Getting to the heart of child maltreatment : a multidimensional investigation using an extended family design

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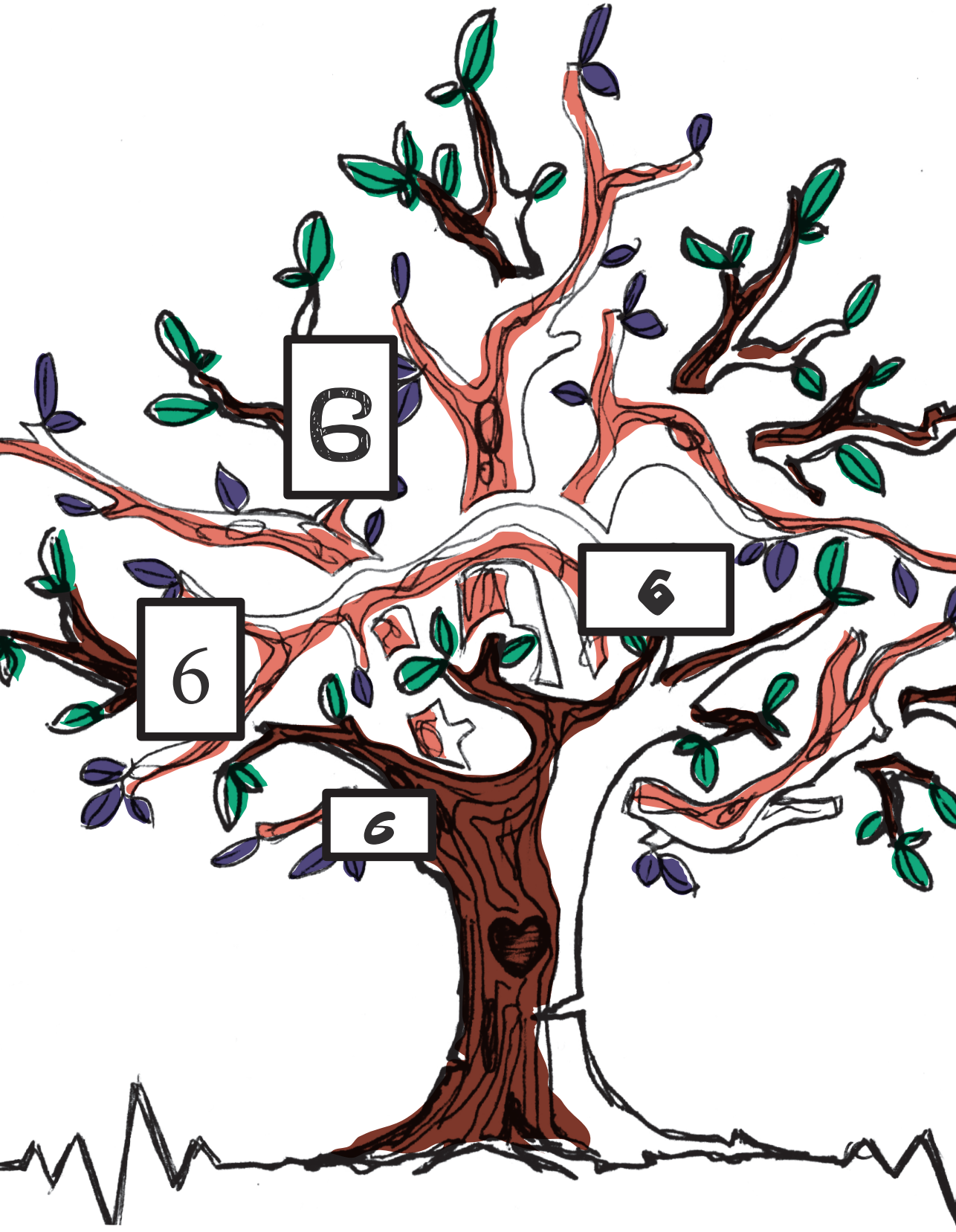
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Chapter 6

General discussion

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The aim of this dissertation was to gain more insight into the etiology and sequelae of child maltreatment using a multidimensional multi-method investigation in extended families. First, we examined the intergenerational transmission of child maltreatment (ITCM) with a central focus on the role of reporter effects. A principal-component-analytic approach that combined father, mother and child reports was used to test ITCM. This approach was compared to two more common approaches: ITCM based on one reporter and ITCM based on different reporters from each generation. Intergenerational transmission of abuse was consistently found across approaches, whereas intergenerational transmission of neglect was only found using the perspective and data of one single reporter (Chapter 2).

In the next chapters we zoomed in on antecedents and consequences of child maltreatment that might play a role in ITCM, and examined these in several (pseudo-) parenting contexts. Findings showed that parents' perceptions of infant emotional sounds did not differ according to their childhood maltreatment experiences. However, childhood maltreatment experiences were associated with parents' behavioral and autonomic responses in the parenting context (Chapters 3 and 4). First, higher levels of neglect were related to using more handgrip force during infant crying and using less handgrip force during infant laughter. In addition, parents who experienced higher levels of childhood neglect exhibited elevated autonomic activity during baseline, during listening to infant emotional signals, and while discussing conflict with their offspring. Parents who experienced higher levels of abuse showed more warmth and less negativity while discussing conflict with their offspring.

Besides focusing on correlates of child maltreatment at the individual (i.e., parent) level, we also focused on correlates of child maltreatment in the family context. Results demonstrated that parent-offspring interactions were less similar in dyads characterized by higher levels of neglect, and more similar in dyads characterized by higher levels of abuse. Family cohesion was not associated with child maltreatment (Chapter 5).

In the following sections we will elaborate on the differential results that were found for child abuse and neglect, on including a multilevel perspective in child maltreatment research, and on the utility of advanced statistical techniques in answering complex research questions in our field. Limitations and directions for future research and interventions will also be discussed.

Measurement of abuse and neglect and the intergenerational transmission

Among the many deleterious consequences, one subsumed consequence of child maltreatment is that victims may themselves become perpetrators of child maltreatment. The "cycle of maltreatment" hypothesis (Thornberry, Knight, & Lovegrove, 2012) has been extensively discussed and examined in the past few decades. Although the majority of research has found evidence in support of the intergenerational maltreatment hypothesis, transmission is by no means inevitable (Madigan et al., 2019). Rates of transmission vary considerably across studies: the percentage of maltreated children who become maltreating parents varies from 6.7 to 40% (Dixon et al., 2005; Egeland, Jacobvitz & Sroufe, 1988; Pears & Capaldi, 2001). Variation in transmission rates can be due to methodological biases, including poor operational definitions of maltreatment, single informants for the assessment of maltreatment in different generations, and an absence of prospective studies. Findings from a systematic review suggest that there is less evidence for the "cycle of maltreatment" hypothesis in studies with higher methodological rigor (Thornberry et al., 2012). Yet, a recent meta-analysis of ITCM studies (Madigan et al., 2019) revealed that solely the effect size for the transmission of physical abuse decreased with increasing study quality, but there was little indication that study methodological quality affected effect sizes for the transmission of other types of maltreatment.

One methodological aspect of ITCM was addressed in the current dissertation: the use of single-informant vs. multi-informant approaches. Intergenerational transmission of abuse was consistently found across approaches – from the perspective of one reporter, from the perspective of different reporters from each generation and with a component-analytical approach that combined father, mother and child reports. Yet, intergenerational transmission of neglect was only found using a single informant for the assessment of maltreatment in different generations. Because including multiple perspectives may increase validity due to reduction of random error and systematic bias (Thornberry et al., 2012), the validity of transmission of neglect may be called into question. Our finding that transmission of neglect was only found using a less rigorous method, whereas transmission of abuse was found across methods, may seem to deviate from the finding of the meta-analysis of Madigan and colleagues' (2019) that effect sizes weakened for the transmission of physical abuse with increasing study quality. However, we only investigated one methodological aspect, i.e., using single vs. multiple informants. This aspect may be particularly relevant when comparing transmission rates of abuse and neglect. Abuse describes the presence of behavior whereas neglect describes the absence of behavior. It is possible to estimate the presence of behavior without judging its adequacy (e.g., My mother/ father shouted, yelled or screamed at me), whereas estimating the absence of behavior requires a judgment whether the behavior should have been present (e.g., My father/mother was not able to make sure that I got to the doctor or hospital when needed).

Hence, the measurement of neglect might be more subjective than the measurement of abuse, resulting in more disagreement between parents and children, which complicates combining their scores. Although research has shifted more towards studying neglect, continued efforts are needed to improve its assessment.

Finally, it is worth noting that there is no perfect measure or method that can completely and correctly identify all types of maltreatment. Error or "noise" is common in all scientific methods, and perhaps even more common in a field examining such a sensitive phenomenon as child maltreatment. The data-driven approach (i.e., PCA) that we used to combine reports of multiple informants, therefore, should not be viewed as the "single best method" to estimate child maltreatment, rather as a method to combine reports of different informants that also takes the unique perspectives of informants into account. For a component reflecting abuse, similar weights were obtained for child, father and mother reports. This indicates that the score on this component was virtually equivalent to a mean score of the three reporters. Thus, for researchers primarily interested in a combined multi-informant score of abuse a mean score may suffice. For the component reflecting convergence on neglect, child report was given less weight, because disagreement between child and parent reports was higher than disagreement between father and mother reports. Yet, theoretically, there seems little reason to give child reports less weight than parent reports when estimating the occurrence of child maltreatment. Ultimately, decisions on the method of combining maltreatment reports should be guided by the specific research question. For research questions that underlie a hypothetical process, a theory-driven approach might be more appropriate than a data-driven approach to combine informants.

Differential correlates of abuse and neglect

We distinguished between abuse and neglect when examining the antecedents and consequences of child maltreatment. Results suggest that abuse (i.e., the *commission* of inadequate care) is more strongly associated with behavioral responses, whereas neglect (i.e., the *omission* of adequate care) is more strongly associated with physiological responses.

Parents who experienced higher levels of childhood neglect showed autonomic *hyper*-(re)activity during baseline, during listening to infant emotional signals, and while discussing conflict with their offspring. One possible explanation for these findings may be that neglect is – even more so than abuse – a pervasive chronic stressor that jeopardizes adequate functioning of the autonomic nervous system (De Bellis, 2005). Recurrence of neglect has been shown to be higher than recurrence of abuse (Jonson-Reid, Drake, Chung, & Way, 2003; Lipien & Forthofer, 2004), and neglect seems more intractable to intervention (i.e., MacMillan et al., 2005). Hence, neglect is often described as a chronic problem that is difficult to resolve (Hildyard & Wolfe, 2002). Exposure to a chronic stressor, such as

neglect, may cause dysregulation of physiological systems, i.e., allostatic load (Danese & McEwen, 2012) resulting in *hyper*-(re)activity of the autonomic nervous system (ANS) – as was found in the current dissertation. Interestingly, similar patterns of autonomic *hyper*-reactivity to stressors have been found in foster children who experienced chronic neglect (Oosterman, Schipper, Fisher, Dozier, & Schuengel, 2010) and children who were adopted out of institutions - which can be considered an extreme form of neglect (Gunnar, Frenn, Wewerka, & Ryzin, 2009). Yet, elevated ANS activity has also been associated with a history of childhood abuse (e.g., Heim, 2000). However, neglect was not statistically controlled for in the analyses, making it unclear to what extent neglect may have accounted for this association. Moreover, although neglect often involves chronic situations (Hildyard & Wolfe, 2002; Lipien & Forthofer, 2004), abuse may also follow a chronic pattern. To date, there is no other research that examined the unique effects of both abuse and neglect on ANS reactivity within the same study. Our findings need to be replicated in future studies that also take maltreatment chronicity into account, to confirm and understand the differential consequences of abuse and neglect on ANS functioning.

We also demonstrated that parents who experienced higher levels of abuse were less warm and more negative while discussing conflict with their offspring. Lower levels of warmth and higher levels of negativity, in turn, were shown to be associated with parental abusive behavior. Contrary to neglect, abuse may be more strongly associated with the behavioral system via the learning of maladaptive behavioral patterns. According to social learning theory (Bandura, 1973), individuals learn to exhibit aggressive behaviors because they observe others acting aggressively and because they are positively reinforced when exhibiting aggressive behaviors. Such an aggressive interpersonal style may also translate into a set of parenting beliefs or behaviors likely to be transmitted from one generation to the next. This, however, may apply less to behaviors that are more automatically controlled. For example, we also found that neglect, but not abuse, was associated with the modulation of handgrip force while listening to infant crying and laughter. Modulation of handgrip force can be considered a form of unconscious behavior difficult to control or to model.

Finally, our findings may also indicate that parents with childhood experiences of abuse or neglect are more likely to engage in that same type of maltreating behavior towards their own offspring, referred to as homotypic intergenerational continuity of maltreatment (Madigan et al., 2019). Parents who experienced more childhood abuse displayed less warm and more negative behavior towards their offspring, which is typically also observed in abusive parents (e.g., Borrego, Timmer, Urquiza, & Follette, 2004; Wilson, Rack, Shi, & Norris, 2008). The transmission of neglectful behavior, on the other hand, may be more difficult to observe. Neglectful parents are generally characterized by a lack of involvement (Wilson, et al., 2008), which might be unobservable during a task where they are "forced" to interact with their offspring. Instead, these parents may experience more stress as a result, which may - in part - explain their elevated ANS response.

A multiple-levels-of-analysis perspective on child maltreatment

In the current series of studies we concurrently examined cognitive-affective, physiological, behavioral, and family environmental processes aiming to gain more insight into the complex nature of child maltreatment. During a standardized handgrip paradigm parents' perceptions, behavior and ANS functioning while listening to infant crying and laughter were simultaneously examined. As described and explained above, higher levels of neglect were associated with stronger ANS responses while listening to infant cry and laughter sounds. In addition, higher levels of neglect were related to more handgrip force during infant crying and less handgrip force during infant laughter. However, parents' appraisals of infant emotional signals did not vary as a function of their maltreatment experiences. In addition, parents' appraisals of infant crying and laughter were not correlated with their autonomic and behavioral responses to these infant emotional sounds. Together, these findings indicate that the effects of maltreatment on emotional responding to infant signals operate mainly at an unconscious level. Thus, parents who experienced higher levels of childhood neglect seem unaware of their physiological and behavioral responses elicited by infant emotional signals.

In addition, findings indicated that parents' history of neglect may affect their ANS responses. Physiological regulation, in turn, has been postulated to underlie parental behavior responses (e.g., Bridges, 2008) but our data supported this only to some extent. No correlations were found between parental behavioral responses and their ANS reactivity to infant emotional signals. Moreover, parasympathetic nervous system (PNS) reactivity was only associated with negativity, but not with warmth or emotional support, such that parents who exhibited *decreased* PNS reactivity showed more negativity while discussing conflict with their offspring. This finding was unexpected, since *increased* PNS reactivity (i.e., vagal withdrawal) is generally assumed to accompany negative emotional states (Beachaine, 2001). Indeed, in the parenting context, increased PNS withdrawal has been found in parents who displayed more negative behavior, i.e., use of harsh discipline, towards their offspring (Lorber & O'Leary, 2005). Nevertheless, PNS withdrawal has also been found in mothers displaying less negative (i.e., intrusive) behavior but only among mothers with high cortisol levels (Mills-Koonce et al., 2005). PNS withdrawal may have protected parents from displaying negative behavior when they experience either chronic or acute stress. This hypothesis could not be tested in our study as we did not measure cortisol. Future studies could consider using markers of both ANS and HPA-axis reactivity to disentangle associations between biological systems and parenting behaviors. We also explored if ANS reactivity mediated the association between neglect and behavioral responses. Results revealed that this was not the case, indicating that ANS activity was not a mechanism underlying the effects of childhood maltreatment on parenting behavior. Because parenting is a complex of multiple behaviors, cognitions, and emotions involving multiple neural circuits (Kohl, Autry, & Dulac, 2017) assessing markers

of multiple physiological systems is needed to fully explain how parents' biology shapes their parenting behavior.

Although our examination of the biological underpinnings of child maltreatment was limited to one physiological system (i.e., the ANS), we did examine multiple autonomic measures to clarify the concept of autonomic arousal. First, we included both measures of the sympathetic (SNS) and PNS. Overall, findings of Chapter 4 suggest that both the PNS and SNS are affected by childhood maltreatment, such that parents who experienced higher levels of neglect exhibited more PNS withdrawal and greater SNS activity in a stressful parenting context, indicative of autonomic *hyper*-reactivity. Interestingly, similar patterns of ANS reactivity have been found when participants with a history of childhood maltreatment reacted to psychosocial stressors in general (Heim et al., 2000; Dale et al., 2009). In addition, we distinguished between so-called trait-related (measured during rest) and state-related (measured during a task) measures of ANS activity. Parents who experienced higher levels of childhood neglect also exhibited higher basal ANS activity, indicative of elevated autonomic arousal regardless of the specific demands of the environment. Whereas ANS reactivity indicates how an individual responds to a stressor, i.e., a state, sustained autonomic activation is assumed to more generally reflect the capacity to regulate emotions, i.e., a trait (Brosschot et al., 2005; Reijman et al., 2016).

Finally, child maltreatment was examined in the context of the family. In line with previous studies (Wilson et al., 2008; Cerezo & D'Ocon, 1999) we found that not only parents but also their offspring communicated more negatively in parent-offspring dyads marked by higher levels of child abuse. This may suggest that child abuse is part of an overall distorted parent-offspring relationship, rather than limited to occasional incidents of inadequate parenting behavior. In line with previous studies (Giuliano, Skowron, & Berkman, 2015; Skowron, Kozlowski, & Pincus, 2010), parents and offspring also showed more interactive affective mismatch, i.e., higher dyadic affective dissimilarity, in dyads marked by higher levels of neglect. Yet, unexpectedly, dyadic affective similarity was higher in dyads marked by higher levels of abuse. A scatter plot (see Supplementary material, Figure S5.1) revealed that parents who perpetrated low levels of abuse communicated more positively than their offspring but the difference in communication between parents and offspring decreased with increasing levels of abuse. It might be that non-maltreating parents are more skilled in maintaining a positive stance to keep the interaction positive despite negative behavior of their offspring, whereas maltreating parents are more reactive to offspring's displays of negativity. Indeed, research has shown that abusive parents are *hyper*-reactive to aversive behavior displayed by their children and become more easily annoyed than non-maltreating and neglectful parents (Bousha & Twentyman, 1984).

Because we examined both maternal and paternal interactions with offspring spanning a wide age range, we also explored moderating effects of gender and age. Interestingly, none were found, indicating that the association between child maltreatment and parent-

offspring interactions is not different for fathers or mothers, and may not be dependent on whether the maltreatment happened recently or has happened several years ago. The latter finding seems particularly worrisome, considering that the parent-offspring relationship not only provides the foundation for future relationships (e.g., Bowlby, 1969), but in general also continues to play an important role during adulthood (Van Wel, Linssen, & Abma, 2000). Finally, although we observed more positive parent-offspring interactions in more cohesive families, family cohesion was not associated with child maltreatment. This indicates that family cohesion might still be intact despite incidences of child maltreatment within specific parent-offspring dyads in the family. However, we also consider it a possibility that we failed to observe lower family cohesion in families marked by higher levels of child maltreatment, because observations of cohesion in the least cohesive families were not included. During data-collection, we noticed that with some families it was impossible to schedule all family members on the same day , which may indicate reluctance among certain family members to enter the laboratory together.

Advanced statistical techniques in child maltreatment research

Studying the complex multidimensional nature of child maltreatment is methodologically challenging and goes hand in hand with the application of more complex research designs. Although their use is far from being standard practice in the child maltreatment field, advanced statistical techniques, which increasingly become available, may offer solutions to these methodological challenges.

First, our three-generational extended family design enabled us to examine family-level correlates of child maltreatment. Yet, the family represents a complex, hierarchical structure in which multiple children and parents from the same family are not independent from one another. Ignoring the family level, and conducting the analysis at the parent or child level, might result in underestimation of the standard errors of regression coefficients leading to invalid statistical inferences. Moreover, if the family-unit is left out of the model, important questions about family contextual effects cannot be explored (Jenkins, Rasbash, & O'Connor, 2003). Despite the recognized importance of incorporating family system notions into child maltreatment research and practice (e.g., Cicchetti & Toth, 1995), few studies have actually assessed family context effects. We, therefore, explicitly modelled family level effects using modern multilevel modelling techniques. Multilevel models, also known as random effects models and hierarchical linear models provide a flexible regression modelling framework for handling data sampled from clustered population structures (Hox, 2002). In addition, in one of our studies we investigated the association between child maltreatment and parent-offspring interactions including multiple parents and multiple offspring, which enabled us to examine the similarity in parenting behavior across siblings and across parents. In doing so, we added another complexity to the data structure, since offspring were nested within parents (parents participated with multiple

offspring) and parents were nested within offspring (offspring participated with father and mother), implying multiple crossed random effects. In the past it was difficult to fit mixed models with multiple, crossed grouping factors to relatively large, unbalanced, data sets. However, with the methods in the lme4 package (Bates, Maechler, Bolker, & Walker (2015) for R (R Core Team, 2018) we were able to do this. Considering the rapid development and availability of specialized multilevel modeling techniques, there seems little reason for researchers in our field to refrain from investigating child maltreatment in the context of the family.

Furthermore, in the current dissertation correlates of maltreatment were assessed at multiple levels of functioning. First generation multivariate methods, like multiple regression, are appropriate for evaluating relations between constructs but do not allow simultaneous evaluation of different dependent variables. Evaluation has to be performed in sequential steps. Second generation multivariate methods, like Path Analysis, allow for the simultaneous analysis of the relations between dependent variables as well as between independent variables and dependent variables (Tabachnick & Fidell, 2001; Jeon, 2015). A second advantage of Path Analysis is, that it permits decomposing correlations among variables to enhance interpretation of relations and the pattern of the effects of one variable on another. A total effect, a direct effect and an indirect effect can be tested via mediation (Jeon, 2015). We used Path Analysis to examine the direct effects of childhood maltreatment on both autonomic and behavioral responses, and to explore an indirect effect of autonomic reactivity in the association between childhood maltreatment and behavioral responses. Fortunately, Path Analysis has become increasingly available for researchers since the introduction of software such as LISREL, AMOS, and R.

Finally, recruiting families is challenging which may result in moderate to high rates of missingness due to family members not willing or not able to participate. Yet, the risk of missingness should not withhold researchers from conducting family studies, since modern techniques for handling missing data such as Multiple Imputation (MI) offer compelling solutions. MI is considered the "gold standard" for handling missing data, because it produces less bias than other typical methods (Allison, 2002; Graham, 2009). MI has been shown to be statistically sound especially for large percentages of missing values as wider confidence intervals will be generated for variables with more missing data, avoiding the risk of false positives (Graham, 2006). While the use of MI appears to be on the rise (Sterne et al., 2009) it is far from common. Reviews of the handling of missing data in various fields showed that only a handful of studies used MI (i.e., Sullivan, Yelland, Lee, Ryan, & Salter, 2017; Rombach et al., 2016). While examining the role of reporter effects in ITCM, and parent-offspring interactions and child maltreatment in the context of the family, we were able to accurately impute data by means of MI – imputations converged across datasets and correlations between variables were approximately similar for non-imputed and multiply imputed data. Thus, examining family-level correlates of child maltreatment or

exploring reporter effects of ITCM does not require complete families. Yet, it is worth noting that MI is a complex time-consuming technique and there may be practical reasons not to perform MI. For example, when we investigated the role of childhood maltreatment in parents' responses to infant emotional signals we decided not to use MI, because whole trajectories of participants were missing, i.e., participants had missing data on all repeated measurements. It is impossible to predict someone's trajectory by means of predictors measured at one occasion, so MI, or any other imputation technique, was not deemed feasible. In addition, another sound imputation technique may be implemented in the analysis, making it unnecessary to perform MI. For example, we used Path Analysis to examine the association between a history of childhood maltreatment and parents' behavioral and autonomic responses while discussing conflict with their offspring. Path Analysis incorporates a Full Information Maximum Likelihood (FIML) estimation method. FIML handles missing data within the analysis model, rather than replacing or imputing the data. The model is estimated by a FIML method, meaning that all available information is used to estimate the model. MI and FIML have been shown to produce similar results when outcome data are missing and the same information is incorporated in a multiple imputation model as in a full information maximum likelihood estimation (Collins, Shafer & Kam, 2001). Lastly, when only a small amount of the data is missing (e.g., less than 5%), it can be questioned whether the benefits of using MI outweigh the costs.

General limitations

The research presented in this dissertation has some limitations. First, retrospective reports were used to measure maltreatment, which may be subject to measurement error and recall bias (Hardt & Rutter, 2004). Yet, it has been shown that false positives are rare in retrospective reports of child maltreatment, and retrospective and prospective reports are approximately similarly associated with psychopathology, indicating that reporting bias due to current psychopathology is minimal (Hardt & Rutter, 2004; Scott, McLaughlin, Smith, & Ellis, 2012). Moreover, whenever possible, we combined parent and child reports in the maltreatment scores reducing individual bias.

Second, the findings presented in this dissertation are correlational, precluding conclusions about causality. However, although causal inferences can be made from intervention studies with a prospective design, experimental research on humans that evoke child maltreatment is unethical.

Third, due to the three-generational design of our study, the age range of parents and offspring was quite large, limiting conclusion about the effects of maltreatment during specific developmental periods. In addition, we examined the association between parent-offspring interactions and child maltreatment, whereas the nature of parent-offspring relationships changes across the lifespan (Buhl, 2007; McGue, Elkins, Walden, & Iacono, 2005). Nevertheless, the *quality* of the parent-offspring relationship has been

shown to be quite stable across the lifespan (Belsky, Jaffee, Hsieh, & Silva, 2001; Dalton, Frick-Horbury & Kitzmann, 2006). An advantage of the design of the current study is that it allowed us to cover parenting experiences across the entire span of growing up for most participants. Lastly, age was included as a covariate in all of our analyses and age did not moderate our findings presented in Chapter 5, suggesting that the associations between child maltreatment and parent-offspring interactions are independent of offspring's age.

It is further of note that the current study is not representative of the general population. First, because we oversampled for child maltreatment to compensate for the potential underrepresentation of maltreating parents in general population sampling. Second, the majority of participants in our study were Caucasian. Findings presented in the current dissertation, therefore, require replication in different populations and different settings.

Recommendations for future research and interventions

Findings presented in this dissertation highlight the need for future research and interventions to distinguish between abuse and neglect, despite their high co-occurrence (Herrenkohl & Herrenkohl, 2009). Our findings suggest that neglect is more strongly associated with physiological responses, whereas abuse may be more strongly associated with behavioral responses. Replication in future studies that also include neurophysiological measures is needed to confirm and to further our understanding of the differential correlates of abuse and neglect. Meanwhile, our findings may provide a basis for more tailored interventions. Specifically, parents with a history of neglect could benefit from interventions based on bio-feedback to help them to become aware of their physiological responses and to successfully regulate these responses in order to promote sensitive parenting. In contrast, abusive parents and their offspring, and parents with a history of abuse may benefit more from interventions that directly target their behavioral responses, such as parent-child interaction therapy (e.g., Batzer et al., 2015).

Furthermore, it might be worthwhile to include multiple informants when examining child maltreatment to overcome reporter bias and to provide a more comprehensive picture. This may be particularity relevant when estimating ITCM, since reliance on a single reporter who reports on his/her own perpetration and on the perpetration of maltreatment by his/her parents obviously violates the basis assumption of all science that measures of the in independent and dependent variables are independent (i.e., Thornberry et al., 2012). However, in line with previous studies (e.g., Chan, 2015), we found modest convergence in child and parent perspectives on reported maltreatment. Yet, we would argue that precisely this divergence makes it relevant to include and to explore the role of multiple reporters, since different reports may lead to different conclusions (Kobulsky, Kepple, Holmes, & Hussey, 2017). When examining the role of reporter effects in ITCM different conclusion were reached for neglect (but not for abuse) when multiple reporters were included. However, similar associations were found between parents'

history of childhood maltreatment and their responses to infant emotional signals and offspring verbalizations for child and multi-informant reports. Thus, it may depend on the construct under evaluation whether single- or multi-informant methods produce different results. A better understanding of reporter effects also has practical implications. When deciding about interventions in case of maltreatment, such as out-of-home placements, professionals often take into account both parent and child reports in their decision making (Gilbert et al., 2009). Understanding the implications of parent-child convergence and divergence may support professionals in making more informed decisions.

Moreover, contrary to the majority of studies about child maltreatment that solely included mothers (e.g., Wilson et al., 2008), we included a relatively large number of fathers in our study. Hence, findings of the present dissertation can be generalized to *all* parents. While gender was included as a covariate in all of our studies, and gender effects were explored when examining child maltreatment in the context of the family, studying gender effects was not the main focus of our research. Because fathers' involvement in child care has continuously increased in many western countries the past few decades (Jones & Mosher, 2013; World Health Organization (2007), it would be of interest to examine the role of fathers in the etiology and sequelae of child maltreatment in more detail.

Finally, although we used a multidimensional multi-method investigation of child maltreatment to gain a more comprehensive understanding of child maltreatment, participants of the current study were evaluated at one point in time. Longitudinal research is needed to capture the dynamic nature of child maltreatment even better. Future research should consider to concurrently examine cognitive-affective, psychological, behavioral, and family processes and their interplay at various developmental periods to provide an integrative conceptualization of child maltreatment over the developmental course. In doing so, both protective and risk factors for a healthy development in the presence of significant adversity can be identified.

Concluding remarks

In the current series of studies, a multidimensional approach was used to investigate the antecedents and consequences of child maltreatment. Consistently different conclusions were reached for abuse and neglect. First, we found evidence of intergenerational transmission of abuse using both single- and multi-informant approaches. However, intergenerational transmission of neglect was only found when the same individual reported on experienced and perpetrated neglect, suggesting that the evidence of transmission of neglect is driven by dependency of the perceptions of one person. In addition, abuse (both experienced and perpetrated) was found to be more strongly associated with parents' behavioral responses, whereas experienced neglect was more strongly associated with parents' autonomic responses. These findings highlight the need to distinguish between abuse and neglect, both in research and in practice. Furthermore, we aimed to provide

a more integrative conceptualization of the antecedents and consequences of child maltreatment by concurrently examining processes at different levels of functioning (i.e., cognitive-affective, physiological, behavioral and family). Interestingly, for most part, parents' behavioral and autonomic systems were not interrelated. Continued efforts are needed in order to understand how parents' biology shapes their parenting behavior. For example, future research on child maltreatment could consider assessing multiple physiological systems and their interplay with behavior at varying developmental periods. Although we do acknowledge that including all levels of analysis within the same research design is not easy, interdisciplinary research incorporating neuroscience and developmental psychopathology is on the rise, facilitating a multidimensional developmental approach. Such an approach might not only be crucial for continued progress to take place in understanding the antecedents and consequences of child maltreatment, but also informs efforts to develop interventions that promote parental functioning.

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