Childhood Maltreatment as a Transdiagnostic Risk Factor for Psychopathology

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Abstract

Over the last decades, childhood maltreatment has emerged as a major risk factor for the development and maintenance of transdiagnostic psychopathology. Notably, higher prevalence rates of maltreatment have been found for nearly all mental disorders, with particularly high numbers for post-traumatic stress disorder, depression, borderline personality disorder and anxiety disorders. Furthermore, childhood maltreatment has been associated with an earlier onset of mental disorders, a more severe and chronic course of disease as well as reduced rates of psychological treatment benefit. However, the pathways that underlie this relationship are still unknown. It has been shown that various factors, for example biological alterations, play a role in the relationship between childhood maltreatment and mental disorders. Research investigating the influence of psychological factors, such as emotional reactivity and emotional regulation, attachment or post-traumatic stress symptoms is rare. These investigations are highly relevant in order to identify potential targets for psychological interventions. First approaches in this line of research examine specific transdiagnostic treatments for early traumatization, such as Imagery Rescripting. However, as childhood maltreatment is suspected to be associated with a broad array of mental disorders, it might not be explained by a single underlying mechanism. Instead, multiple pathways are probable to mediate the relationship between childhood maltreatment and transdiagnostic psychopathology. Therefore, the major aim of this thesis is to make a first step in filling this research gap by investigating the underlying psychological mechanisms between childhood maltreatment and psychopathology in clinical studies.

Studies I and *II* were conducted with a clinical sample (*N*= 69) of patients with obsessive compulsive disorder (OCD). Preliminary research, though limited by small sample sizes and inconsistent findings, showed that childhood maltreatment might play a role in OCD. In order to replicate and expand on these findings we aimed to examine the association of childhood maltreatment and OCD more closely.

Study I primarily examined the subtypes of childhood maltreatment influencing OCD and additionally the impact of childhood maltreatment on the success of psychological OCD treatment (immediately following treatment and at 6 months post). We found three main results: First, increased prevalence rates of childhood maltreatment among our OCD patient sample in comparison to a general German population sample. Second, childhood maltreatment severity was related to greater OCD symptom severity, with the most robust relationship for the

maltreatment subtype of emotional abuse. Third, individuals with higher levels of childhood maltreatment reported greater OCD symptoms at pre-treatment, post-treatment, and 6 months after their inpatient stay, compared to patients without maltreatment experiences. However, in contradiction of our hypothesis, childhood maltreatment did not influenced treatment benefit.

Based on the findings, *study II* aimed to examine the underlying mechanisms of the detected association between childhood maltreatment and OCD symptoms. Potential mediating factors were chosen based on the following criteria: (a) evidence for association with childhood maltreatment, (b) evidence for association with OCD, and (c) existing plausible theoretical explanation for this mediator as an underlying mechanism. Therefore, we predicted that, emotion regulation difficulties, rumination, an insecure attachment style, dissociation, and post-traumatic stress symptoms are potential mediators between the association of childhood maltreatment and OCD symptom severity. In line with our hypotheses, these factors all mediated the relationship between childhood maltreatment and OCD symptom severity. However, regarding insecure attachment styles, the subtype of avoidant attachment was not linked to either childhood maltreatment or OCD symptom severity, suggesting that in OCD an anxious attachment is more prominent.

S*tudy III* investigated the specific role of emotional reactivity as an underlying mechanism between childhood maltreatment and major depression in a clinical sample of patients with major depression (N= 69). Whereas in the literature for major depression the findings regarding heightened emotional reactivity are inconsistent, childhood maltreatment was widely associated with increased emotional reactivity. We therefore hypothesized that the severity of childhood maltreatment is related to higher emotional reactivity among depressive patients. Hence, self-reported and physiological emotional reactivity was measured while presenting audio recordings with neutral, negative and individualized childhood trauma-related scripts (so called script imagery method).

In line with our hypothesis, depressive patients with higher levels of childhood maltreatment reported heightened emotional reactivity to the childhood trauma-related script and the negative script compared to the neutral script. In particular, they rated the negative script as more aversive and distressing. Additionally, they showed more re-experiencing and dissociation experiences in response to the negative script. Equally, the trauma-related script was perceived as more aversive and distressing. Furthermore, it resulted in greater levels of

arousal and showed more avoidance as an emotional regulation strategy. In contrast to our hypothesis, no effect of childhood maltreatment on physiological responsiveness emerged.

Overall, there is a growing body of literature showing that childhood maltreatment is a transdiagnostic risk factor for various mental disorders. However, few researchers have addressed the question of how this early vulnerability to psychopathology develops and persists. This thesis aimed to expand on current knowledge of the underlying pathways of the relationship between childhood maltreatment and psychopathology in two different mental disorders. The study findings presented in this thesis provide first evidence that heightened emotional reactivity (but not psychophysiological reactivity) and difficulties in emotion regulation, together with rumination might play a role. Moreover, post-traumatic stress symptoms, even those deemed subclinical, such as hyperarousal, avoidance and dissociative symptoms might be mediating factors between childhood maltreatment and transdiagnostic psychopathology. Since we found indications that re-experience might also play a role in mediating this relationship, future work will concentrate on exploring this factor in more detail. Additionally, further work is needed to investigate the cause of high divergence between self-report emotional reactivity and psychophysiological reactivity. From a methodological perspective, problems in assessing childhood maltreatment retrospectively with the childhood trauma questionnaire will be discussed. Moreover, implications for a theoretical transdiagnostic model and methodological approaches, as well as directions for future research on the underlying pathways of childhood maltreatment and psychopathology are outlined.

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1. General Introduction

Prologue

> '*Child maltreatment leads to the premature death of at least 850 children under 15 years in the European Region every year. Not all deaths from maltreatment are properly recorded and this figure may be an underestimate; the mortality data are the best available currently. Deaths, however, are only the tip of the iceberg. Much abuse may not come to the attention of child protection services. The evidence for development of mental ill health, such as depression, anxiety, eating disorders, behavioural problems, suicide attempts, self-harm and illicit drug use, after maltreatment is strong and indisputable. Posttraumatic stress disorder has been reported in as many as one fourth of abused children. Child maltreatment may be responsible for almost one fourth the burden of mental disorders, especially in association with other adverse or negative experiences in childhood.*'
>
> European report on preventing child maltreatment of the WHO (2018).

Childhood maltreatment is a constant topic in psychological clinical treatment. Childhood maltreatment survivors report an enormous influence these early adverse experiences have had on their entire lives and the long-term effects they still suffer from today. That these individual reports can also be substantiated scientifically is known since the publication of the Adverse Childhood Experiences (ACE) study (Felitti et al., 1998). The longitudinal study found a strong relationship between number of adverse childhood experiences and increased health-risk behaviours contributing to multiple health problems, such as smoking, alcoholism, drug abuse, sexual promiscuity, poor mental health, depressed affect, and suicide attempts among adult study participants (Dube et al., 2001; Felitti et al., 1998; Valerie J. Edwards et al., 2003). Even though the results are 20 years old, research into the manifold consequences of early traumatic experiences is still in its infancy. While research on childhood maltreatment consequences was initially focused on post-traumatic stress disorder, it is now clear that childhood maltreatment is a transdiagnostic risk factor for a wide range of physical and psychological disorders. The World Health Organisation (WHO) also recognizes and identifies the evident connection between maltreatment in childhood and a variety of health problems throughout the lifespan. The organisation has therefore placed childhood maltreatment as an important topic on its global health policy agenda (WHO, 2002). The present thesis aims to contribute to an understanding of the complex relationships and pathways

associated with maltreatment experiences in childhood and their triggered symptoms in adulthood. Although, recent research has shown that many physical conditions, such as heart disease and other stress-related illnesses, are clearly associated with child abuse, this thesis has a special focus on its psychological consequences.

Epidemiology of childhood maltreatment

Childhood maltreatment is defined by any act of commission or omission by a parent or other caregiver that results in harm, potential for harm, or threat of harm to a child, whereas the harm does not need to be intended. Children can experience different forms of maltreatment and the consensus definitions of child maltreatment include the following subtypes (Fairbank et al., 2014; WHO, 2018):

- *Physical abuse* includes causing physical pain or injury, and all types of physical punishment and physical harassment.
- *Neglect,* sometimes separated into physical and emotional neglect, includes failing to give a child the physical or emotional care needed according to their age and development.
- *Emotional abuse* describes such behaviour as belittling, denigrating, scapegoating, threatening, scaring, discriminating, ridiculing or other nonphysical forms of hostile or rejecting treatment.
- *Sexual abuse* includes a wide range of sexual behaviours between a child and an older person, often but not necessarily involving bodily contact, such as genital exposure, verbal sexual harassment or exploitation for pornography.

Overall, childhood maltreatment exposure requires significant adaptation by the child and represents a deviation from the expectable environment. These experiences can either be repeated and long-lasting (e.g., prolonged neglect) or involve single occasions that are severe enough to represent such a strong deviation (e.g., sexual abuse). Moreover, these experiences are either an absence of expected inputs (e.g., deprivation of language and food), or the presence of unexpected inputs that represent significant threats to the physical integrity or well-being of the child (e.g., violence) (McLaughlin, 2016).

Prevalence

The German President of the Federal Criminal Police Office reported that in 2019 4,055 children were victims of physical and 15,701 were victims of sexual abuse in Germany. In addition, 15,936 cases of sexual violence (including attempts) against children were registered (Münch, 2020). This means that in 2019, an average of 43 children were victims of sexual violence every day. Since this 12-month prevalence only includes the cases reported to the police, the actual number including unreported incidents can be assumed to be much higher. A prospective longitudinal study in Munich in 2000 showed that in a sample of 3,021 interviewed adolescents (14-24 years old), 7.5% suffered from physical attacks and 2% from sexual abuse as a child (Perkonigg et al., 2000). Extrapolated to the 10.5 million children living in Germany, a total number of 787,500 children may have been victims of physical and 262,500 children victims of sexual abuse.

More recent empirical findings come from a cross-sectional representative sample (*N*= 2510; 53.3% female) of the German population and include a dimensional analysis of child maltreatment by severity-scores, assessed by the Childhood Trauma Questionnaire (Bernstein et al., 2003). The retrospective study (Witt et al., 2017) showed that 31.0% (*n* = 772) of participants reported at least one type of child maltreatment. Of all participants, 6.5% reported at least moderate emotional abuse, 6.7% reported physical abuse, 7.6% sexual abuse, 13.3% emotional neglect, and 22.5% reported physical neglect (for details see Table 1.1). In the *European Report on Preventing Child Maltreatment*, the WHO (2018) reported for European countries slightly higher prevalence rates of 9.6% for sexual abuse, 22.9% for physical and 29.1% for emotional abuse. Furthermore, incidence rates of 16.3% for physical and 18.4% for emotional neglect were estimated. However, data on the prevalence of childhood maltreatment varies between studies. Prevoo et al. (2017) give multiple reasons for this, e.g., interviewing a child vs. an adult, the sample structure, the definition of childhood maltreatment or the type of assessment. In addition, socio-economic factors and a country's level of economic development play a major role. Thus, even though current German prevalence studies are rare, results of prevalence studies from other countries are not generalizable.

Table 1.1. Prevalence of childhood maltreatment (in %) in a representative German population sample (N = 2510) (Witt et al., 2017)

CTQ Subscale	Childhood Maltreatment in %†			
	none to low	low to moderate	moderate to severe	severe to extreme
Emotional abuse	80.8	12.0	3.9	2.6
Physical abuse	87.1	5.8	3.3	3.3
Sexual abuse	85.6	6.3	5.3	2.3
Physical neglect	57.8	19.2	13.4	9.0
Emotional neglect	59.2	27.0	6.2	7.1

Note. CTQ, the Childhood Trauma Questionnaire – Short Form (CTQ).
†. number of patients above CTQ cut-off scores according to (Bernstein et al., 2003).

Assessment of childhood maltreatment

Methodological studies have concluded that childhood maltreatment experiences can be assessed with reasonable reliability and validity (e.g.; Hardt & Rutter, 2004; Mathews et al., 2020). In general, a prospective assessment is recommended instead of a retrospective assessment. Indeed, in retrospective reports, reliability problems occur often in the form of false negative rates, i.e., there is a tendency to underreport, while there is no evidence of false positives (Hardt & Rutter, 2004). The primary bias of underreporting childhood maltreatment experiences might be due to memory recall bias (e.g., participants might have been too young to remember, forgot the event or did not realise that a certain kind of behaviour was abusive), the wish to protect the caregivers or the need for data protection and privacy (Hardt & Rutter, 2004). However, due to economic and time constraints prospective assessment is often not feasible, in particular when investigating the effect of childhood maltreatment on the development of psychopathology in adulthood. For measuring childhood maltreatment retrospectively, self-report assessment is the most common and preferred approach, since childhood maltreatment may be known best to the respondent. Self-reports are usually assessed through questionnaires or interviews that measure the frequency and severity of exposure to childhood maltreatment and take into account the described subtypes of abuse and neglect.

The current gold standard in assessing childhood maltreatment retrospectively is the Childhood Trauma Questionnaire – Short Form (CTQ) (Bernstein et al., 2003; German version: Wingenfeld et al., 2010). The CTQ is a brief, standardized, and well-validated 28-item self-

report inventory. It measures retrospectively the frequency of childhood maltreatment exposure on a dimensional 5-point Likert scale ranging from 'never true' (1) to 'very often true' (5). The CTQ provides continuous variables representing frequency of childhood maltreatment exposure to each subtype of abuse and neglect: emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect. Moreover, validated cut-offs exist for generating dichotomous indicators for each domain (Bernstein et al., 2003). Exemplary statements are, e.g., 'When I was growing up, my parents were too drunk or high to take care of the family' or 'When I was growing up, I got hit so hard by someone in my family that I had to see a doctor or go to the hospital'.

Childhood Maltreatment as a risk factor for the development of psychopathology

In the clinical psychology, a *risk factor* is a variable that is associated with an increased likelihood of a negative health outcome such as a physical disease or a mental disorder. However, risk factors are primarily correlational and not necessarily the cause of the adverse outcome. Moreover, risk factors do not directly determine the development of disorders, but rather influence other processes and mechanisms that are affected by individual adaptation, i.e. an individual person as a system might processes risk factors into pathological or adaptive states (Fairbank et al., 2014; Kraemer et al., 1997). We distinguish between more distant (i.e. distal), and closer (proximal) triggers and causes in a chain of events. A broader effect on various mental disorders (multifinality), such as childhood maltreatment, is expected to be a distal risk factor for ones that are more proximal. In addition, we assume moderators to be divergent trajectories explaining why a particular transdiagnostic risk factor leads to different mental disorders in different people or even to different mental disorders within the same person over time (Nolen-Hoeksema & Watkins, 2011).

Even though childhood maltreatment is a distal risk factor, it is assumed that childhood maltreatment is in fact an important causal risk factor for psychopathology (Gilbert et al., 2009; Norman et al., 2012). However according to Kraemer et al. (1997), a temporal precedence of the investigated factor before the outcome is the most necessary criteria to label a factor as a causal risk factor (Kraemer et al., 1997). Research testing such temporal precedence should use a longitudinal or experimental study design. In line with this, childhood maltreatment fulfils the criteria of casual relationships, as the wide availability of prospective studies provides conclusive evidence of a temporal relationship (Clark et al., 2010; Cohen et al., 2001; Ford et

al., 2007; Green et al., 2010; Koenen et al., 2007; Weich et al., 2018). Second, consistency and replications are an additional heuristic when claiming a causal relationship, i.e. the relationship can be observed repeatedly in different, independent studies (e.g. Friis & Sellers, 2008). In accordance with this criterion, the association between childhood maltreatment and psychopathology persisted consistently across different study designs, samples, and geographic regions (Kessler et al., 2010; Norman et al., 2012). A further criterion that indicates a causal relationship is the dose-effect relationship. This means that the relationship grows systematically (e.g. linearly) with the dose (e.g. Friis & Sellers, 2008). A dose–response relationship between psychopathology and childhood maltreatment is supported by mounting evidence that those experiencing more childhood maltreatment are at greater risk of developing mental disorders than those experiencing less severe maltreatment (Norman et al., 2012; Steine et al., 2017). Similarly, the results of the ACE study indicated an additional dose-response-relationship showing, that with higher number of childhood maltreatment experiences, the probability of developing mental disorders in adulthood increased (Anda et al., 2010; Dube et al., 2001; Felitti et al., 1998; Valerie J. Edwards et al., 2003).

In essence, the growing body of longitudinal research from the last two decades has shown that childhood maltreatment can be called a major risk factor for a broad array of serious, costly, lifelong psychopathology. For example, several reviews and recent meta-analyses have shown that there is robust evidence of childhood maltreatment as a risk factor for the development of post-traumatic stress disorder (PTSD), dissociative disorder, affective disorder, anxiety disorder, personality disorder (in particular borderline personality disorder), eating disorder, somatic disorder, schizophrenia and substance abuse disorder (Carr et al., 2013; Gilbert et al., 2009; Herzog & Schmahl, 2018; Nelson et al., 2018; Norman et al., 2012; Putnam, 2003) in adulthood. Additionally, there is some evidence that childhood maltreatment survivors with, e.g., major depression, anxiety, or substance use disorders tend to have an earlier age at onset, greater symptom severity, higher comorbidity, increased risk for suicide, and worse treatment response than individuals with the same diagnoses who didn’t experience childhood maltreatment (Teicher & Samson, 2013). However, the association of childhood maltreatment with different types of commonly occurring mental disorders are largely nonspecific, with little variation in the strength of associations across disorders (Green et al., 2010; Kessler et al., 2010). Furthermore, it was shown that these associations also persist independently of additional adult life stress. Nevertheless, it was found that childhood maltreatment moderates the association between changes in adult life stress and transdiagnostic psychopathology, i.e.

through increasing vulnerability (Albott et al., 2018). For this reason, childhood maltreatment is increasingly referred to as *a transdiagnostic risk factor for psychopathology* in the current literature (e.g., Conway et al., 2018; McLaughlin et al., 2020).

Childhood Maltreatment and its effects on psychological treatment outcome

Even if a risk factor meets criteria for a causal relationship, it remains unclear which mechanisms underlie the observed relationship and whether those mechanisms only have an influence on the development of mental disorders or also on their maintenance. To date research has mostly focused on the influence of childhood maltreatment on the development of psychopathology, but there are few findings on its influence on the course and outcome of treatments.

For the example of major depression, childhood maltreatment has been proven to influence not only symptom development but also symptom severity and a chronic course of illness. Patients with major depression and a history of childhood maltreatment are less responsive to the gold standard of psychological treatments for depression (Nanni et al., 2012; Nelson et al., 2018), especially to pharmacological interventions (Nemeroff et al., 2003; Williams et al., 2016). Furthermore, they are vulnerable to faster symptoms recurrence after treatment (Harkness et al., 2012). Moreover, Schilling et al. (2015) investigated the influence of childhood maltreatment in the course of inpatient treatment in a large study sample across different mental disorders (N= 742), including mental and substance abuse, affective disorders, anxiety disorders, obsessive-compulsive disorders, trauma-related disorders, dissociative disorders, and somatoform disorders. The authors found, that patients with severe and multiple childhood maltreatment experiences started psychotherapy with higher symptom severity and achieved minor treatment outcomes compared to a group with mild childhood maltreatment or subjects without these maltreatment history. This is consistent with findings in other mental disorders showing that childhood maltreatment was related to poorer treatment outcomes in psychotic disorders (Thomas et al., 2019) and to more complex psychopathological manifestations in bipolar disorder, such as comorbidity and higher suicidality (Daruy-Filho et al., 2011; Garno et al., 2018). Although the influence of childhood maltreatment on treatment outcome is studied more differentiated for highly prevalent disorders, such as major depression, it is poorly studied for disorders that occur less frequently. Therefore, further research is required to determine if the influence of maltreatment on symptom severity and treatment outcome can be generalized to less prevalent mental disorders.

Despite the negative effect of childhood maltreatment on treatment outcome, little is known about the underlying mechanisms. Principally, several mediating factors might be conceivable. First, it has been shown that dissociation has a negative impact on treatment outcome. Subjects with these symptoms might dissociate as a response to negative emotions arising in psychotherapy which leads to a less favourable outcome (Spitzer et al., 2007). For example, dissociation has been linked with poor learning during a classical conditioning paradigm in patients with borderline personality disorder and OCD (Ebner-Priemer et al., 2009; Rufer et al., 2006). This may be explained by the reduced emotional engagement during dissociative experiences, since emotional engagement is thought to be crucial for successful exposure treatment. Second, an insecure attachment pattern is shown to negatively affect the therapeutic quality of alliance leading to poorer treatment outcome (Diener & Monroe, 2011). Finally, avoidance behaviour could deprive the individual from receiving new, belief disconfirmatory feedback, e.g. in exposure therapy (Wheaton et al., 2018). In order to intervene effectively, it is necessary to understand the developmental processes and mechanisms that are altered by childhood maltreatment and how they ultimately contribute to the aetiology and maintenance of psychopathology.

Transdiagnostic pathway model

As demonstrated above, childhood maltreatment can be regarded as a transdiagnostic distal risk factor for psychopathology. According to the transdiagnostic process models by Nolen-Hoeksema and Watkins (2011), more effort is needed to specify the mechanisms linking the broad array of mental disorders. The authors draw attention to the fact that little work has been done to determine how central distal transdiagnostic factors, such as child maltreatment, lead to intermediate transdiagnostic factors, which again result in a group of additional mental disorders. In addition, they stated that transdiagnostic models have only theoretical and practical value if they explain the mechanisms underpinning multifinality as well as the reasons why one individual develops one set of symptoms while another with the same transdiagnostic risk factor develops another set of symptoms (divergent trajectories). In sum, transdiagnostic models require the ability to explain the mechanisms linking distal and more proximal risk factors to each other, and subsequently to psychopathologies. Moreover, the authors offer a heuristic for the development of transdiagnostic models, suggesting to investigate (a) different levels of transdiagnostic factors and their relative theoretical and clinical usefulness, (b) types of mechanisms by which factors at one level may be related to factors at other levels, and (c)

types of moderating factors that may determine whether a transdiagnostic factor leads to certain specific disorders or symptoms and not others (divergent trajectory) (Nolen-Hoeksema & Watkins, 2011).

Potential mechanisms linking childhood maltreatment and psychopathology

Multiple pathways are likely to mediate the association between the distal risk factor childhood maltreatment and diverse psychopathology (McLaughlin, 2016). In the present chapter different underlying mechanisms between the relationship of childhood maltreatment and psychopathology will be discussed. These proximal risk factors were chosen based on the following criteria: (a) evidence for association with childhood maltreatment, (b) evidence for association with psychopathology, (c) existing theoretical explanation for this proximal risk factor as mechanism. First, emotional and social impairments to include emotional reactivity, emotion regulation, rumination, dissociation, and insecure attachment will be discussed. Finally, the role of trauma-related symptoms as a mediator between childhood maltreatment and transdiagnostic psychopathology will be debated.

In this thesis, an attempt will be made to establish a transdiagnostic model for the distal risk factor childhood maltreatment and the development of psychopathology according to the framework of Nolen-Hoeksema and Watkins (2011). For this purpose, the described mechanisms are assumed to be the proximal risk factors. Figure 1.1 shows a simplified illustration of this model which forms the basis for the specific study topics that will be discussed in the following.

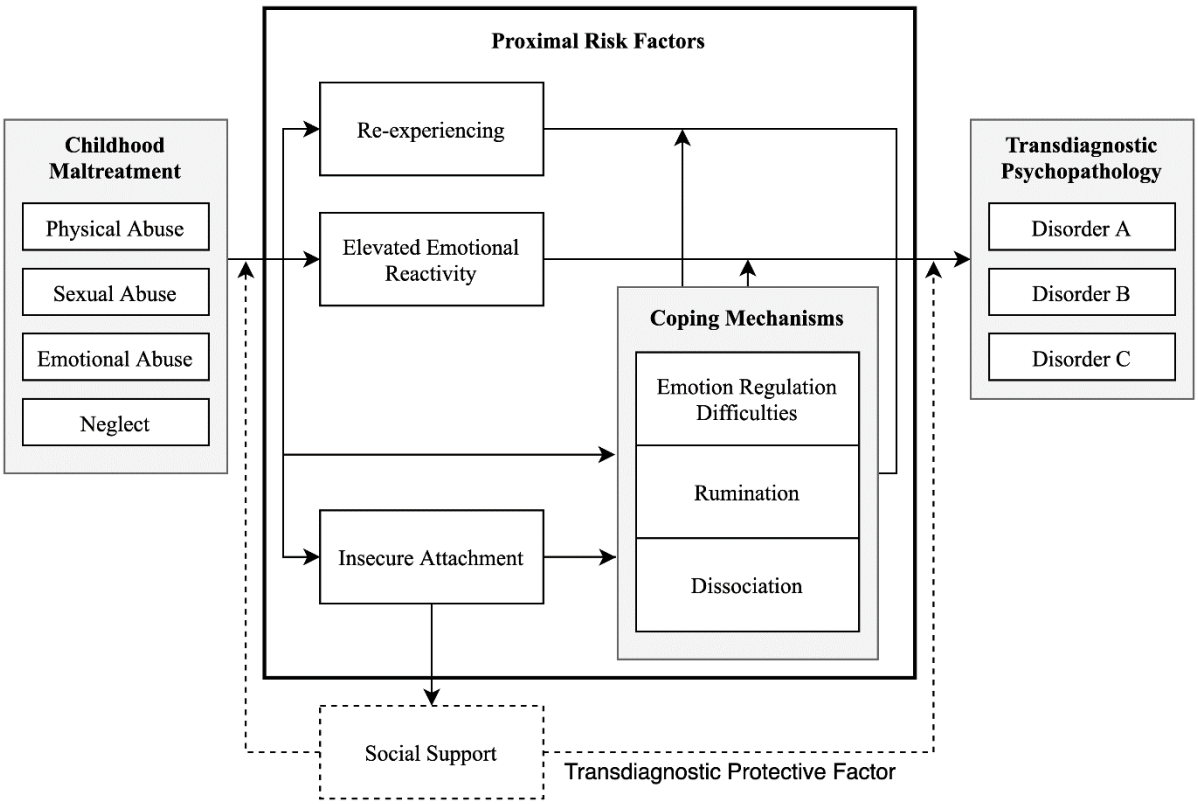

Figure 1.1. Transdiagnostic model of the potential underlying mechanisms between the distal risk factor childhood maltreatment and the development of transdiagnostic mental disorders.

Emotional reactivity

In recent decades, multiple potential mechanisms by which childhood maltreatment increases risk for mental disorders were proposed. As an empirically evidenced mechanism, emotional reactivity has been linked to childhood maltreatment and psychopathology. Emotional reactivity is defined as the extent to which an individual experiences emotions, responds to a variety of stimuli (sensitivity), the intensity of the response, and the duration of arousal. Emotional responsiveness can feature subjective experiences, behavioural responses, or physiological changes (Nock et al., 2008; Tracy et al., 2014). Emotional reactivity is suggested to be altered due to neuroendocrine and neuroanatomical changes after early trauma exposure. Given the elevated brain plasticity in youth, neuropsychological research findings indicate that childhood maltreatment experiences, such as sexual abuse, might affect the development of the brain and impair major hormonal systems (e.g. Heim & Nemeroff, 2001; Heim et al., 2008; Hein & Monk, 2017; Teicher et al., 2016).

As a major brain alteration, heightened amygdala reactivity has been confirmed in meta-analysis to be linked with childhood maltreatment (Hein & Monk, 2017). For example, maltreatment survivors showed increased emotional responses to emotional faces (angry,

fearful or sad) in comparison to neutral faces observable in greater amygdala activation (Dannlowski et al., 2012; van Harmelen et al., 2013).

Regarding the major hormonal systems, it has been found that the hypothalamic-pituitary-adrenal (HPA) axis, which plays a crucial biological role in buffering the effects of emotional stress, is significantly dysregulated in survivors of maltreatment. Therefore, the sympathetic nervous system may become hyperactive, leading to increased arousal and hypervigilance in individuals with a history of childhood maltreatment (Faravelli et al., 2012; Heim & Nemeroff, 2001; Heim et al., 2000; Heim et al., 2008; Murali & Chen, 2005).

These findings are corroborated by evidence showing hypervigilance towards threat-related stimuli. For example, increased neurobiological reactivity (plasma adrenocorticotropin (ACTH) and cortisol responses) to psychosocial stress situations in childhood maltreatment survivors was found (Heim & Nemeroff, 2001; Heim et al., 2000; Heim et al., 2008). Moreover, increased reactivity to trauma-related pictures in sexually abused females compared to females without childhood maltreatment was shown (Ben-Amitay et al., 2016). However, more research is needed to disentangle whether there is a difference between the exposure to general psychosocial stress and trauma-related triggers. To integrate these basic biological findings to behavioural components of normal and abnormal functioning, a new framework for understanding and investigating underlying causes of psychopathology using transdiagnostic theory is necessary. According to the Research Domain Criteria (RDoC) (Kozak & Cuthbert, 2016), it is important to check these results on a peripheral physiological, behavioural and self-report level. In line with neurobiological findings, increased emotional responsiveness in childhood maltreatment survivors towards aversive and stressful stimuli has also been shown in studies using self-report measures (Heleniak, McLaughlin, et al., 2016; McLaughlin et al., 2010). For example, longitudinal studies via ecological momentary assessment reported increased emotional reactivity in response to daily life stress, as reflected in an increase in negative affect or a decrease in well-being (Glaser et al., 2006; Infurna et al., 2015).

Maltreated children often live in environments characterized by high levels of danger. Therefore, a sensitive emotional responsiveness to threat-related cues might be a reasonable adaption, as it could lead to a prompter identification of threat in order to react quickly. Whereas a sensitive emotional reactivity to threat was beneficial in childhood, it might be a lasting vulnerability to psychopathology that persists into adulthood. In line with this, several studies have shown an association of heightened emotional reactivity with transdiagnostic

psychopathology (Heleniak, Jenness, Vander Stoep, et al., 2016; Heleniak, McLaughlin, et al., 2016; Kim-Spoon et al., 2013; Weissman et al., 2019) and specific disorders. For example, emotional reactivity has been consistently linked with anxiety and depression symptoms (Bylsma et al., 2008; Carthy et al., 2010; Goldin et al., 2009; Macatee & Cougle, 2013), as well as externalizing problems in youth (Singh & Waldman, 2010). However, heightened emotional reactivity as a single proximal transdiagnostic risk factor might not explain why childhood maltreatment causes the array of different disorders it is associated with (i.e., multifinality). Therefore, it is important to investigate further mediators of the emotional reactivity effects.

Emotion regulation

There is a growing body of literature suggesting that dysfunctional emotion regulation strategies might interact with elevated emotional reactivity to develop and maintain various mental disorders (Heleniak, Jenness, Stoep, et al., 2016; Kim & Cicchetti, 2010; McLaughlin et al., 2019; Messman-Moore & Bhuptani, 2017; Weissman et al., 2019). For example, McLaughlin et al. (2015) instructed maltreated adolescents who showed greater amygdala activation in response to negative images to decrease their emotional response. As a result, the participants showed superior activation of the prefrontal cortex compared to a non-abused control group but no longer differed in their amygdala activation. The prefrontal cortex appears to be linked with emotion regulation systems and cognitive control (Ochsner & Gross, 2005). Emotion regulation is commonly defined as the processes by which individuals influence their specific emotions, when they have them, and how they experience and express emotions (Gross, 1998). Moreover, Gratz and Roemer (2004) divide emotion regulation into the four dimensions (1) awareness and understanding of one's emotions, (2) acceptance of negative emotions, (3) ability to successfully engage in goal directed behaviour and control impulsive behaviour when experiencing negative emotions, and (4) ability to use situationally appropriate emotion regulation strategies.

However, (developmental) empirical research assumes that child maltreatment impairs the development of an adaptive emotion regulation acquisition. One of the reasons offered is that appropriate emotion regulation strategies are learned in the course of child development, with primary caregivers as role models and interaction partners. For example, emotional invalidation (i.e. emotional experiences are rejected, ignored, or judged) by the caregivers, which occurs with neglect and abuse, distorts the ability to identify and adequately differentiate emotions. Moreover, dismissive or punishing reactions from their primary caregivers might

lead to avoidance in expressing emotions adequately or in avoidance of asking for the caregiver's assistance in problem-solving to reduce distress (Cloitre et al., 2008). In line with this, emotion regulation difficulties are particularly prominent in survivors of early-onset chronic interpersonal trauma (Ehring & Quack, 2010). Childhood maltreatment survivors exhibit various difficulties with emotion regulation. First, childhood maltreatment survivors suffer from a lack of emotional awareness (i.e. alexithymia), referred to as the ability to identify and differentiate affective states (e.g. Pollak et al., 2000; Weissman et al., 2020). Second, they show problems with accepting and tolerating negative emotions (Briere & Rickards, 2007), such as heightened fear of emotions (Tull et al., 2007) and avoidance (Batten et al., 2002; Marx & Sloan, 2005). Finally, childhood maltreatment survivors show considerable difficulties in adaptively modulating their emotional reactions (Cicchetti & Toth, 2005; Cook & Rumrill Jr, 2005; Kim & Cicchetti, 2010). This is evidenced by their high usage of maladaptive emotion regulation strategies, which has been confirmed in several studies (e.g., Bradley et al., 2011; Briere & Rickards, 2007; Burns et al., 2010; Cicchetti & Toth, 2005; Cloitre et al., 2005; Heleniak, Jenness, Vander Stoep, et al., 2016; Marx & Sloan, 2005; Michl et al., 2013; Tull et al., 2007). In turn, maladaptive emotion regulation strategies are highly associated with the development of transdiagnostic psychopathology (Aldao et al., 2010; Cludius et al., 2020). In essence, it can be assumed that maladaptive emotion regulation is a factor that can be impaired in the child's development after experiencing childhood maltreatment (including threat and deprivation). This might not only predict the development of psychopathology in prospective studies but also mediate the associations between childhood maltreatment and psychopathology (Heleniak, Jenness, Stoep, et al., 2016; Kim-Spoon et al., 2013; McLaughlin et al., 2011; Weissman et al., 2019).

Rumination

Rumination has been suggested in the transdiagnostic model of Nolen-Hoeksema and Watkins (2011) to be an important transdiagnostic proximal risk factor leading from childhood maltreatment to psychopathology. It is therefore worth investigating it separately as a cognitive emotion regulation strategy that might play a role in the association between childhood maltreatment, emotional reactivity and psychopathology.

In several studies, it has been stated that individuals with a history of childhood maltreatment engage in high levels of rumination as a maladaptive cognitive emotion regulation strategy. These findings persist in studies with healthy samples (Conway et al., 2004; Heleniak,

Jenness, Stoep, et al., 2016; Spasojević & Alloy, 2002), as well as in clinical samples (Barnhofer et al., 2006; O'Mahen et al., 2015). Rumination is defined as passively focusing on the symptoms of distress and on the causes and consequences of these symptoms (Nolen-Hoeksema et al., 2008). Moreover, child maltreatment was simultaneously associated with elevated emotional reactivity and greater habitual use of maladaptive responses to distress, like rumination (Heleniak, Jenness, Stoep, et al., 2016). Unexpected stressful life events and highly insecure environments might nurture a passive internalizing style of emotion regulation- as chances for active problem-solving are low - and uncontrollable environmental threats attract attention in a ruminative manner (Nolen-Hoeksema & Watkins, 2011; Sarin & Nolen-Hoeksema, 2010; Spasojević & Alloy, 2002). Typically, children learn how to regulate emotions adequately by observing their caregivers, which becomes difficult when their primarily caregivers are not present or show maladaptive emotion regulation strategies themselves (e.g. Denham et al., 1997). However, a growing body of literature suggests that rumination is an important transdiagnostic factor that is highly associated with aetiology, maintenance, and vulnerability of psychopathology (Ehring & Watkins, 2008; Nolen-Hoeksema & Watkins, 2011). Moreover, first evidence indicates that rumination might be a mediating underlying mechanism between the associations of childhood maltreatment with the development of psychopathological symptoms (Michl et al., 2013).

Dissociation

Dissociative symptoms might be a further relevant psychological factor interacting with heightened emotional reactivity. On the one hand, dissociative reactions have been discussed as a biologically determined freezing response to extreme distress (Nijenhuis et al., 1998) and as a defence strategy for reducing the emotional and physiological impact of a traumatic event (van der Kolk et al., 1996). According to the concept of the 'fight, flight and freeze' paradigm of reacting to traumatic distress, maltreated children are in most cases unable to fight or flee from a traumatic situation and are usually not protected by caregivers, who might even represent the threat as perpetrators. When the threat continues, the only coping strategy left is the dissociative 'freezing' reaction, which can range from disengagement, inward focus, numbing, daydreaming to derealisation, depersonalization or, in extreme circumstances, to catatonic reactions (Nijenhuis et al., 1998; Perry et al., 2000). On the other hand, a dissociative coping style is also described as an automatic response that makes available emotional discharge from unendurable distress (Gershuny & Thayer, 1999). This dissociative coping style develops in peritraumatic maltreatments as a desperate attempt to cope with the inconceivable distress the

child suffers (van der Kolk et al., 1996). Consistently, the exposure to childhood maltreatment is suggested to predict the development of dissociative symptoms (e.g. American Psychiatric Association, 2013; Draijer & Langeland, 1999; Loewenstein, 2018; Simeon et al., 2001). In adulthood this behaviour might be maladaptive, especially since dissociation is often triggered in non-danger environments. In line with this, dissociative symptoms are highly associated with emotion regulation difficulties, in particular with alexithymia (Briere, 2006). Therefore dissociative symptoms might interfere with the adaptive processing of emotions (Grabe et al., 2000) and subsequently lead to psychopathology (Evren et al., 2008). Indeed, a growing body of literature shows that dissociative symptoms transdiagnostically increase the risk of developing mental disorders (Lynn et al., 2019; Putnam & Trickett, 1993; Schauer & Elbert, 2010).

The summarized literature suggests that childhood maltreatment might lead to changes in emotional reactivity and characteristic patterns of emotion coping mechanisms. In turn, these emotional response patterns are reasonable pathways linking child maltreatment with the development of psychopathology. However, elevated emotional reactivity and difficulties with emotion regulation are non-specific mechanisms that might manifest in multiple domains (i.e., affect, physiology, neural responses), linking the distal risk factor childhood maltreatment to psychopathology transdiagnostically (McLaughlin et al., 2020).

Insecure attachment style

The effect of stable, high-quality and supportive relationships is suggested to be a protective pathway (Jaffee, 2017; McLaughlin et al., 2020), i.e., it has a buffering effect on the link between childhood maltreatment and psychopathology (e.g. Collishaw et al., 2007). For example, in sexual abuse survivors reduced PTSD symptom severity was stated for those with high versus low social support (Schumm et al., 2006). However, childhood maltreatment survivors struggle to establish and preserve secure relationships (Horan & Widom, 2015; Rogosch et al., 1995). Making friends, finding an intimate partner, and building stable relationships as well as benefiting from them depend on general attachment abilities. The attachment style is formed through an individual's first learning experiences in early relationships. However, it has been proposed that interpersonal trauma, such as maltreatment exposure that is often perpetrated by key attachment figures like caregivers or close relatives (referred to as betrayal trauma) (Gilbert et al., 2009), increases vulnerability to insecure attachment styles (Lieberman, 2004).

A securely attached child perceives an attachment figure to be responsive and nearby. Thereby, it gains confidence, which is shown through exploration and socializing behaviours. When the child notices a threat, it approaches the primary caregiver to receive attention and support. Adult (romantic) relationships are considered by dynamics related to these ones. For example, adults with secure attachment style typically feel safer when their partner is accessible and responsive. Seeking for support in case of a threat helps to regulate emotions adequately (Brennan et al., 1998; Hazan & Shaver, 1987). However, in an insecure environment, where children are consistently neglected or their attachment figures are rejecting, insensitive, unpredictable, or even frightening, approaching their primary caregivers might instead cause more harm. This results in an insecure attachment style. These children build an internal working model in which they cannot rely on the support and comfort of others. In terms of threat, insecure children are regulating themselves by either overly demanding attention or support in an anxious way or by withdrawing from others by attempting to be highly self-sufficient (avoidant) (Brennan et al., 1998; Fraley & Shaver, 2000; Fraley & Spieker, 2003). An anxious attachment style is defined by insecurity and deficiency in close relationships, whereas an avoidant attachment style is defined by the avoidance of closeness and intimacy in relationships (Brennan et al., 1998). These insecure attachment behaviour patterns are likely to persist into adulthood (Hazan & Shaver, 1987; Styron & Janoff-Bulman, 1997). This is consistent with research results showing consistently higher rates of an insecure attachment style in maltreated children compared to non-maltreated children (Cicchetti & Toth, 2005; Cloitre et al., 2008; Cyr et al., 2010). Moreover, insecure attachment was considered to be associated with psychopathology (Bakermans-Kranenburg & van Ijzendoorn, 2009; Mikulincer & Shaver, 2007; Olssøn & Dahl, 2014), as well as to mediate the link of childhood maltreatment and symptom severity, as shown, e.g., in anxiety disorders and major depression disorder (Bifulco et al., 2006; Goodall et al., 2015; Muller et al., 2012; Schierholz et al., 2016). However, path analysis revealed that insecure attachment styles that developed as a result of childhood maltreatment might not be directly associated with psychopathology, but relate strongly to poor emotion regulation capacities (see subtopic emotion regulation) (Cloitre et al., 2008) and diminishing expectations of social support (Cloitre et al., 2008; Kim & Cicchetti, 2010). Therefore, it has been suggested that maltreated individuals with an insecure attachment style have severe difficulty engaging in emotionally supportive relationships, which would have helped them to process and cope with their emotional experiences. This is clearly evident in maltreated children (Lieberman, 2004).

Trauma-related symptomatology

Finally, the presence of trauma-related symptoms following childhood maltreatment, such as post-traumatic stress symptoms of alterations in arousal and reactivity, avoidance, dissociation and reexperiencing, might also contribute to the development and maintenance of transdiagnostical psychopathology.

Alterations in arousal and reactivity. As stated above, elevated emotional reactivity, hypervigilance and arousal (Dannlowski et al., 2012; Daruy-Filho et al., 2011; Glaser et al., 2006; Infurna et al., 2015; Murali & Chen, 2005; van Harmelen et al., 2013), especially in response to potential threat (e.g. Ben-Amitay et al., 2016), has been shown to characterize maltreated children and might lead to different mental disorders. An increase in arousal and reactivity, in particular by exposure to trauma-related cues, has been designated a criterion of PTSD according to DSM-5 (American Psychiatric Association, 2013). Thus, elevated emotional reactivity and hyperarousal are also part of the post-traumatic stress symptom spectrum.

It remains unclear whether in maltreatment survivors heightened emotional reactivity is likewise a specific trauma-related symptom triggered by trauma related stimuli (e.g. Ben-Amitay et al., 2016), or if it is a more generalized stress sensitization linked to an increase in negative affect (e.g., Glaser et al., 2006; Infurna et al., 2015; van Hamerlen et al., 2012), and if this distinction generally plays a role in the development of different psychopathological symptoms. In summary, emotional reactivity has to be studied in more detail in order to clarify if different levels of emotional reactivity can explain multifinality.

Avoidance. As discussed above, maladaptive emotion regulation strategies in response to distress might underly the association between childhood maltreatment and psychopathology (e.g., Heleniak et al., 2016). This includes avoidant emotion-focused coping behaviour or experiential avoidance, which is defined as an unwillingness to experience negative thoughts and feelings accompanied by high efforts to escape from them (Batten et al., 2002; Marx & Sloan, 2005). Likewise, the emergence of avoidance has been particularly associated with early childhood maltreatment experiences (Bell & Higgins, 2015; Rosenbaum et al., 2020). Moreover, recently conducted studies indicate that avoidant emotion-focused coping might be a specific maladaptive and dysfunctional emotion regulation strategy, mediating childhood maltreatment and latter psychopathology (Bodenschatz et al., 2019; Sheffler et al., 2019). Also PTSD is characterised by a persistent avoidance of stimuli associated with the traumatic event.

However, further research is needed to investigate whether in childhood maltreatment survivors (without a full diagnosis of PSTD) avoidance is also pronounced by maltreatment related cues.

Dissociation. As stated above, dissociative symptoms can be regarded as a dimensional coping mechanism related to transdiagnostical psychopathology. However, dissociation might also be considered a PTSD-related symptom. Since its development is assumed to be a result of the exposure to traumatic events, dissociation is strongly associated with PTSD (Briere, 2006), as well as part of its diagnosis.

Re-experiencing. Distinguished by involuntary intrusions, re-experiencing is also a hallmark symptom in post-traumatic stress. Nevertheless, re-experiencing can also occur transdiagnostically and may be a possible mechanism that mediates the link between childhood maltreatment and psychopathology. This factor will be discussed in more detail below, as little research has been done in this context so far.

Intrusions are defined as instances of involuntary or direct (as opposed to voluntary) retrieval whose appearance in consciousness is spontaneous rather than following a deliberate effort or search (Berntsen, 2009; Brewin et al., 2010). Furthermore, intrusions are commonly linked to specific traumatic adverse events (Hackmann & Holmes, 2004). For example, neuropsychological research showed that memory and imagery in intrusions seem to rely on common brain networks activations (Brewin et al., 2010). Intrusive imagery appears to be of theoretical and clinical interest, as it is strongly linked to emotional distress (e.g. Beck, 1970; Horowitz, 1970; Lang, 1977). For example, it has been reported that imagery elicits stronger emotional responses than corresponding verbal cognitions (Holmes & Mathews, 2005; Holmes et al., 2008).

Consistent with this, intrusions are prominent in many types of psychopathology. For example, patients with social phobia reported negative and distorted intrusions linked to earlier memories of adverse social events shortly before the onset of the social phobia disorder (Hackmann et al., 2000). Similiar results were found in other anxiety disorders, such as agoraphobia (Day et al., 2004), body dysmorphic disorder (Osman et al., 2004) and obessive-compulsive disorder (OCD) (Hackmann et al., 2004; Speckens et al., 2007). Most intrusions were either memories of earlier adverse events or were associated with them. Overall, the intrusions were repeated, percieved highly vivid, detailed, mainly visual and with an exceedingly distressing content. In line with this, OCD patients rated the vividness and the sense of reality of their intrusions comparable to intrusions in PTSD (Hackmann et al., 2004)

whereas the distress appeared to be even higher (Speckens et al., 2007). In summary, there is increasing empirical evidence suggesting that intrusions can be regarded as a transdiagnostic process (Hirsch & Holmes, 2007; Mansell et al., 2008). Moreover, it seems to be a dimensional process, as involuntary remembering also appears to be a common, ordinary phenomenon in healthy individuals (Berntsen & Rubin, 2008). However, imagery in healthy individuals is reported significantly less common and distressing (Hackmann & Holmes, 2004). Though, intrusions also differ between disorders, in particular as to their subject (Lipton et al., 2010; Reynolds & Brewin, 1999). Overall, the content of the intrusions corresponds to the specific content of cognitions associated with each disorder. For example, in major depression it deals with negative life events and interpersonal problems and in social phobia with public failure and shame (Brewin et al., 2010). Although in many studies of intrusive imagery, it was not thoroughly investigated which images comply precisely to autobiographical memories, and it was often found that fantasy-based images were associated with features of real memory (Brewin et al., 2010).

Generally, there is preliminary research that trauma-related symptomatology following childhood maltreatment might be an underlying mechanism contributing to the development and maintenance of psychopathology. For example in major depression, Schierholz et al. (2016) found in their multiple mediation model that the association between childhood maltreatment and major depression cannot fully be explained by unspecific mechanisms, i.e., maladaptive emotion regulation strategies, insecure attachment style, etc. By including PTSD symptom severity, the mediatior PTSD added statistical valence to the model and explained the complete association by a full mediation model. However, it was only investigated in major depression, and the sample showed a high comorbidity of PTSD. Therefore, findings have to be replicated in a sample of individuals without diagnosed PTSD who demonstrate major depression or another psychopathology to investigate whether the association was due to the PTSD comorbidity or whether underlying PTSD symptoms might be a transdiagnostic mechanism explaining the relationship between childhood maltreatment and psychopathology. Similar results were noted in a paediatric prospective study, showing that trauma-related symptoms at the age of three appeared to partially or fully mediate the pathways from early childhood maltreatment exposure to greater psychopathology in the following years, accompanied by a lower competence in elementary school. Specifically, young children who manifested avoidance and arousal symptoms were at heightened risk for later internalizing symptoms and poorer social competence whereas those with heightened arousal showed a heightened risk for

later externalizing symptoms (Briggs-Gowan et al., 2011). Ideally, more investigations are needed to figure out in what manner trauma-related symptoms influence these early pathways.

Aims of the present thesis

The aim of the present thesis is to shed light on the mechanisms underlying the association between childhood maltreatment and the development of psychopathology. Therefore, the proposed proximal risk factors as described in the transdiagnostic pathway model (see Fig. 1.1) have to be tested, including emotional reactivity, difficulties in emotion regulation, rumination, dissociation, insecure attachment and posttraumatic stress symptoms.

Since disturbed social and emotional processes linked to psychopathology differ from those of healthy individuals, the results of analogous studies are often not generalizable to clinical populations. To ensure validity of our findings, we have chosen to investigate them directly in clinical samples. In order to assume that the proximal risk factors are transdiagnostically affected it has to be investigated in all mental disorder. As a first step, the three conducted studies examine two different mental disorders. The first two studies were carried out in a disorder group that has only been minimally studied in this context: OCD. The third study was carried out in a sample of patients with major depression - a disorder in which the relationship and mechanisms are already well established (Nelson et al., 2018; Schierholz et al., 2016). The presented research enables a more detailed and differentiated investigation of the underlying mechanisms that associate childhood maltreatment with the development of psychopathology.

Study I

According to the first step of the guideline by Nolen-Hoeksema and Watkins (2011) (a) different levels of a transdiagnostic factors and their relative theoretical and clinical usefulness have to be investigated, most previous studies investigating childhood maltreatment as a risk factor for the development of psychopathology have mostly focused on mental disorders such as PTSD, affective disorders, personality disorders, and substance use disorder (Cohen et al., 2001; Norman et al., 2012). It is necessary to investigate theoretical and clinical usefulness, also in disorder groups that are often neglected, e.g., because of their low prevalence rates. For example, preliminary evidence suggests that childhood maltreatment plays a role in the development and maintenance of OCD, but data is limited and inconsistent. Therefore, we

intended to confirm these findings within a thoroughly diagnosed clinical sample of patients with OCD.

First, we investigated prevalence rates of childhood maltreatment in a sample of patients with OCD, as a primary indicator of theoretical relevance of maltreatment within this disorder group. Second, we examined the influence of specific subtypes of childhood maltreatment on symptom severity of OCD. The third and key goal was to investigate whether childhood maltreatment is linked with poorer treatment outcomes, as found in other disorders, e.g., in major depression (Nelson et al., 2018).

Study II

Further steps in the guidelines by Nolen-Hoeksema and Watkins (2011) require that (b) types of mechanisms by which factors at one level may be related to factors at other levels and (c) types of moderating factors that may determine whether a transdiagnostic factor leads to certain specific disorders or symptoms have to be investigated.

Based on the findings in *Study I*, the aim was to further investigate the underlying mechanisms grounded on our pictured transdiagnostic model in the present sample. Despite considerable indirect evidence, showing that the potential mechanisms described above are associated with both childhood maltreatment and psychopathology, few studies have established formal mediation models. Likewise, potential mediators have been mostly studied in isolation so far, as past studies have typically focused on one or two of these variables. Hence, in the current *Study II* we intended to investigate all suggested mediators within one sample. Finally, we planned to replicate and extend the central findings of Schierholz et al. (2017). They found that emotional dysregulation, avoidance in close relationships and post-traumatic stress symptoms mediated the relationship between childhood maltreatment and depressive symptom severity, partially matching with our transdiagnostic model presented above. However, it has to be examined whether these findings can be generalized transdiagnostically to other mental disorders, such as OCD. Hence, the aim of *Study II* was to test the role of emotion regulation deficits, rumination, insecure attachment style, dissociation, and post-traumatic stress symptoms as potential mediators in the link between childhood maltreatment and symptom severity in a clinical sample of patients with OCD.

Study III

As stated above, emotional reactivity plays an important role in psychopathologies such as major depression. Therefore, it has been investigated extensively, with conflicting results. On the one hand, there is evidence that major depression is associated with reduced emotional reactivity to positive and negative stimuli. On the other hand, findings suggest an increased emotional reactivity to negative stimuli. Using our transdiagnostic model we suggest that one potential moderator may be childhood maltreatment. As stated above, increased arousal or emotional responsivity to aversive stimuli is a key mechanism for the link between childhood maltreatment and psychopathology. It is therefore plausible that the severity of childhood maltreatment, which is highly prevalent in patients with major depression, might partly, contribute to inconsistent findings. Therefore, the aim of *Study III* was to test this hypothesis by examining the impact of childhood maltreatment on emotional reactivity in individuals with major depression but without PTSD.

In addition, we investigated if there is a difference in heightened emotional reactivity (a) triggered by trauma related stimuli, similarly to criterion E of the PTSD diagnosis (e.g., Ben-Amitay et al., 2016), or (b) triggered by generalized distress (e.g., to aversive psychosocial stress, such as social exclusion), as specified in criterion C (e.g., Glaser et al., 2006; Infurna et al., 2015; van Hamerlen et al., 2012), and its relation with post-traumatic stress symptoms.

2. Study I:

Impact of Childhood Maltreatment on Obsessive-Compulsive Disorder symptom severity and treatment outcome

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Abstract

Background. Preliminary evidence suggests childhood maltreatment to play a causal role in the development and maintenance of obsessive-compulsive disorder (OCD). However, both the effect of childhood maltreatment on the course of OCD treatment and the role of specific subtypes of maltreatment remain largely unknown.

Objective. This study aimed to investigate the relationship between childhood maltreatment and the severity and time course of OCD symptoms within a clinical sample of OCD patients (*N*=68). We hypothesized that higher levels of childhood maltreatment in OCD patients would be associated with higher symptom severity and worse treatment outcomes.

Method. Assessments of childhood maltreatment, OCD symptomatology, and related variables were completed in a sample of OCD patients before and after inpatient treatment as well as at 6 month follow-up.

Results. Emotional abuse, sexual abuse and neglect were highly prevalent in our sample. Additionally, severity of experienced childhood maltreatment was associated with higher OCD symptom severity, with the strongest association found for emotional abuse. Hierarchical linear models indicated that patients with childhood maltreatment showed higher OCD symptom severity at pre-treatment, post-treatment, and follow-up compared to patients without these experiences. However, childhood maltreatment did not moderate symptom improvement during treatment.

Conclusion. Thus, although childhood maltreatment is not related to treatment outcome, it is highly prevalent among OCD patients and childhood trauma survivors still show higher OCD symptom severity after treatment. Therefore, childhood maltreatment should be considered in psychological interventions in individuals with OCD.

3. Study II:

Potential mediators of the association between childhood maltreatment and obsessive-compulsive disorder in adulthood

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Abstract

Background. Childhood maltreatment (CM) is associated with enhanced symptom severity of obsessive-compulsive disorder (OCD). However, little is known about the mechanisms underlying this relationship. In order to improve treatment for CM survivors suffering from OCD, it is important to understand the psychological processes mediating the putative association between CM and OCD.

Method. The aim of the study was to investigate the role of emotion regulation difficulties, rumination, attachment, dissociation, and posttraumatic stress symptoms as potential mediators between CM and OCD symptom severity in a clinical sample of OCD patients (*N*= 68). Participants completed self-report questionnaires and standardized clinical diagnostic interviews while attending specialized inpatient treatment for OCD. To test hypothesis-based mediation models, mediation analyses were calculated using a regression-based approach.

Results. As predicted, all hypothesized factors were found to mediate the association between CM and OCD symptom severity. Additionally, more severe CM leads to increased difficulties in emotion regulation, anxiety in close relationships, rumination, dissociative symptoms, and posttraumatic symptoms, which subsequently leads to more severe OCD symptoms.

Conclusions. The findings point towards psychological processes that might be responsible for the well-studied relationship between CM and OCD. Implications for future research and clinical management of OCD in CM survivors are discussed.

4. Study III:

Emotional Reactivity in Major Depression: The Impact of Childhood Maltreatment

This chapter is a pre-copyedit version of an article submitted in *Brain and Behavior:*

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Abstract

Background. Emotional reactivity plays an important role in major depression (MDD) and has therefore recently been investigated widely, with conflicting results. First, there is evidence that MDD is associated with *reduced* emotional reactivity to positive and negative stimuli. However, other findings suggest an *increased* emotional reactivity to negative stimuli. To better understand these conflicting findings, it appears central to investigate moderators of emotional reactivity in MDD. One potential moderator might be childhood maltreatment (CM), as this has been linked to increased emotional reactivity and is highly prevalent in MDD.

Method. The aim of the study was to investigate the impact of CM on emotional reactivity in individuals with MDD. Therefore, we assessed self-reported behavioural and physiological emotional reactivity to general negative and individualized trauma-related scripts in MDD patients.

Results. As hypothesized, MDD patients reporting higher levels of CM perceived the negative script imagery as more aversive and distressing when compared to the neutral script. In addition, MDD patients reporting higher levels of CM also rated the trauma-related script imagery as more aversive and distressing, experienced higher arousal, and used more avoidance while imagining this script compared to the neutral script. However, no effect of CM on physiological responses during the script imagery task was found.

Conclusions. Overall, CM appears to be related to increased subjective emotional reactivity – but not psychophysiological reactivity – in depressed individuals, and might help to explain discordant results in the literature regarding emotional reactivity in MDD. Implications for future research and psychological interventions of MDD with CM are discussed.

Introduction

Emotional reactivity has been suggested to play an important role in major depression (MDD) and has therefore been widely investigated in recent decades (e.g., Bylsma et al., 2008). Interestingly, however, findings regarding an association between emotional reactivity and MDD have been mixed. For example, Rottenberg et al. (2005) suggested in their emotion-context insensitivity hypothesis that MDD is characterized by an attenuated emotional reactivity across emotion-eliciting contexts. In line with this hypothesis, a growing body of research has found further support for the concept of emotional context insensitivity in MDD. For example, laboratory-based studies exposing participants to emotion-eliciting stimuli (e.g., films, idiographic imagery) have shown diminished self-reported behavioural and physiological emotional reactivity to positive and negative stimuli in depressed participants when compared to healthy controls (Rottenberg et al., 2005, Rottenberg & Gotlib, 2004; Rottenberg & Cowden Hindash, 2015). Moreover, reduced differences in responding differently to sad vs. neutral contexts was related to higher MDD severity, longer illness duration, and lower levels of overall psychosocial functioning (Rottenberg et al., 2002).

On the other hand, another line of research has shown opposite findings. For example, increased self-reported emotional reactivity to daily life events has been reported in individuals suffering from MDD (e.g., Bylsma et al., 2011). Furthermore, a series of studies have shown increased behavioural as well as neurobiological responses to stressors (Grillon et al., 2013; Suslow et al., 2010), as well as increased psychophysiological responses to negative stimuli (e.g., Sigmon & Nelson-Gray, 1992; Golin et al., 1977; Lewinsohn et al., 1973).

This diverging pattern of findings raises the crucial question of which variables might moderate the emotional hyper- vs. hypo-responsivity to emotional stimuli in individuals with MDD. The current manuscript focuses on the role of childhood maltreatment (CM) as a possible explanatory variable for differences in emotional reactivity in individuals with MDD. CM is a promising candidate for several reasons. To begin with, CM is highly prevalent in patients with MDD, with on average 45% of patients reporting some form of CM (Nelson et al., 2017). In addition, CM has been shown to be related to higher severity and chronicity and lower treatment response in MDD (e.g., Arcata et al., 2005; Bernet et al., 1999; Comijs et al., 2013; Nanni et al., 2012; Nelson et al., 2017). Moreover, there is extensive evidence showing that CM is related to increased emotional reactivity in two regards. First, individuals with early traumatic experiences, such as emotional, physical or sexual abuse, or emotional or physical neglect (i.e.,

CM) have been found to show *generally increased emotional reactivity*, independent of a posttraumatic stress disorder (PTSD) diagnosis. For example, increased emotional reactivity was reported in healthy individuals with a history of CM in response to daily life stress (Glaser et al., 2006; Infurna et al., 2015, Wichsers et al., 2009). These findings were extended by evidence showing increased neurobiological reactivity to threat-related emotional faces in healthy individuals with CM (Dannlowski et al., 2012; van Hamerlen et al., 2012). Moreover, enhanced psychophysiological responses have been found in response to stressors as well as during a resting period (Pole et al., 2007; Murali & Chen, 2005; Bonnano et al., 2003). Importantly, in two studies, increased general emotional reactivity was also found in individuals with a history of CM who also suffered from MDD or anxiety disorders (Glaser et al., 2006; van Hamerlen et al., 2012). In addition to generally increased emotional reactivity, there is evidence that CM experiences are specifically related to high emotional reactivity to trauma-related stimuli. For example, a study investigating physiological reactivity to emotional pictures in a group of sexually abused women found increased reactivity to trauma-related pictures in sexually abused females compared to females without CM (Ben-Amitay et al., 2016). However, 25% of participants with CM in this sample were diagnosed with PTSD, around 30% with past or present MDD, and around 35% with other disorders. Therefore, it is unclear to what degree these findings are a consequence of exposure to CM or, for example, driven by clinical PTSD or other symptomatology.

In sum, there is consistent evidence for a link between CM and increased general emotional responsivity as well as high emotional and physiological reactivity to trauma-related stimuli. It therefore appears conceivable that the severity of CM, which is common in patients with MDD, may partly explain differences in emotional and physiological reactivity within an MDD population. The aim of the current study is to directly test this idea by investigating the impact of CM on emotional reactivity in individuals with MDD but not PTSD. As PTSD has consistently been shown to be associated with increased reactivity to trauma reminders, it appeared important to exclude participants suffering from comorbid MDD and PTSD in order to test whether CM is related to emotional reactivity in MDD. Furthermore, we want to investigate whether this heightened emotional reactivity is specific to trauma-relevant stimuli (e.g., Ben-Amitay et al., 2016) or whether it is more generalized (e.g., Glaser et al., 2006; Infurna et al., 2015; van Hamerlen et al., 2012). We assessed self-reported behavioural and physiological emotional reactivity to negative and individualized trauma-related scripts in a sample of patients receiving treatment for MDD, whereby the negative script represented an

everyday aversive interpersonal situation. We hypothesized that the severity of CM is related to higher emotional reactivity to trauma-related scripts (compared to neutral scripts; H1) as well as to negative scripts (compared to neutral scripts; H2).

Method

Sample

During a period of one year, 69 patients with MDD, who were receiving inpatient treatment at a specialized clinic, were recruited. Inclusion criteria for study participation were a primary diagnosis of MDD according to DSM-IV and the age of legal majority. Exclusion criteria were a diagnosis of PTSD, being actively psychotic or demented or currently abusing alcohol and/or drugs. Further information on the demographic data can be found in Table 4.1.

Table 4.1. Demographic and clinical characteristics of the sample (N = 69)

	M	*SD*
Age in years	40.91	13.92
Education in years	15.54	3.84
Age at onset of clinical MDD symptoms, years	29.81	16.83
Number of depressive episodes	3.29	2.55
MDD symptom severity[a]	31.59	13.53
	N	%
Gender (female)	23	32.9
Marital status (in stable partnership or married)	39	55.7
Handedness (right)	64	92.8
Psychopharmacological treatment		
Antidepressants	50	72.5
Benzodiazepines	0	0
Stimulants	1	1.4
Mood stabilizers	1	1.4
Antipsychotics	10	14.5
Comorbid axis I disorders[c]		
any anxiety disorder	31	44.9
somatoform disorder	8	11.6

Note. MDD = major depression disorder.
a. measured with the Inventory of Depressive Symptoms (IDS).
b. number of patients above CTQ cut-off scores for more than minimal CM according to (Bernstein et al., 2003).
c. measured with the Structured Clinical Interview for DSM-IV (SCID I).

Measures and tasks

Participants completed self-report questionnaires and standardized diagnostical clinical interviews. All interviewers were trained and supervised by an experienced clinical psychologist.

Assessment of MDD and comorbid DSM-IV Axis I Disorders

DSM-IV Axis I diagnoses were assessed using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I)[1] (First et al., 2002; Wittchen et al., 1997). In addition, MDD symptom severity was assessed with the Inventory of Depressive Symptoms (IDS-SR). To assess for a diagnosis of PTSD, which was an exclusion criterion, we used a 30-item structured interview, the Clinician-Administered PTSD Scale for DSM-5 (CAPS-5), in combination with the Life Events Checklist for DSM-5 (LEC-5) (Schnyder, 2013; Weathers et al., 2013). Participants meeting diagnostic criteria for PTSD were then excluded from study participation.

Childhood maltreatment

The Childhood Trauma Questionnaire – Short Form (CTQ) (Bernstein et al., 2003; Wingenfeld et al., 2010) was used to measure CM. It is a brief, standardized, and well-validated self-report inventory to retrospectively assess abuse and neglect (with five subscales: emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect). The CTQ contains 28 statements (e.g., 'When I grew up, I was punished with a belt, a board, a cord, or some other hard object'), and the respondent is instructed to answer on a 5-point Likert scale from 'never true' (1) to 'very often true' (5).The internal consistency in the current study was good for the CTQ total score (Cronbach's $\alpha = .88$).

Script imagery task

The script-driven imagery procedure used here is based on published standard script-driven imagery procedures (e.g., Orr et al., 1998; Pitman et al., 1987) and is a commonly used paradigm for symptom provocation in PTSD research. The duration of the scripts used in the current study slightly deviates from the original approach (Pitman et al., 1987) but is in line with a more recent modified version of the task (Sack, Hopper & Lamprecht, 2004; Sack et al.,

[1] Please note that at the time of the assessment, the German version of SCID-5 was not yet available. Therefore, MDD was diagnosed using the SCID for DSM-IV. The only major change in diagnostic criteria for MDD between these DSM versions was the deletion of the criterion 'bereavement exclusion'. In the current sample, no participant experienced the current MDD symptoms in response to a recent loss. Therefore, all participants met criteria for MDD according to both DSM-IV and DSM-5.

2012). Specifically, scripts of 3-4 min rather than 30 sec were used, and no extra imagery period took place after the script had ended.

The neutral script described a situation of washing dishes (as used in Sack et al., 2012), and the negative script described a situation of social exclusion and negative social assessment in a professional context. Both scripts were standardized, i.e. had exactly the same content for each participant. The trauma-related script, however, consisted of the idiographic CM experience experienced by the respective participant, which had been assessed in advance. All trauma scripts were prepared and recorded in a neutral voice for playback in the laboratory by the study's principal investigators, and described the scenario in detail.

Responses to Script-Driven Imagery Scale

The Responses to Script-Driven Imagery Scale (RSDI; Hopper et al., 2007) was used to measure posttraumatic stress symptoms caused by the Script-Driven Imagery task. The RSDI is an 11-point scale designed to measure symptomatic responses to exposure to traumatic events, such as those occurring in the script-driven imagery task. The RSDI has three empirically derived factors: re-experiencing, avoidance and dissociation. Each item (e.g., 'did you avoid thinking about the event'; 'did you feel the event reappear as if you were experiencing it again') is measured on a scale from 0 (not at all) to 6 (very much). The RSDI demonstrates adequate to strong internal consistency, divergent and convergent validity with self-reports and physiological indices for the response to script-driven imagery, as well as with established measurements of PTSD symptoms and dissociation. This measure has shown good psychometric properties, also in studies with repeated script-controlled imaging and in the German version (Hopper et al., 2007; Sack et al., 2008). The ratings for the RSDI were performed after each script presentation, and a total symptom score for each exposure trial was calculated by summarizing the results for the subscales re-experiencing, avoidance and dissociation. In our sample, the internal consistency, for example for the trauma script, was good for the subscales re-experiencing and avoidance (Cronbach's α = .81-.89) and satisfactory for the subscale dissociation (Cronbach's α = .54).

Psychophysiological measures

Psychophysiological data was recorded using a six channel wearable amplifier system (Mobi; Twente Medical Systems International [TMSi], EJ Oldenzaal, Netherlands) and the recording software package Polybench 1.22 (TMSi) with a sampling rate of 1024 Hz, streamed to disk and displayed on a PC monitor for online monitoring of data quality. Offline data

inspection and manual artefact rejection for electromyography (EMG), electrocardiogram (ECG) and electro dermal activity (EDA) was done in ANSLAB 2.6, a software suite for psychophysiological recordings (Blechert et al., 2015). Responses were defined for all variables as averages across the script relative to a 1 min baseline (untransformed raw values used). Separate averages were generated for all imagery scripts.

Facial EMG electrodes for the bipolar recording of the corrugator supercilii and musculus frontalis activities were placed on the left side of the face according to international guidelines (Fridlund & Cacioppo, 1986). EMG pre-processing comprised a 28 Hz high-pass filter, a 50 Hz notch filter, rectification, low pass filtering (15.92 Hz), and a 50 msec moving average filter. Skin conductance response (SCR) was measured in micro Siemens via Ag/AgCl electrodes filled with isotonic paste and placed on the hypothenar surface of the medial phalanges of the middle and index fingers of the nondominant hand. For pre-processing of the SCR, a 1 Hz low-pass filter was used. Heart rate (HR) was recorded via ECG continuously in beats per minute (bpm). Artefacts from ectopic or missed beats were detected as outliers appearing as spikes from the adjacent interbeat interval (IBI) curve, deleted, and interpolated from adjacent measurements. HR was used to calculate heart rate variability (HRV) parameters by the ANSLAB software as high frequency (0.14-0.50 Hz) spectral power density in both HRV parameters – frequency-domain (high frequency power; natural logarithm of spectral power; logHFBpower in $msec^2$) and time-domain (root mean square of the successive differences; RMSsd) – of IBI variability, following established guidelines (Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology, 1996).

Procedure

The study was approved by the Research Ethics Committee of the Department of Psychology at LMU Munich and recruitment and study assessment took place at the clinic at the beginning of participants' inpatient stay for MDD treatment. The assessment was divided over 3 sessions of 2 hours each, with a one-week interval in between each session.

In the first two assessments sessions, interviews and questionnaire measures were conducted. After having signed a written consent form, participants were first interviewed with the SCID-I to establish diagnoses of MDD and comorbid axis I disorders. Subsequently, the CAPS-5 was carried out to evaluate diagnostic criteria for PTSD (exclusion criteria). After demographic data and control information for the physiological assessment (e.g., handedness, current drug consumption) had been collected, participants then filled in self-report

questionnaires, such as CTQ and IDS-SR. Afterwards, participants were asked in a semi-structured interview about their worst CM experience and had to describe it in detail for the preparation of the script imagery task.

In the 3rd session, the script imagery task was conducted. The laboratory assessment started with sensor application for EMG, ECG and EDA, followed by a 3-minute quiet sitting baseline. At the beginning of the presentation, participants' current mood was checked using the multidimensional state questionnaire (MDBF; Steyer, Schwenkmezger, Notz, & Eid, 1997). Before starting the audio script task, participants were instructed to imagine the situation described in the forthcoming audio script as vividly as possible, as if it were happening at that moment, while closing their eyes or looking at the fixation cross on the screen. This was done to facilitate emotional engagement with the task. For a first trial run, each participant heard a relaxation script to become familiar with the imagination task. A neutral audio script, a negative script and an individualized CM-related script were then presented to participants in a pseudorandomized order (CM-neutral-negative vs. negative-neutral-CM). Immediately following each audio script, participants were asked to judge their emotional response during the task ('How did you feel while imagining the content of the audio script?') by rating levels of distress (no distress to extreme distress), valence (pleasant to unpleasant), arousal (calm to aroused), and vividness on separate scales ranging from 0 to 100. Based on published script-driven imagery procedures (e.g., Orr et al., 1998; Pitman et al., 1987), each trial consisted of five sections: (a) prescript rating; (b) 1 min baseline period; (c) 3-4 min script presentation; (d) 3 min recovery; and (e) completion of postscript visual analogue scales (valence, arousal, vividness, distress) and RSDI. The next trial was identical to the first trial with the exception of script content. The audio scripts were presented with noise-suppressing headphones, using E-Prime 2.0 Professional (Psychology Software Tools, Inc., Sharpsburg, PA, USA). The volume was constant across participants. After completion of the task and sensor removal, participants were debriefed and asked to contact their therapist if necessary.

Statistical analysis

The alpha level for all analyses was set to .05. All statistical analyses were performed using SPSS Statistics 24 (SPSS Inc., Chicago, IL, USA). In order to test Hypotheses 1 and 2, we estimated a two-level multilevel linear model with random intercepts and random slopes. Physiological emotional reactivity measurements, like baseline-corrected HRV, SCR, EMG, as well as subjective measures, such as the visual analogue scales (valence, arousal, vividness,

distress) and RSDI questionnaire scores, served as the dependent variables and were each predicted by the negative and trauma script (Level 1, within-subject) compared to the neural script, CTQ score (grand mean centred, Level 2, between-subjects), and their cross-level interactions.

Results

Sample characteristics and prevalence of CM

Descriptive statistics for demographic, clinical, and neuropsychological control measures are presented in Table 4.1. Baseline IDS-SR scores indicated a severe level of depressive symptoms across all participants (M = 31.59, SD = 13.53). Prevalence of CM in our sample is shown in Table 4.2 and indicates that although only 24.6% reached clinical cut-off (moderate to extreme) for the CTQ sum score, 56.5% of the sample had experienced some type of child abuse and neglect in the clinical range, with the highest prevalence found for emotional abuse and neglect. Nearly 66% of those with CM experiences reported more than one subtype (N = 26).

Table 4.2. Prevalence of CM in the MDD patient sample (N = 69)

CTQ Subscale	CM *n* (%)†				CTQ *M* (*SD*)
	none to low	low to moderate	moderate to severe	severe to extreme	
Emotional abuse	28 (40.6)	19 (27.5)	10 (14.5)	12 (17.4)	10.71 (4.75)
Physical abuse	58 (84.1)	4 (5.8)	5 (7.2)	2 (2.9)	6.29 (2.18)
Sexual abuse	56 (81.2)	8 (11.6)	5 (7.2)	0 (0)	5.49 (1.28)
Physical neglect	39 (56.5)	16 (23.2)	12 (17.4)	2 (2.9)	7.38 (2.46)
Emotional neglect	17 (24.6)	24 (34.8)	11 (15.9)	17 (24.6)	13.16 (5.12)
Total CM	23 (33.3)	29 (42)	15 (21.7)	2 (2.9)	43.03 (12.02)

Note. MD, major depression; CM, childhood maltreatment; CTQ, the Childhood Trauma Questionnaire – Short Form (CTQ).
†. number of patients above CTQ cut-off scores according to (Bernstein et al., 2003).

Emotional reactivity to audio scripts

Descriptives for all variables assessed in relation to the script imagery task are shown in Table 4.3. First, a series of multilevel analyses was conducted with indices of physiological reactivity to the scripts as dependent variables, and type of script (dummy coded: negative vs. neutral; trauma vs. neutral), CTQ scores, and script type x CTQ interaction as predictor variables (see Table 4.4). Results showed significant higher skin conductance responses during the trauma script and the negative assessment compared to the neutral script for the total sample. However, for the other psychophysiological measures (HRV, EMG), no significant effects of script type were found. In contrast to the hypotheses, neither a main effect of CM on any of the physiological response measures to the trauma and the negative script nor interaction effects involving the CTQ were found.

Second, we repeated the analyses for subjective indices of emotional reactivity to the script imagery task. Results showed increased reactivity for the negative and trauma scripts compared to the neutral script assessment on the ratings of valence, arousal, vividness and distress, as well as on responses to the script-driven imagery scale measuring posttraumatic stress symptoms (re-experiencing, avoidance and dissociation). In line with the hypotheses, individuals with higher global CTQ scores indicated greater negative valence and more distress, as well as increased arousal, and indicated using more avoidance strategies in response to the trauma script compared to the neutral script (H1). Similarly, CTQ scores were also significantly positively related to heightened valence and distress, as well as re-experiencing and dissociation in response to the negative script compared to the neutral script (H2).

Table 4.3. Variables related to the Script Imagery Task: Descriptives

	Audio script					
	Neutral		Negative		Trauma	
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*
Psychophysiological measures[a]						
HRV time domain (RMSsd)	-2.40	13.19	-0.77	14.99	-2.75	13.66
HRV frequency domain (logHFBpower)	-0.39	0.92	-0.34	0.94	-0.36	0.87
Skin conductance response	-0.81	0.52	-0.41	0.49	0.07	0.59
Electromyography (EMG) corrugator supercilii	-0.64	1.83	-0.60	1.81	-0.60	1.80
EMG musculus frontalis	1.37	10.60	0.70	3.91	0.86	2.44
Subjective measures						
Valence	33.58	19.64	60.58	18.07	73.81	19.63
Arousal	24.04	20.80	48.45	21.43	69.25	21.57
Vividness	76.98	23.81	65.85	22.08	83.89	16.55
Distress	18.50	22.21	41.70	23.38	66.58	22.72
RSDI re-experiencing	6.80	4.61	8.99	5.90	15.47	5.79
RSDI avoidance	2.28	3.12	3.97	4.16	5.46	4.54
RSDI dissociation	4.09	4.52	5.67	4.32	6.57	4.62

Notes. HRV= Heart Rate Variability; RMSsd = Root mean square of the successive differences; logHFBpower= natural logarithm of high frequency spectral power; RSDI= Responses to Script-Driven Imagery Scale;
[a] base-line corrected values

Table 4.4. Results of the linear mixed effects model for all dependent variables of the psychophysiological and subjective measures.

	HRV time domain (RMSsd)			HRV frequency domain (logHFBpower)			Skin conductance response			Electromyography (EMG) corrugator supercilii			EMG musculus frontalis		
Fixed parts	*B*	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*
Intercept	-2.42	1.65	.147	-0.38	0.11	**.001**	-0.81	0.06	**<.001**	1.38	0.99	.166	-0.65	0.22	**.004**
script negative (t1)	1.63	1.25	.196	0.04	0.07	.530	0.39	0.05	**<.001**	-0.68	1.12	.548	0.04	0.27	.878
script trauma (t2)	-0.37	0.90	.684	0.02	0.08	.742	0.89	0.09	**<.001**	-0.60	1.07	.581	0.04	0.29	.877
CTQ	-0.02	0.14	.910	-0.01	0.01	.433	0.01	0.01	.108	-0.05	0.08	.532	0.004	0.02	.828
CTQ x t1	0.00	0.10	.995	0.00	0.01	.838	0.003	0.004	.447	0.05	0.09	.591	0.02	0.02	.488
CTQ x t2	-0.07	0.07	.364	0.01	0.01	.293	-0.003	0.01	.708	0.04	0.09	.693	-0.02	0.02	.503

	Valence			Arousal			Vividness			Distress		
Fixed parts	*B*	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*
Intercept	33.55	2.38	**<.001**	24.40	2.56	**<.001**	76.66	2.90	**<.001**	18.59	2.69	**<.001**
script negative (t1)	27.03	3.22	**<.001**	23.89	3.56	**<.001**	-10.88	3.45	**.002**	23.42	3.07	**<.001**
script trauma (t2)	40.19	3.19	**<.001**	44.74	3.09	**<.001**	7.17	3.14	**.026**	47.89	3.19	**<.001**
CTQ	-0.39	0.20	.054	-0.14	0.21	.517	-0.10	0.24	.683	-0.45	0.22	**.047**
CTQ x t1	0.62	0.27	**.024**	0.45	0.30	.138	0.13	0.29	.664	0.99	0.26	**<.001**
CTQ x t2	0.74	0.27	**.007**	0.56	0.26	**.034**	0.38	0.26	.155	0.88	0.27	**.002**

	Responses to Script-Driven Imagery Scale (RSDI) re-experiencing scale			RSDI avoidance scale			RSDI dissociation scale		
Fixed parts	*B*	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*
Intercept	6.81	0.59	**<.001**	2.31	0.37	**<.001**	4.15	0.53	**<.001**
script negative (t1)	2.21	0.68	**.002**	1.63	0.47	**.001**	1.50	0.48	**.002**
script trauma (t2)	8.63	0.79	**<.001**	3.14	0.52	**<.001**	2.41	0.67	**.001**
CTQ	-0.01	0.05	.877	-0.04	0.03	.246	-0.09	0.04	**.041**
CTQ x t1	0.14	0.06	**.019**	0.07	0.04	.077	0.13	0.04	**.001**
CTQ x t2	0.08	0.07	.227	0.15	0.04	**.001**	0.07	0.06	.210

Notes. t1= dummy for neutral-negative script comparison; t2= dummy for neutral-trauma script comparison; HRV= Heart Rate Variability; RMSsd = Root mean square of the successive differences; logHFBpower= natural logarithm of high frequency spectral power; CTQ= the Childhood Trauma Questionnaire – Short Form (CTQ).

Discussion

The present study investigated the impact of CM on emotional reactivity in individuals with MDD using the script imagery method with traumatic, negative and neutral scenarios. Our sample of depressed patients showed differential responses to the different scripts, with increased subjective emotional responding as well as increased skin conductance responses to the negative and traumatic scripts in comparison to the neutral script. The key hypothesis of the current study was that CM severity would be related to the degree of emotional responding to the trauma-related and negative scripts (compared to the neutral script). This was supported by robust effects of CM severity on subjective responses to the audio scripts. Specifically, MDD patients with higher levels of CM perceived the trauma script as more aversive and distressing, experienced higher arousal, and used more avoidance as an emotional regulation strategy compared to the neutral script. Moreover, MDD patients with higher levels of CM also rated the negative script as more aversive and distressing, and showed more re-experiencing and dissociation experiences in response to the negative script than to the neutral script. On the other hand, and in contrast to the hypotheses, no effects of CM on psychophysiological variables was found.

The finding of heightened emotional responsivity to trauma-related and negative material in MDD patients with high CM load is consistent with results from earlier studies showing that CM survivors in general subjectively experience and report higher emotional reactivity towards aversive and stressful life events (Glaser et al., 2006; Infurna et al., 2015). In addition, our findings are consistent with the view that CM severity could explain part of the heterogeneity of findings in earlier research. Specifically, they may suggest the existence of a subgroup of MDD patients with high CM load who are more responsive to trauma-related triggers, as well as triggers related to stressful life events more generally (e.g., social threat situations), than MDD patients without such CM experiences, who may, in turn, show stronger context insensitivity as described by Rottenberg et al. (2005).

It has recently been suggested that alterations in emotional reactivity developed as a consequence of CM exposure may represent an enduring phenomenon persisting into adulthood that might, in turn, increase individuals' vulnerability to psychopathology (Weissman et al., 2019). First evidence that this could indeed be the case for the development of MDD following CM comes from a longitudinal study of adolescents showing that higher levels of CM

experiences were related to heightened emotional reactivity to stress; emotional reactivity, in turn, predicted the subsequent onset of MDD in adulthood (McLaughlin et al., 2010).

It appears likely that the link between heightened emotional reactivity and psychopathology is moderated by a number of additional vulnerability factors, including emotion regulation. For example, there is preliminary evidence that dysfunctional emotion regulation strategy use may moderate the association between CM and psychopathology (Heleniak et al., 2016). Specifically, a combination of heightened emotional reactivity and excessive use of emotional avoidance as a dysfunctional emotion regulation strategy may be characteristic of CM survivors with depression. Although, to our knowledge, no study has directly tested this hypothesis, there is consistent indirect evidence supporting the role of emotional avoidance in addition to high emotional reactivity in this context. First, MDD patients with high CM load in our sample showed both heightened emotional reactivity and increased avoidance in response to the trauma-related script. Second, there is consistent evidence showing that CM experiences are related to (emotional) avoidance (Bell & Higgins, 2015; Rosenbaum et al., 2020), and results of a longitudinal study suggest that avoidant emotion-focused coping might link CM and subsequent psychopathology (Sheffler et al., 2019). Futhermore, recent research indicates that depressed individuals with CM exposure are disposed to avoid processing of threatening or burdensome stimuli by reducing attention and attention shift (Bodenschatz et al., 2019). Finally, there is also consistent research linking (emotional) avoidance to MDD, i.e. it predicts the development (Blalock & Joiner, 2000; Jacobson & Newman, 2014) and maintenance of MDD symptoms (Shahar & Herr, 2011), and is particularly linked to a chronic course of MDD (Brockmeyer et al., 2015).

Unexpectedly, participants with high CM load not only reported heightened emotional responses to the negative script but also indicated high levels of re-experiencing and dissociation symptoms while listening to this script. This was surprising because – in contrast to the trauma-related script – the negative script was generic and not about a personal experience. However, it cannot be ruled out that the script bore similarity to things experienced by our participants, and may have therefore unintentionally also been trauma-related. Specifically, the content of this script (social exclusion in a work context) could have triggered memories of emotional abuse experienced by a large proportion of our sample, leading to increased fear of exclusion and rejection sensitivity frequently observed in MDD patients (Chesin et al., 2015; Khan et al., 2015). In order to further test whether heightened emotional

reactivity is event-specific or more generalized, future research should use a broader range of negative scripts differing in their resemblance to participants' personal experiences.

In contrast to our hypotheses, and unlike some earlier findings (e.g., Ben-Amitay et al., 2016), the association between CM and emotional reactivity was restricted to subjective variables; levels of CM were not related to physiological reactivity in response to trauma-related or negative script imagery. There are several possible explanations for this unexpected finding. First, our sample showed overall lower levels of CM than earlier MDD samples reported in the wider literature (Nelson et al., 2017). Second, previous research often focused on certain CM subtypes, for example, sexual abuse (Ben-Amitay et al., 2016). Although more than half of our sample reported some subtype of CM above the clinical cut-off, most of them had experienced emotional abuse and neglect, and only 7% reported sexual abuse. It cannot be ruled out that different types of CM might differentially be related to physiological responsiveness to trauma script imagery. Third, although the lack of increased, heightened physiological responding in CM survivors in our sample conflicts with some earlier findings, it is in line with another set of studies showing dissociations between subjective versus physiological responding in survivors of multiple traumas. For example, McTeague et al. (2010) compared responses to script-driven emotional imagery (idiographic trauma-related and standardized negative) in a PTSD sample with either single-trauma or multiple-trauma exposure (which often included CM experiences). In this earlier study, only the single-trauma survivors demonstrated robust startle and autonomic responses, exceeding those shown by PTSD patients who had survived multiple traumatic events. Of note, despite their greater subjective reported aversion and arousal compared to a single-trauma group, the multiple-trauma group even showed blunted defensive reactivity. Moreover, the multiple-trauma group was related with more chronic and severe PTSD symptoms, higher prevalence of comorbid MDD (85%), and more pervasive dimensional dysphoria. The authors concluded that multiple traumas in contrast to a single trauma yielded a different psychophysiological profile characterized by a more blunted reactivity and higher comorbidity of depressive symptoms, although verbal reports were consistent with the diagnostic criteria implicating exaggerated hyperarousal in PTSD. This theory is supported by animal studies with rats showing that short stressors evoke anxiety and hyperarousal symptoms, whereby chronic stressors lead to anhedonia and depressive behaviour (Avgustinovich et al., 2005; Rygula et al., 2005). It may be assumed that an alarm reaction of the body no longer occurs regularly when stressful events happened continuously and became habituated. Interestingly, however, the strong subjective perception and evaluation of stress

seems to persist. Nevertheless, further experimental studies are needed to test this hypothesis and to further investigate the divergence of emotional reactivity at a subjective or physiological level, especially under separate consideration for single versus multiple traumas.

Limitations

A number of limitations need to be taken into account when interpreting the study findings. First, as mentioned above, the prevalence for CM in our sample was considerably lower than typically reported in the wider literature (e.g., Nelson et al., 2017). This may be due to self-selection during recruitment, where potential participants received the information that our study addressed the relationship between early trauma and depression. We cannot rule out that in such a setting, individuals with a particularly high CM exposure may have refused to participate in the study, possibly due to a prominent avoidance tendency as discussed above. Second, we did not exclude individuals receiving psychopharmacological treatment, which may have influenced the psychophysiological measures. However, a recent meta-analysis comparing effects of psychopharmacological treated samples and medication-free samples did not find different results regarding HRV measures (Alvares et al., 2016). Third, the results showed that the negative and trauma scripts were also experienced more vividly than the neutral script, which may have had an influence on emotional reactivity in general. However, if this had been the reason for increased reactivity, it probably should have been also shown in psychophysiological measures.

Conclusion

Overall, the current study showed that CM may have an impact on generally increased emotional reactivity in individuals with MDD. Our results might contribute to better understanding the inconsistent findings reported so far on emotional reactivity in depressed individuals in earlier studies, highlighting the role of CM load as a moderator. Of note, we also found strong avoidance behaviour within this group, which may suggest that avoidance as a maladaptive emotion regulation strategy might be a moderator that needs to be taken into account when examining the role of emotional reactivity in CM survivors with depression. Future research should directly test the idea that a combination of heightened emotional reactivity and high emotional avoidance may be characteristic of CM survivors with depression. Conversely, on the physiological level, no increased reactivity to negative or trauma-related scripts compared to neutral scripts was found in individuals with CM and MDD. However,

previous studies show that the high divergence of subjective and physiological emotional reactivity might indicate a characteristic pattern of emotional responding in individuals with chronic and multiple instances of traumatization. However, this theory still requires more detailed investigations in the future.

5. General Discussion

The major goal of the present thesis was to examine the mechanisms underlying the association between childhood maltreatment and psychopathology.

To this end, *Study I* and *II* tested a clinical sample of patients with OCD whether and through which mediator's childhood maltreatment experiences are associated with the development, symptom severity and treatment benefit of OCD. *Study III* investigated the association of childhood maltreatment and heightened emotional and physiological reactivity as a suggested potential mechanism in a clinical sample of patients with major depression. The main findings of the studies are summarized below and future suggestions for research into pathways of childhood maltreatment and psychopathology are discussed.

Summary of results

Study I and *Study II* investigated the role of childhood maltreatment in a sample of patients with OCD. Previous research in this field showed an increased prevalence of childhood abuse and neglect among patients with OCD, associated with both increased OCD symptom severity and poor treatment outcomes. Since this research is limited by small sample sizes and inconsistent findings, *Study I* aimed to replicate and extend these findings by assessing subtypes of childhood maltreatment, and by examining the association between childhood maltreatment and the impact on psychological OCD treatment (post-treatment and 6 months follow-up).

In *Study I* three main results emerged: First, increased prevalence rates of childhood maltreatment among OCD patients in comparison to a general population sample were found. Second, childhood maltreatment severity was related to higher OCD symptom severity. The strongest relationship was established for the childhood maltreatment subtype emotional abuse. Third, patients with more severe childhood maltreatment indicated more severe OCD symptoms at pre-treatment, post-treatment, and at a 6 month follow-up compared to patients without childhood maltreatment experiences. Yet, in contrast to our hypothesis, childhood maltreatment did not moderate psychological treatment course.

Based on these findings, *Study II* examined the underlying mechanisms of the present relationship between childhood maltreatment and OCD symptoms following the proposed transdiagnostic pathway model of the influence of childhood maltreatment on psychopathology (see Fig. 1.1).

As predicted, mediation analyses showed that higher levels of childhood maltreatment were associated with major difficulties in emotion regulation, increased rumination, more dissociative symptoms, greater anxiety in close interpersonal relationships, and more posttraumatic stress symptoms, which in turn was associated with more severe OCD symptoms. Additionally, and in line with our hypotheses, all of these factors mediated the relationship between childhood maltreatment and OCD symptom severity. However, avoidant attachment style was neither linked to childhood maltreatment nor to OCD symptom severity, suggesting that in OCD an anxious attachment style is more prominent.

In *Study III* we examined the impact of childhood maltreatment on emotional reactivity in a clinical sample of patients with major depression. For this purpose, we used the script imagery method. Patients were exposed to standardized negative and neutral audio recordings as well as to an individualized childhood maltreatment scenario while assessing self-reported emotional reactivity and physiology (electromyography, electrocardiogram and electro dermal activity).

Patients with major depression revealed different emotional reactivity in response to different scripts, with increased subjective emotional responding as well as elevated skin conductance responses to the negative and traumatic scripts in comparison to the neutral script. In line with our hypothesis, childhood maltreatment severity was related to the degree of emotional reactivity to the childhood trauma-related script and to the negative script, as compared to the neutral script. In particular, patients with major depression and severe childhood maltreatment experiences rated the negative script to be more aversive and distressing. Furthermore, they showed more re-experiencing and dissociation experiences in response to the negative script. Similarly, patients with higher levels of childhood maltreatment rated the trauma-related script to be more aversive and distressing. Moreover they experienced greater arousal and showed more avoidance as an emotional regulation strategy. Conversely, in regard to the physiological responsiveness, no effect of childhood maltreatment was shown.

Integration of results and implications for future research

In previous chapters, the results of the *Studies I-III* were discussed in detail. The following chapter focus on the integration and evaluation of the results for all three studies in relation to the proposed transdiagnostic pathway model. Specifically, the role of posttraumatic stress symptoms will be addressed, as these findings are the most novel and difficult to integrate into existing concepts. The divergent trajectories will be discussed using the example of OCD. In addition, general implications for future research into the underlying pathways of the association between childhood maltreatment and psychopathology will be suggested. Finally, general methodological concerns regarding the assessment and investigation of childhood maltreatment retrospectively will be discussed.

Pathways from childhood maltreatment to transdiagnostic psychopathology

Knowing the impaired psychological mechanisms underlying the association between childhood maltreatment and psychopathology is highly relevant from a clinical perspective. It may provide information on promising targets for innovative interventions for childhood maltreatment survivors suffering from psychopathology. For example, we found in Study I that childhood maltreatment survivors suffer from more severe OCD symptoms and remain on a higher symptom level after an OCD focused psychological treatment. Thus, patients with a history of childhood maltreatment might need more specific psychological treatment to demonstrate the same symptom level as people without maltreatment experience. This is consistent with findings in other mental disorders, e.g., in major depression (Nelson et al., 2018). However, it is still not clear why childhood maltreatment leads to a higher symptom level before and after treatment. In order to intervene effectively, it is necessary to understand the underlying mechanisms that are altered by childhood maltreatment leading to the development and maintenance of psychopathology.

As mentioned before, the potential proximal risk factors are considered to be transdiagnostic mechanisms in the literature. Although we also assume the potential proximal risk factors to be general transdiagnostic pathways leading from childhood maltreatment to psychopathology, we investigated them in specific mental disorders. In order to assess transdiagnostical constructs that have an influence on the development of mental health, it might not sufficient to measure these constructs across different mental disorders gathering disorder specific symptoms (Fusar-Poli et al., 2019). Ideally, new transdiagnostic approaches should be integrated instead, such as the RDoC criteria. However, as a first step, we aimed to

examine the potential pathways leading from childhood maltreatment to in various mental disorders (multifinality), and to compare the results in the end.

The findings from a clinical sample with OCD patients in Studies I and II, a disorder in which associations with childhood maltreatment and potential mechanisms have rarely been investigated, are consistent with research in other clinical samples, e.g., in major depression - a mental disorder that has been well studied in this context (Nelson et al., 2018; Schierholz et al., 2016). In detail, even though the findings from Study II involved several single mediation models rather than a combined mediation model (see discussion in Study II), the results are consistent with the findings of Schierholz et al. (2016). The authors found that emotion regulation difficulties, insecure attachment style and posttraumatic stress symptoms mediated the relationship between childhood maltreatment and depression symptom severity. Thus, similar mechanisms seem to be involved across both disorder groups, as described in the transdiagnostic pathway model (see Fig. 1.1).

Taken together our findings in an OCD sample are consistent with those of previous studies in major depression. This result would suggest general transdiagnostic mechanisms. Moreover, the results of the clinical studies are consistent with the general pathways between the relationship of childhood maltreatment and psychopathology that we proposed in our transdiagnostic pathway model. Although there is also clear evidence in the literature that the proposed proximal risk factors can be regarded as transdiagnostic, further work is needed to replicate the pathway model in combined mediation models, in more mental disorders or via pathway analyses in a large clinical dataset.

Our studies constitute a first step and there is still a lot for future research to explore. First, a next step would be to test our proposed transdiagnostic pathway model in other mental disorders. For example, based on high prevalence rates of childhood maltreatment, eating disorders or substance abuse disorders would be promising options for further exploration (e.g. Downs & Harrison, 2002). Second, although one of the strengths of Study II is the combination of several factors that have traditionally been investigated separately, our results are only preliminary, as the sample size prohibited to analyse all potential factors in a statistically meaningful combined mediation model. Hence, the transdiagnostic pathway model could not yet test directly. Third, the transdiagnostic pathway model remains superficial in some factors and it would be essential to refine and examine it in more detail. In Study II, for example, the sample size prohibited to differentiate in the analyses for the several emotions regulation

difficulties separately. Fourth, in epidemiological studies the theoretically postulated pathways can only be captured with trait based questionnaires. Moreover, interactions can also hardly be investigated, such as moderating factors. For example, coping mechanisms to heightened emotional reactivity are better assessed in experimental designs, such as in Study III. Finally, although the model is a first attempt to simplify the complexity and multifinality of the relationship between childhood maltreatment and psychopathology, it does not claim to be complete, as, e.g., cognitive deficits and biases have been neglected. There are first indications that cognitive deficits and biases in information processing, such as attentional biases or working memory deficits, are consistently and strongly linked to several psychopathologies (Mansell et al., 2008; Mathews & MacLeod, 2005) and probably can result from childhood maltreatment experiences (e.g. Beers & de Bellis, 2002).

The role of trauma-related symptomatology due to maltreatment

The complex range of psychopathological outcomes associated with maltreatment may reflect several interconnected pathways leading to psychopathology. On the one hand, a key assumption is that child maltreatment is an indicator of early interpersonal dysfunction within the context of the caregiver-child relationship. As the learning environment for children is interactional, maltreatment is expected to impair the achievement of developmental milestones across the lifespan. For example, childhood maltreatment disrupts the attainment of emotion regulation and interpersonal skills (Cloitre et al., 2005), such as building socially supportive relationships through a secure attachment style or regulating emotional distress by engaging rather in problem-solving than in passive rumination. In turn, this failure to regulate behaviour and emotions persists and contributes to a range of other problems throughout life (Fergusson & Horwood, 1998).

On the other hand, several psychological processes might be directly disturbed by early traumatization. For example, childhood maltreatment produces lasting effects on the child's stress response and brain structures (e.g. Crowe & Blair, 2008). For example for a child who grows up in a violent or distressing environment it is an adaptive response to be hypervigilant and sensitive and to remain in a persistent stress response mode. The more intense and prolonged the maltreatment and the more the child exhibits distress and fear. As a result, it is more likely that there will be changes in the neural system resulting in states becoming traits (Lang & McTeague, 2009). In general, reactions to childhood maltreatment are evidenced in somatic, cognitive, emotional and behavioural symptoms (Cohen & Scheeringa, 2009;

Scheeringa et al., 2011; Terr, 1981). The specific presentation of trauma-related symptoms varies by developmental level and capacity (Terr, 1981). In preschool-age children report in particular somatic symptoms, such as dizziness, eating problems and sleep disturbances. However, the latter one is pronounced by recurrent nightmares (Baggerly & Exum, 2008; Corrarino, 2008; Dyregrov & Yule, 2006). Moreover, children report repeated intrusions and heightened emotional reactivity, such as increased fear of separation, in the dark or toileting (Scheeringa et al., 2003). Behavioural symptoms are often seen as a way of processing the adverse experiences due to their limited ability to verbalize emotions, including re-enactment in play, hyperactivity and regression in skills, comprising enuresis, thumb sucking and loss of language (Baggerly & Exum, 2008; Corrarino, 2008; Dyregrov & Yule, 2006). School-age children have higher ability of logic to understand events and remember more vividly. Therefore, they show more PTSD symptoms than pre-school children, but less than adolescents (Scheeringa et al., 2011; Terr, 1981). The trauma-related symptom pattern is marked by hyperarousal and re-experiencing symptoms, such as sleep disturbances, hypervigilance, nightmares, intrusions and repetitive trauma-related play (Terr, 1981). Moreover, they show heightened emotional reactivity, pronounced for anger, guilt, anxiety and sadness (Cohen & Scheeringa, 2009; Dogan-Ates, 2010). Adolescents have in average sufficient cognitive ability to understand the meaning of traumatic events. Therefore they considered to show PTSD symptoms similar to adults: re-experiencing, persistent avoidance of trauma-related cues, negative alterations in cognitions and mood, hyperarousal, -vigilance and increased emotional reactivity (Cohen & Scheeringa, 2009; Dogan-Ates, 2010; Scheeringa et al., 2011). These untreated trauma-related symptoms in children do not outgrow, but rather become chronic and unremitting (Cohen & Scheeringa, 2009). In addition, early trauma-related symptoms have been related to heightened risk for several mental disorders in infants (Briggs-Gowan et al., 2012; Scheeringa et al., 2005) and older children (Carter et al., 2010; Copeland et al., 2007); and this vulnerability persists into adulthood. This is in line with the findings of Study II, showing that the association of childhood maltreatment and OCD symptom severity was mediated by dissociative and partial posttraumatic stress symptoms (including re-experiencing, avoidance, negative alterations in cognition and mood and alterations in arousal and reactivity). Our study replicated the previous findings of Schierholz et al. (2016) who showed like results in patients with major depression. Despite their exploratory nature and their methodological limitations, these studies should regarded as a first step into investigating and conceptualizing dimensional, subsyndromal PTSD symptoms as a mediator between childhood maltreatment and psychopathology.

As a next step, we focused on a specific symptom cluster of PTSD alterations in more detail in Study III - emotional reactivity. Although there is evidence that early traumatization directly changes neurobiological processes, which leads to hyperarousal and higher emotional reactivity, little is known about the clinical expression of these symptoms in childhood maltreatment survivors, apart from full PTSD diagnosis. In our sample of patients with major depression, higher levels of childhood maltreatment were related to heightened emotional reactivity in response to general adverse social exclusion and to trauma-related cues. However, due to the lack of a healthy control group, it remains unclear whether this trauma-related symptom pattern in childhood maltreatment survivors is related to increased psychopathology. In addition, the results show increased emotional reactivity in childhood maltreatment survivors only in self-report measures. In contrast to our hypotheses, no effects of childhood maltreatment on the assessed psychophysiological variables (heart rate variability, electromyography of the corrugator supercilii and musculus frontalis activities, and skin conductance response) was found.

Interestingly, in response to to the maltreatment-related and negative scenario patients with major depression and a history of childhood maltreatment also showed other trauma-related symptoms. When presented the maltreatment-related cue they reported increased avoidance behaviour. Moreover, the generic standardized negative stimulus referred to a standardized interpersonal distress scenario consisting of social exclusion situation in a work context. In response to this scenario, patients with more severe childhood maltreatment experiences reported re-experiencing symptoms. We suggest that it could have triggered memories of emotional abuse and emotional neglect that were the most frequent maltreatment subtypes in our sample. When emotional abuse and neglect were repeatedly experienced in childhood, interpersonal situations are generally perceived as threat-related and associated with increased fear of social exclusion and rejection sensitivity (Feldman & Downey, 2008; Luterek et al., 2004). The findings are also in line with research findings showing that re-experiencing symptoms in major depression mainly deal with negative life events and interpersonal problems (Brewin et al., 2010). However, intrusions appear to be a transdiagnostical phenomenon (Hirsch & Holmes, 2007; Mansell et al., 2008). Since we assume re-experiencing symptoms as a relevant pathway leading from childhood maltreatment to psychopathology, we are currently in the progress of investigating in a further study OCD patients' intrusions as they might relate to childhood maltreatment and trigger neutralizing behaviour.

These trauma-related symptom patterns, emotional reactivity, avoidance and reexperiencing triggered by maltreatment-related cues were shown in the absence of a full PTSD diagnosis. Therefore, subsyndromal posttraumatic stress symptoms due to childhood maltreatment experiences might play a role in several mental disorders. However, caution should be taken when interpreting our findings as evidence for a mediating role of subsyndromal PTSD symptoms between childhood maltreatment and the development of further psychopathology, as our cross-sectional design cannot clarify temporal precedence. We assume that the development of PTSD after childhood maltreatment is mediated by the proximal risk factors. For example, it has been shown that for successful recovery from trauma to occur adaptive emotion regulation might be crucial. Therefore, early impaired emotion regulation processes as a result of childhood maltreatment might also be a risk factor for the development and/or maintenance of PTSD (Ehring & Quack, 2010). In line with this, a recent study found self-reported emotion regulation problems to be strongly associated with functional impairment beyond PTSD symptom severity in treatment-seeking women who had experienced childhood maltreatment (Cloitre et al., 2005). When a traumatic event happens to an adult, we assume prior attainment of all developmental milestones through childhood, adequate coping resources and a secure self-concept, participation in supportive social safety net and a fully developed brain. Additionally, children process stressful events differently than adults do and respond according to their developmental level (e.g. Terr, 1981). Moreover, as stated above, the ongoing processes' of psychological and neurological development become interrupted or altered by early traumatic experiences. Thus, it is clear that the relationship between trauma symptomology and developemental consequences of trauma is complex and multidirectional. Therefore, the transdiagnostic pathway model can only be seen as a first step, which could oversimplify the actually complex and multidirectional connections.

Our results suggest that, e.g., in case of chronic maltreatment, PTSD symptoms might exist on a subsyndromal level although not fulfilling full PTSD diagnosis. This is consistent with literature identifying PTSD as a dimensional rather than a categorical disorder. A growing body of research has identified partial or subsyndromal PTSD cohorts who are significantly more impaired than healthy controls and significantly less impaired than subjects with full PTSD (Breslau et al., 2004; Schnurr et al., 2000). Moreover, literature indicates that individuals with subsyndromal PTSD generally exhibit greater symptom severity, chronicity, suicidal behaviour, general functional impairment and higher comorbidity than non-affected individuals (Breslau et al., 2004; Schnurr et al., 2000). These results suggest that PTSD is a spectrum

disorder in which posttraumatic stress symptoms are distributed along a mild-to-severe continuum, comparable to dysthymia in affective disorders (Friedman et al., 2014).

Another line of research has focused on the heterogeneity of PTSD. Whereas the dissociative subtype has widely been investigated (e.g. Stein et al., 2013) and put down in the DSM-5 criteria, there is room for discussion about other aspects of heterogeneity. For example, Andrews et al. (2009) suggest PTSD as a disorder of stress-related fear circuity, based on neural changes caused by threat and stress (heightened activation of the amygdala and insula, with downregulation of the hippocampus and prefrontal cortex) (Andrews et al., 2009). Contrary to this a different neuropathological pattern was observed in the dissociative PTSD subtype (Lanius et al., 2012). This classification may be oversimplified, as other findings indicate that increased emotional reactivity focuses not on fear, but primarily on other negative feelings such as guilt, shame, sadness and anger (Rizvi et al., 2008). Thus, PTSD might be better characterized by anhedonic mood and anxious rumination (Resick & Miller, 2009). Watson (2005) therefore suggested that PTSD should be summarized as an internalising disorder along with affective disorders. However, this contradicts findings of an externalising PTSD phenotype (Friedman et al., 2011). Therefore, PTSD-related research shows extensive heterogeneity in clinical expression of PTSD and traumatic exposure. For example, trauma exposure, such as childhood maltreatment is suggested to manifest in variety of clinical presentations, such as a fear-based anxiety, a dysphoric/ anhedonic subtype, an aggressive/ substance-abusing subtype, an dissociative subtype, etc. as well as combinations of any of these (Friedman et al., 2014). On the other hand, research often correlates a posttraumatic subtype in other mental disorders, which differs from non-affected individuals in the onset, treatment success, symptomatology pattern and symptom severity, e.g., in OCD (Fontenelle et al., 2012) or major depression (Nelson et al., 2018). One advantage of elaborating transdiagnostic models is to provide a reasonable explanation for the high load of comorbidity and heterogeneity within a disorder cluster (Nolen-Hoeksema & Watkins, 2011).

Potential divergent trajectories by the example of OCD

> *Mrs. M., a 34 year old woman, has been suffering for about 18 years from serious compulsive behaviours of washing and cleaning, which massively affects her everyday life. After contact with "dirt", she is disgusted with herself and performs extensive cleaning rituals, for example after touching strangers, money and the handrails in the subway. But her compulsion to wash herself also is associated with sexuality. If her husband does not show any sexual interest for a longer period of time, she has to wash and clean herself from top to bottom. However, even after sexual intercourse she takes a shower for hours, then covers the bed again and has to wash the bed linen directly. Ms. M. has reported that she was sexually abused several times by her uncle during her childhood. She states to see a relationship to the OCD symptoms she suffers from today by saying that she has never learned to defend herself and that the compulsions are therefore an outlet for her mental distress ('I am disgusted with myself because I let it happen to me'). Intrusions about the sexual abuse seem to come up involuntary, but they are also triggered externally, e.g., by TV programmes about rape and child abuse. She therefore tries to avoid them because she feels a strong urge to wash herself afterwards.*
>
> This is a report of a study participant. To maintain anonymity, personal details were changed.

According to the guidelines put forth by Nolen-Hoeksema and Watkins (2011), a transdiagnostic pathway model should not only address the universal mechanisms by which a distal risk factor leads to multiple disorders (i.e., multifinality), but also explain the differences, e.g., why one individual with childhood maltreatment experiences develops depressive symptoms while another with the same experiences develops OCD symptoms (i.e., divergent trajectories) (see Fig. 5.1).

This can be exemplified in OCD by the insecure attachment style, as it can be regarded as a universal pathway, but also might feature divergent trajectories. On the one hand, we assume that an insecure attachment style, as a transdiagnostic factor, generally leads to less social support (a protective factor) as well as to promote emotion regulation difficulties. On the other hand, in contrast to the findings in childhood maltreatment survivors with major depression (Schierholz et al., 2016), patients with OCD and childhood maltreatment demonstrated an anxious attachment, not an avoidant attachment style in Study II. Therefore it may conclude that the subtypes of insecure attachment styles could be disorder-specific. Indeed,

OCD has been characterized by an anxious attachment style (Doron, Moulding, et al., 2012). Doron, Moulding, et al. (2012) have suggested that individuals with an anxious attachment style are more likely to be worried that a partner will not be available in times of need. In addition, they often use 'hyperactivating' attachment strategies, such as vigorous, insistent attempts to receive care, support and love from their relationship partners as a strategy to regulate distress and manage threats and insecurities (Mikulincer & Shaver, 2003). The hyperactivation of the attachment system involves intensifying expressions of distress and neediness characterized by asking for others' care, as well as a quick response of frustration and anger due to not receiving enough support, and a fear of being abandoned because of their negative self-concept (Mikulincer & Shaver, 2003). All these feelings and thoughts tend to perpetuate an overestimation of perceived threat, leading to the experience of overwhelming, uncontrollable distress, exacerbating unwanted intrusions, and therefore contributing to the development of obsessions (Doron, Sar-El, et al., 2012).

Although our results did not investigate a particular divergent trajectories leading to OCD, according to our proposed pathway model further divergent trajectories are conceivable, which could explain the connection between childhood maltreatment and OCD. For example, there are preliminary indications that increased emotional reactivity is also present in OCD (Cougle et al., 2013) related to neutralising actions. For instance, heightened disgust and fear reactions to contaminants were associated with greater washing symptoms (Olatunji et al., 2007). However, emotional reactivity in OCD is suggested to be focused on prominent emotions in OCD, e.g., disgust, fear, guilt and aggression. These emotions are also associated with traumatic experiences (Rizvi et al., 2008). To the best of our knowledge, no one has studied the association between childhood maltreatment and emotional reactivity in OCD. However, the script driven imagery paradigm could also be used to investigate the role of emotional reactivity in OCD. According to our transdiagnostic model, patients with OCD and childhood maltreatment tend to show higher emotional reactivity, especially in terms of disgust, guilt, shame, fear and aggression, than patients without early trauma. In this sense, the emotional reactivity would be associated with reinforced dysfunctional coping behaviour- the neutralising actions according to the OCD symptom pattern (Salkovskis et al., 1999). This association is suggested to be moderated by the emotion regulation difficulties found in Study II. Moreover, as our study also provided preliminary evidence that posttraumatic stress symptoms mediate the association between childhood maltreatment and OCD, including hyperarousal and

reactivity to trauma-related stimuli, it appears to be conclusive to investigate whether the emotional reactivity is specifically related to cues associated with childhood maltreatment.

It might be promising to assume similar links for re-experiencing symptoms in OCD. Since recurrent and persistent images are part of the DSM-5 criteria for OCD, recent research has focused on intrusive images in OCD. For example, Speckens et al. (2007) found that 80% of participants with severe OCD reported intrusive mental images while two-thirds of these images were associated with memories of adverse childhood experiences. This is consistent with research investigating the specific content of intrusive images in OCD. For example, Lipton et al. (2010) found in a sample of OCD patients that 43% of the patients experienced recurrent intrusive images associated with memories of a traumatic episode as a child or adult and 14% reported intrusive images related to violence, abuse and neglect at home. However, they did not differentiate between early memory and experiences in adulthood. Remarkably, sensory modalities, vividness and especially the distress of intrusions in OCD has been reported to be similar to those in PTSD (Ehlers et al., 2004; Hackmann et al., 2004; Speckens et al., 2007). In accordance with these findings, patients with OCD reported more frequent compulsions and mental checking in response to mental images of earlier adverse life events (Ladouceur et al., 2000; Lafleur et al., 2011; Speckens et al., 2007). Therefore, neutralising actions could serve as a strategy to cope with (partial) PTSD symptoms (divergent trajectory), although further research is needed to investigate this suggested mechanism.

As stated above, attempts to fill this research gap by examining intrusions related to childhood maltreatment and their association to neutralizing behaviour in patients with OCD is presently in progress. If this future work confirms that neutralising actions might be a coping strategy for underlying PTSD symptoms, such as re-experiencing, this would not only highlight the possible role of childhood maltreatment experiences in the genesis of OCD but also deliver new approaches for clinical interventions. For example, a clinical study with patients with OCD showed that psychological treatment focused on OCD led to a decrease in OCD-specific symptoms and at the same time to an increase in PTSD-specific symptoms. In addition, a subsequent increase in OCD symptoms was associated with a decrease in PTSD symptoms (Gershuny et al., 2002). This implies that standard evidence-based treatments for OCD cannot address such intrusions (e.g. exposure response prevention treatment). Likewise, the findings in Study I indicate that patients with OCD who have a history of childhood maltreatment, additional therapeutic interventions might be necessary. This suggests that treatments for re-experiencing symptoms in PTSD might be helpful in such cases. Indeed, a preliminary case

report of Veale et al. (2015) showed that an imagery rescripting method (e.g. Arntz & Weertman, 1999) might be a promising therapeutic technique for OCD as an adjunct to traditional CBT when intrusive images are linked to aversive memories. For example, a 30 year old man (age 7 at OCD onset) described unacceptable images of being the worst possible person alive ('I am the worst kind of human being and don't deserve to live'). These images were directly related his memories of physical and sexual abuse. Before the rescripting, these memories were associated with shame and guilt. Within the treatment, he could accept that he was not responsible and to redirect blame for what happened and accordingly re-scripted his memories ('none of this is my fault; they are despicable human beings') (Veale et al., 2015). These are preliminary findings of a case series whose validity is marked by several limitations, e.g., previous cognitive behavioural therapy of the patients. Future work will require randomized controlled trial comparing imagery rescripting with an active control condition while also controlling for previous treatments.

In the cognitive behavioural model of OCD cognitive processes and interpretation biases are central (Salkovskis et al., 1998). Intrusive thoughts and images are also common in healthy individuals (Brewin et al., 2010). However, the misinterpretation of the significance of these intrusions and the responsibility for actions drives the distress and maladaptive responses. For example, biases such as apprehending negative events and the feeling personal responsibility for preventing harm to themselves and others are dominant in OCD. These cognitive biases likely represent the divergent trajectories leading to OCD. However, cognitive alterations in form of persistent negative beliefs about oneself, others or the world are known to be caused by traumatic experiences and part of the PTSD syndrome. Further study needs to be done to investigate the associations between cognitive alterations due to childhood maltreatment experiences and the evident interpretations biases prominent in OCD.

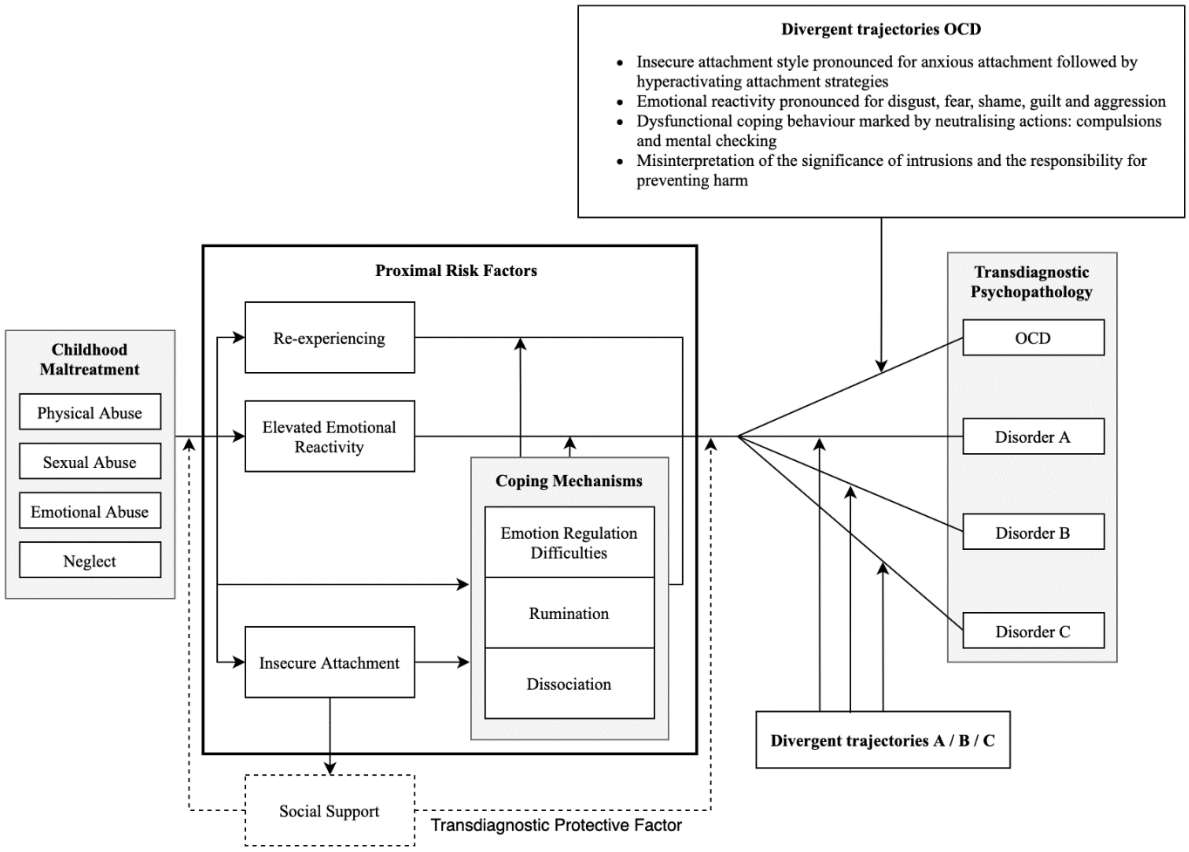

*Figure 5.1***.** Pathway model of potential underlying mechanisms and its moderators between the distal risk factor childhood maltreatment and the development of OCD.

Theoretical and methodological problems in the assessment of childhood maltreatment in adulthood

The validity and reliability of adult retrospective reports of childhood maltreatment experiences represents another point for discussion. Hardt and Rutter (2004) included in their review of retrospective childhood maltreatment assessments a range of interview and questionnaire measures that asked in adulthood about seriously adverse experiences in childhood, including e.g. the CTQ, the Parental Bonding Instrument (Parker, 1989), the Egna Minnen Beträffande Uppfostran (Perris et al., 1980), or the Childhood Experiences of Care and Abuse Interview (Bifulco et al., 1994). The authors concluded that although the internal consistency and reliability of the scales have been satisfactory, the scales of emotional abuse as well as emotional and physical neglect failed to specifically measure their respective item.

Assessing childhood maltreatment retrospectively with the current gold standard CTQ similar methodological problems have to be taken in account. *Study I* used the CTQ in order to investigate different subtypes of childhood maltreatment. Since the physical neglect subscale

did not show adequate reliability in our sample, it had to be excluded. Similar reliability problems with the physical neglect scale showed up in other studies and samples as well (e.g. Bornovalova et al., 2006; Chesin et al., 2015; Klinitzke et al., 2012). In line with this, a factor analysis of the German CTQ version showed a low factor load for the physical neglect scale (Wingenfeld et al., 2010). This corresponds to the findings of the original version, in which the items on the physical neglect subscale also revealed significantly lower charges compared to the items of the other scales. Indeed, further studies evaluating factor analyses with both the original American version and a Swedish translation showed that the scale of physical neglect was not a stable factor in their sample (Gerdner & Allgulander, 2009; Villano et al., 2004). Therefore, the physical neglect subscale does not appear to be a stable factor within the CTQ. In addition, Wingenfeld et al. (2010) found a low item discriminatory power with this scale. These poor psychometric properties could be explained by ambiguous item formulations, lack of specificity and hardly distinguishable from other scales to include the emotional neglect and emotional abuse scales. For example, item 2 ('when I was growing up, I knew that there was someone to take care of me and protect me.') refers to 'caring and protecting relatives'. However, this aspect could alternatively reflect emotional neglect or emotional abuse. For this reason, it is suggested that the CTQ subscales should be understood as distinct but highly associated factors (Scher et al., 2001). Although the CTQ is currently regarded as the gold standard and the most commonly used questionnaire for measuring childhood maltreatment via retrospective self-report, future research should aim to improve the reliability and validity of retrospectively assessing childhood maltreatment. Standardized interview-based assessments of childhood maltreatment are an alternative to questionnaire-based approaches like the CTQ. They allow gathering more details about the specific experiences while professionally evaluating the maltreatment severity. However, research into this field shows no clear advantage of interviews over questionnaires or vice versa (Hardt & Rutter, 2004).

Abuse versus neglect

Apart from methodological issues, the theoretical differentiation between the constructs of abuse and neglect are a further point of discussion. This thesis, as well as large parts of the related literature do not distinguish between different subtypes of childhood maltreatment, assuming that all forms will have similar effects on the developmental processes. We therefore implicitly assume that all types of childhood maltreatment influence the proposed mechanisms (see Fig. 1.1) in the transdiagnostic model in the same way. However, this assumption might be too simplistic since severe violence is not likely to influence a child's development in the

same way as experiencing an absence of responsible caregivers, lack of communication and starvation might.

In developmental psychology, former theoretical approaches of childhood maltreatment supported a distinctive examination of different dimensions of subtypes with unique developmental consequences (Manly et al., 1994; Manly et al., 2002). Similarly, recent literature assumes that different dimensions of childhood maltreatment might to be associated with distinct developmental impairments (e.g., Humphreys & Zeanah, 2015; McLaughlin et al., 2020). The authors suggest extracting primary dimensions of environmental experience to describe numerous types of adversity that share common features. Considering that both neglect and abuse are deviations from the expected experiences in childhood, the former can be regarded as an inadequate input or deprivation and the latter can be considered as harmful input or threat (e.g., Humphreys & Zeanah, 2015; McLaughlin et al., 2020). As expected, behavioural and neuropsychological studies provide preliminary evidence of neural differences in emotion perception and recognition between abused and neglected children (Humphreys & Zeanah, 2015; Pollak et al., 2000; Pollak & Tolley-Schell, 2003).

Future research is needed in order to determine if consequences of abuse and neglect also differ in other psychological processes. This research will be challenging for several reasons. First, human environments can hardly be controlled experimentally. Second, abuse and neglect frequently co-occur and are therefore often confound studies of childhood maltreatment. This correlation is underlined by the ACE study. In this study, over 50% of participants who reported physical neglect in childhood also reported physical abuse, whereas approximately 20% of physically abused individuals also reported physical neglect (Dong et al., 2004). Therefore, future studies should identify the pathways that result in psychopathology by prospectively assessing different experiences of maltreatment during childhood and investigate the two dimensions of threat and deprivation in more detail. For example, behavioural lab measures designed to approximate deprivation or threat might help to identify typical reactions and individual differences to both types of maltreatment. This approach may include observations like the still face paradigm as a proxy for parental unresponsiveness or the gaze of threatening angry faces as a proxy for threatening parental behaviour could be tracked.

Multiple versus single childhood maltreatment experiences

Another relevant point of discussion is the differentiation between multiple and single childhood maltreatment events as these might lead to different results when investigating and

assessing childhood maltreatments effects. In *Study III*, we found increased self-reported emotional reactivity in patients with major depression and childhood maltreatment experiences in history. However, no effects of childhood maltreatment on the assessed psychophysiological reactivity was found. As discussed in the previous chapter, blunted defensive physiological reactivity while self-reporting high distress is related to higher comorbidity of depressive symptoms and multiple traumas in contrast to a single trauma, that is often included in childhood maltreatment (McTeague et al., 2010). Moreover, based on the heuristic outlined by the RDoC, Lang et al. (2016) suggest 'hyporesponder' with a blunted reflex physiology of fear to be an separate anxious misery spectrum disorder associated with cumulative life stress history, including childhood maltreatment. The authors suggest this spectrum would comprise major depression, PTSD with multiple trauma (type II), general anxiety disorder and OCD (Lang et al., 2016). Therefore, this transdiagnostic approach might explain the high overlapping comorbidity in these disorders. The separate anxious misery spectrum disorder is marked by cumulative and longterm distress in history leading to persistent changes in neurophysiological patterns, such as multiple childhood maltreatment experiences (Lang & McTeague, 2009). This is consistent with findings of Park et al. (2014) showing that exposure to multiple types of traumatic events in childhood was associated with a higher odds ratio for psychiatric disorders in general compared to subjects who were exposed to a single traumatic event. In addition, they found that exposure to multiple childhood maltreatment experiences and psychiatric disorders were pronounced for OCD, GAD and somatoform disorder. In line with this, a growing body of literature suggests the high relevance of differentiating between single and multiple maltreatment, as particulary the latter is pronounced to lead to psychopathology in adulthood and consistently to be associated with higher comorbidity and chronicity (e.g. Cloitre et al., 2001).

Conclusion

Overall there is a growing body of literature showing that childhood maltreatment is a transdiagnostic distal risk factor for a broad array of mental disorders. However, sparse research has addressed the question of how this early vulnerability to psychopathology develops and persists. This thesis aimed to expand current knowledge of the underlying pathways linking childhood maltreatment and psychopathology in two different mental disorders. The study findings presented in this thesis provide preliminary evidence that insecure attachment, heightened emotional reactivity and difficulties in emotion regulation, together with

rumination, might play a role. Moreover, posttraumatic stress symptoms, even those deemed subclinical, and dissociative symptoms might be mediating factors between childhood maltreatment and transdiagnostic psychopathology. In light of indication that re-experiencing might also play a role in mediating this relationship, future work will concentrate on exploring this factor in more detail.

This thesis attempted to summarize the current literature and study findings using a transdiagnostic pathway model. This model might provide a framework for a deeper and more systematic exploration of the mechanisms by which childhood maltreatment effects and creates comorbidity among disorders (multifinality). In addition, it might help to search for moderators that determine which specific symptoms will develop in individuals who carry transdiagnostic risk factors (divergent trajectories). Often good science raises more questions than it answers. The transdiagnostic pathway model can only be regarded as a first step that might be oversimplify the complex and multidirectional associations and has not been tested directly. Finally, further work is needed to resolve methodological issues in assessing childhood maltreatment retrospectively and in improving validity regarding the assessment of different subtypes of abuse and neglect.

The ultimate goal is to translate scientific findings into effective and widely disseminated evidence-based practise for helping individuals who present with a history of childhood maltreatment and, whenever possible, to intervene early or even to prevent the far-reaching adverse experiences in childhood.

Zusammenfassung

Childhood Maltreatment as a Transdiagnostic Risk Factor for Psychopathology

Zusammenfassung

Vor 20 Jahren wurde mit der Veröffentlichung der Adverse Childhood Experiences (ACE)-Studie (Felitti et al., 1998) die schwerwiegenden Folgen von Kindesmisshandlungen in den Medien und in der Wissenschaft in den Fokus der Aufmerksamkeit gerückt. Diese großangelegte Längsschnittstudie zeigte in eindeutigen Befunden die klinische Bedeutsamkeit der Spätfolgen von Kindesmisshandlungen für die physische und psychische Gesundheit. So fanden sich zum Beispiel Zusammenhänge von der Anzahl an erlebten Kindesmisshandlungen und späterem gesundheitsgefährdendem Verhalten, wie Rauchen, Alkoholismus, Drogenmissbrauch, sexuelle Promiskuität und psychischen Problemen, wie depressive Verstimmungen und eine erhöhte Rate an Selbstmordversuchen (Dube et al., 2001; Felitti et al., 1998; Valerie J. Edwards et al., 2003). Auch zwei Jahrzehnte später steckt die Forschung zu den vielfältigen physischen und psychischen Folgen früher traumatischer Erfahrungen noch in den Kinderschuhen. Die vorliegende Forschungsarbeit möchte einen Teil dazu beitragen, indem sie zum einen die Auswirkungen von Kindesmisshandlungen (definiert als körperlicher, sexueller, emotionaler Missbrauch und Vernachlässigung) auf psychologische Faktoren und zum anderen auf die Entwicklung und Aufrechterhaltung von transdiagnostischer Psychopathologie untersucht. Angenommene Zusammenhänge von Kindesmisshandlung, psychischen Faktoren und transdiagnostischer Psychopathologie werden in einem Pfade Modell veranschaulicht.

Einleitung

Die Forschung zu den Folgen von Misshandlungen im Kindesalter konzentrierte sich zunächst vor allem auf die posttraumatische Belastungsstörung (PTBS), als klassische Traumafolgestörung (Cohen et al., 2001; Norman et al., 2012). Heute ist jedoch klar, dass Misshandlungen im Kindesalter ein transdiagnostischer Risikofaktor für ein breites Spektrum von psychischen Störungen darstellt (McLaughlin, Conron, Koenen, & Gilman, 2010; Norman et al., 2012). Zum Beispiel lassen sich in einer Vielzahl von psychischen Störungen hohe Prävalenzraten von Kindesmissbrauch finden, wie neben der PTBS, für depressive Störungen, Störungen in Zusammenhang mit psychotropen Substanzen und abhängigen Verhaltensweisen, Essstörungen, Borderline-Persönlichkeitsstörungen und Angststörungen (z.B., Norman et al., 2012). Darüber hinaus wurde Kindesmissbrauchs Erfahrungen mit einem früheren Ausbruch psychischer Störungen, einem schwereren und chronischen Krankheitsverlauf sowie mit geringerem psychotherapeutischem Behandlungserfolg in Verbindung gebracht. Es gibt bisher jedoch kaum Forschung dazu, warum Kindesmissbrauch solche Auswirkungen auf die gesamte Lebenspanne zeigt. Die Breite der psychischen Folgen lässt sich vermutlich nicht durch einen

einzigen zugrundeliegenden psychischen Faktor erklären. Stattdessen werden wahrscheinlich mehrere Faktoren den Zusammenhang zwischen Misshandlung in der Kindheit und verschiedenen psychischen Störungen vermitteln (McLaughlin, 2016).

Erste Forschung aus dem biologischen Bereich zeigte zum Beispiel, dass neurobiologische und hirnstruktuelle Änderungen nach Kindesmisshandlungen die Entstehung von psychischen Störungen bedingen kann (Teicher & Samson, 2016). Forschungen, die den Einfluss auf psychologische und soziale Faktoren untersuchen, wie emotionale Reaktivität und Emotionsregulation, Bindung, etc. sind dagegen selten. Diese Untersuchungen sind aber von hoher klinischer Relevanz, um in Anbetracht der hohen Chronifizierungsrate gezielter mit psychologischen Interventionen ansetzen zu können. Erste Ansätze in dieser Forschungsrichtung untersuchen spezifische transdiagnostische Behandlungen für frühe Traumatisierungen, wie z.B. das Imagery Rescripting. Daher ist das Hauptziel dieser Arbeit, die zugrundeliegenden psychologischen Mechanismen zwischen Misshandlung im Kindesalter und der Psychopathologie in klinischen Studien zu untersuchen.

Studie I und II

Der aktuelle Stand der Forschung zeigt, dass Misshandlungen in der Kindheit auch bei der Zwangsstörung eine Rolle spielen könnte. Diese Befunde kommen jedoch aus Studien mit kleinen oder nicht klinischen Stichproben und nicht immer konnte der Zusammenhang konsistent gezeigt werden (Carpenter & Chung, 2011; Caspi et al., 2008; Fricke, Köhler, Moritz, & Schäfer, 2007; Grabe et al., 2008; Grisham et al., 2011; Hemmings et al., 2013; Lochner et al., 2002). Um diese Befunde zu replizieren und zu erweitern, war deshalb das Ziel dieser Studien den Zusammenhang zwischen Misshandlung im Kindesalter und der Zwangsstörung genauer untersuchen. Die *Studien I* und *II* wurden in einer klinischen Stichprobe (*N*= 69) bestehend aus Patienten mit einer Zwangsstörung durchgeführt, die in Kooperation mit einer deutschen psychosomatischen Klinik bei der stationären Aufnahme rekrutiert wurden.

Das Hauptziel von *Studie I* bestand darin einen generellen Zusammenhang von Kindesmisshandlungen und Zwangsstörung zu untersuchen. Dabei wurden erstens die generellen Prävalenzzahlen von Kindesmisshandlungen erhoben. Zweitens wurde untersucht welche Form der Kindesmisshandlung den größten Einfluss auf die Symptomschwere der Zwangsstörung zeigt. Drittens wurde der Einfluss von Kindesmisshandlung auf die Symptomschwere im Behandlungsverlauf untersucht. Die Erhebungszeiträume für die

Zwangssymptomatik waren zum Zeitpunkt der Aufnahme, unmittelbar vor der Entlassung und 6 Monaten nach dem Aufenthalt in der Klinik.

Die Analysen ergaben folgende Ergebnisse: Erstens zeigten sich generell erhöhte Prävalenzraten von Misshandlungen im Kindesalter in unserer Patientenstichprobe im Vergleich zu einer allgemeinen deutschen Bevölkerungsstichprobe. Zweitens stand der Schweregrad der Misshandlungen im Kindesalter im Zusammenhang mit dem Schweregrad der Zwangsstörung, wobei sich der stärkste Zusammenhang für den emotionalen Missbrauch zeigte. Drittens berichteten Personen mit einem höheren Grad an Misshandlungen in der Kindheit über stärkere Zwangsstörungssymptomatik zu Beginn der Behandlung, nach der Behandlung und auch 6 Monate nach ihrem stationären Aufenthalt, im Vergleich zu Patienten mit Zwangsstörung ohne Misshandlungserfahrungen. Auf der anderen Seite, zeigte sich jedoch, dass Patienten mit Kindesmisshandlungserfahrungen gleichermaßen von der Behandlung profitierten, da sie jedoch mit einem höheren Beschwerdebild starteten, auch mit mehr Restsymptomatik entlassen wurden. Die Befunde sprechen jedoch dafür, dass es klinisch relevant ist zu schauen wodurch dieses höhere Beschwerdebild vermittelt wird.

Auf der Grundlage dieser Ergebnisse zielte *Studie II* darauf ab, die zugrundeliegenden psychischen Faktoren des gefundenen Zusammenhangs zwischen Misshandlung im Kindesalter und der Zwangsstörung zu untersuchen. Mögliche vermittelnde psychische Faktoren wurden auf der Grundlage der folgenden Kriterien ausgewählt: (a) Evidenz für einen Zusammenhang mit Misshandlung im Kindesalter, (b) Evidenz für einen Zusammenhang mit der Entstehung oder Aufrechterhaltung von Zwangsstörung und (c) plausible Theorie für diesen psychischen Faktor als zugrundeliegender Wirkmechanismus, der den Zusammenhang von Misshandlungen in der Kindheit und Zwangsstörungssymptomatik im Erwachsenenalter erklären kann. Auf dieser Grundlage haben wir folgende Faktoren als potentielle Mediatoren zwischen dem Zusammenhang von Kindesmisshandlungsschwere und der Schwere der Zwangsstörung untersucht: Schwierigkeiten bei der Emotionsregulation, Rumination (repetitives negatives Denken), unsicherer Bindungsstil, dissoziative und PTBS Symptome. In Übereinstimmung mit unseren Hypothesen vermittelten alle untersuchten Faktoren den Zusammenhang zwischen Misshandlung in der Kindheit und dem Schweregrad der Zwangsstörung. Im Hinblick auf den unsicheren Bindungsstil traf dies nur für die Unterform ängstlicher Bindungsstil, nicht aber für den vermeidenden Bindungsstil zu.

Da die Zusammenhänge mit frühen Misshandlungserfahrungen und Zwangsstörung bisher wenig systematisch erforscht wurden, war es ein erster Schritt in einer Beobachtungsstudie mit einer sorgfältig diagnostizierten klinischen Stichprobe die Zusammenhänge zu untersuchen, um einen ersten Überblick über die psychischen Faktoren zu bekommen die dabei eine Rolle spielen. Da wir im zweiten Schritt den Einfluss von emotionaler Reaktivität auf traumabezogene Reize als wichtigen Wirkmechanismus detaillierter untersuchen wollten, wählten wir eine klinische Stichprobe in der ein Zusammenhang mit Kindesmisshandlungen bereits gut untersucht und belegt ist (Nelson et al., 2017).

Studie III

Studie III untersuchte daher die spezifische Rolle der emotionalen Reaktivität als zugrundeliegender Mechanismus zwischen Misshandlung in der Kindheit und Symptomschwere in Patienten mit Major Depression (*N*= 69). Bisherige Forschung zu emotionaler Reaktivität bei Menschen mit Depressionen ergaben widersprüchliche Befunde. Zum einen zeigte sich eine emotionale Kontextinsensitivität, das heißt Menschen mit Depressionen zeigen verminderte emotionale Reaktivität auf positive Reize, aber gleichermaßen auch verminderte Reaktivität auf negative Reize (Rottenberg et al., 2005, Rottenberg & Gotlib, 2004; Rottenberg & Cowden Hindash, 2015). Zum anderen gibt es Befunde, die bei depressiven Menschen von einer erhöhten emotionalen Reaktivität und Belastung auf negative Reize zeugen (e.g., Bylsma et al., 2008). Forschungsbefunde aus einer anderen Forschungslinie zeigen jedoch, dass Menschen die Misshandlungen in der Kindheit durchlebt haben, eine erhöhte emotionale Reaktivität zeigen (Ben-Amitay et al., 2016; Glaser et al., 2006; Infurna et al., 2015, Wichsers et al., 2009). Wir stellten daher die Hypothese auf, dass innerhalb der Menschen mit Depression, die Schwere der Misshandlung im Kindesalter mit einer höheren emotionalen Reaktivität zusammenhängt. Dies könnte ein erklärender Faktor für die widersprüchlichen Ergebnisse bei Menschen mit Depression sein, da hier auch hohe Prävalenzraten von Kindesmisshandlungen berichtet werden (Nelson et al., 2017).

Um dies zu untersuchen wurde bei den Studienteilnehmer/ -innen selbstberichtete und physiologische emotionale Reaktivität gemessen während ihnen auditiv neutrale negative Szenarien und ein idiografisches Szenario, basierend auf der schlimmsten eigenen Kindheitserinnerung, vorgespielt wird. Die Teilnehmer/-innen wurden dabei gebeten sich das Szenario bildlich so lebendig wie möglich vorzustellen (script-imagery Paradigma). Nach

jedem Szenario sollten die Teilnehmer/-innen erlebte emotionale Reaktivität bewerten und widerfahrene PTBS Symptomatik angeben.

In Übereinstimmung mit unserer Hypothesen berichteten depressive Patienten mit einem höheren Grad an Misshandlung in der Kindheit, über eine erhöhte emotionale Reaktivität auf das Kindheitserlebnis Szenario und auf das negative Szenario im Vergleich zum neutralen Szenario. Insbesondere bewerteten diese Gruppe das negative Szenario als aversiver und beunruhigender. Bezüglich der traumabezogenen Symptomatik gaben sie vermehrtes Wiedererleben und Dissoziationserfahrungen als Reaktion auf das negative Skript an. Das Kindheitserlebnis Szenario wurden ebenfalls von depressiven Patienten mit einem höheren Grad an erlebten Kindesmisshandlungen als aversiver und beunruhigender empfunden. Darüber gab diese Gruppe bezüglich der traumabezogenen Symptomatik mehr Erregung und Vermeidungsverhalten an. Im Gegensatz zu unserer Hypothese fanden wir diese Effekte nicht in den physiologischen Parametern wieder. Kindesmisshandlungen in der Vergangenheit könnte also ein erklärender Faktor für die Heterogenität innerhalb der Störungsgruppe bezüglich der emotionalen Reaktivität darstellen. Im nächsten Schritt wäre es wichtig zu schauen, ob emotionale Reaktivität auch den gefundenen Zusammenhang mit erhöhter Symptomschwere, Chronifizierung und Komplexität des Störungsbildes mit Kindesmisshandlungen erklären könnte.

Fazit

Insgesamt gibt es eine wachsende Menge an Forschungsbefunden, die zeigen, dass Misshandlung in der Kindheit ein transdiagnostischer Risikofaktor für verschiedene psychische Störungen ist. Nur wenige Forscher haben sich jedoch mit der Frage befasst, wie diese frühe Anfälligkeit für Psychopathologie entsteht und fortbesteht. Ziel dieser Arbeit war es, das gegenwärtige Wissen über die zugrundeliegenden Pfade der Beziehung zwischen Misshandlung im Kindesalter und Psychopathologie bei zwei verschiedenen psychischen Störungen zu erweitern. Die in dieser Arbeit vorgestellten Studienergebnisse liefern erste Hinweise darauf, dass eine unsichere Bindung, eine erhöhte emotionale Reaktivität (aber nicht psychophysiologische Reaktivität) und Schwierigkeiten bei der Emotionsregulation generell, sowie Rumination eine Rolle spielen könnten. Darüber hinaus könnten posttraumatische Stresssymptome, auch solche, die als subklinisch angesehen werden, wie Intrusionen, Vermeidungsverhalten und dissoziative Symptome, vermittelnde Faktoren zwischen Misshandlung in der Kindheit und transdiagnostischer Psychopathologie sein. Es sind jedoch

weitere Arbeiten erforderlich, um die Ursache für die hohe Divergenz zwischen der selbstberichteten emotionalen Reaktivität und der psychophysiologischen Reaktivität zu untersuchen. In der vorliegenden Arbeit werden zudem die methodischen Probleme bei der retrospektiven Beurteilung von Misshandlungen in der Kindheit mit Fragebögen diskutiert. Darüber hinaus werden Implikationen für ein theoretisches transdiagnostisches Modell, sowie Richtungen für zukünftige Forschungen zu den zugrundeliegenden Zusammenhängen von Kindheitsmisshandlung und Psychopathologie skizziert.

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