 2003)
PANAS-X - Positive and Negative Affect Schedule	(Watson & Clark, 1994; Watson et al., 1988)	(Smith et al., 2014) (McGinn, 2014)
<b>Low Positive Affect</b>		
CBAT - Child behavior attribution test	(Dadds et al., 2003)	(Dadds et al., 2003)
DOTS-R - Dimensions of Temperament Scale-Revised for Adults	(Windle & Lerner, 1986)	(Lowell & Renk, 2017)
ERQ - Emotional Reaction Questionnaire	(Batson & Coke, 1981; Batson et al., 1981; Batson et al., 1983)	(Johnson, 1996)



<b>Scale</b>	<b>Scale reference</b>	<b>Used in study</b>
MAACL-R - Multiple Affect Adjective Checklist - Revised	(Zuckerman et al., 1983)	(Johnson, 1996)
PANAS - Positive and Negative Affect Schedule	(Watson et al., 1988)	(Conyngham, 2003)
PANAS-X - Positive and Negative Affect Schedule - Extended	(Watson & Clark, 1994; Watson et al., 1988)	(McGinn, 2014)
<b>Physiology</b>		
<b>Heart rate measures</b>		
Change in heart rate	N/A	(Crowe & Zeskind, 1992)
Resting heart rate	N/A	(Crouch et al., 2018)
Task heart rate	N/A	(Crowe & Zeskind, 1992) (Crouch et al., 2018)
<b>RSA measures</b>		
Resting RSA	N/A	(Crouch et al., 2018)
Task RSA	N/A	(Crouch et al., 2018)
RSA	N/A	(Wells et al., 2019)
	N/A	(Wells et al., 2019)
	N/A	(Wells et al., 2019)
<b>Skin conductance measures</b>		
Skin conductance level	N/A	(Crowe & Zeskind, 1992)
<b>Dysregulation</b>		
<b>General Dysregulation</b>		
DERS - Difficulties in Emotion Regulation Scale	(Deegener, Spangler, Körner, & Becker, 2009; Gratz & Roemer, 2004)	(Dittrich et al., 2018)
		(Lowell & Renk, 2017)
		(Miragoli et al., 2020)
		(Powers et al., 2020)
ECQ - Emotional Control Questionnaire	(Roger & Najarian, 1989)	(Finzi-Dottan & Harel, 2014)
EDS - Emotional Dysregulation Scale	(Bradley et al., 2011)	(Smith et al., 2014)
ERQ - Emotion Regulation Questionnaire	(Gross & John, 2003)	(Lowell & Renk, 2017)
NMRS - Negative Mood Regulation Scale	(Catanzaro & Mearns, 1990)	(Rodriguez et al., 2018)

<b>Scale</b>	<b>Scale reference</b>	<b>Used in study</b>
		(Rodriguez, Smith, et al., 2016) (Rodriguez et al., 2020)
<b>Dysfunctional Coping</b>		
CRI - Coping Responses Inventory	(Moos, 1993)	(Rodriguez, 2009) (Rodriguez, 2010)
CSES - Coping Self-Efficacy Scale	(Chesney, Neilands, Chambers, Taylor, & Folkman, 2006)	(Rodriguez et al., 2018)
EMI-M - Emotion Management Interview	(Shipman & Zeman, 1999)	(Shipman & Zeman, 2001)
WOC - Ways of Coping Questionnaire	(Folkman & Lazarus, 1985)	(Lowell & Renk, 2017)
<b>Dysfunctional Problem Solving</b>		
PPSM - Parental Problem-Solving Measure	(Hansen, 1989)	(Cataldo, 1997)
PS - Problem Solving	(Wasik & Bryant, 1994)	(Miller & Azar, 2019)
PSI - Problem Solving Inventory	(Heppner, 1988; Heppner & Petersen, 1982)	(Skowron & Platt, 2005)
SPSI-RPS - General Problem-Solving - Rational Problem-Solving	(D'Zurilla, Nezu, & Maydeu-Olivares, 1994)	(Cataldo, 1997)
<b>Impulsivity</b>		
16PF - 16 Personality Factor Test	(Cattell et al., 1970)	(Oates et al., 1985)
MBM - Machismo Behavior Measure	(Deyoung & Zigler, 1993)	(Deyoung, 1994)
PIS - Plutchick Impulsivity Scale	(Plutchik & Van Praag, 1989)	(Rodriguez, Gracia, et al., 2016)
PRF-E - Personality Research Form-E	(Jackson, 1974)	(Deyoung, 1994)
SCS - Self-Control Scale	(Tangney, Baumeister, & Boone, 2004)	(Henschel et al., 2014)
SPSI-ICS - General Problem-Solving - Impulsivity/Carelessness	(D'Zurilla et al., 1994)	(Cataldo, 1997)