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The mediation effect of personality functioning between different types of child maltreatment and the development of depression/anxiety symptoms – A German representative study

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ABSTRACT

Background: Child maltreatment (CM) is associated with an increased risk to develop symptoms of depression/anxiety across an individual's lifespan. Recent studies indicated that impairments in personality functioning might mediate this association. The purpose of this study is to add evidence of this mediating effect by regarding different types of CM (emotional, physical and sexual abuse as well as emotional and physical neglect) in the general population.
Methods: A representative sample of the German population ($N = 2{,}354$) completed a set of standardized measures (OPD-SQS: Operationalized Psychodynamic Diagnosis - Structure Questionnaire Short, PHQ-4: Patient Health Questionnaire, CTQ: Childhood Trauma Questionnaire). Mediation analyses were carried out to examine the association between CM types, symptoms of depression/anxiety, and personality functioning.
Results: Up to two-thirds of the associations between CM types and symptoms of depression/anxiety are mediated by personality functioning [indirect effect: emotional abuse ($\beta = 0.219$, 95%-CI: 0.187–0.251, $p < .001$), physical abuse ($\beta = 0.151$, 95%-CI: 0.123–0.178, $p < .001$), sexual abuse ($\beta = 0.163$, 95%-CI: 0.138–0.188, $p < .001$), emotional neglect ($\beta = 0.131$, 95%-CI: 0.104–0.159, $p < .001$) and physical neglect ($\beta = 0.102$, 95%-CI: 0.078–0.127, $p < .001$)].
Limitations: Symptoms of depression/anxiety were measured with screening instruments and results are based on cross-sectional data.
Conclusions: The present investigation expands the evidence on the mediating effect of personality functioning in the association between CM and depression/anxiety symptoms based on data of the general population. Our results show the relevance of types, as the mediating effects are slightly stronger in CM abuse types than in CM neglect types. Knowledge about impaired personality might be an angle for clinical interventions and inspire future research.

1. Introduction

Child maltreatment (CM) is a worldwide problem with an estimated prevalence for high-income countries between 4% and 16% (Gilbert et al., 2009). The World Health Organization (WHO) defines CM as "all forms of physical and/or emotional ill-treatment, sexual abuse, neglect or negligent treatment" (World Health Organization, 1999). The presence of CM is an established risk factor for psychopathology like post-traumatic stress disorders (PTSD), depression or anxiety (Ajilian Abbasi et al., 2015). A recent meta-analysis demonstrated that people with CM

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had twice the risk of developing depression compared to people with no history of CM, while the risk for anxiety disorders was 2.7 times higher (Li et al., 2016). Although the relationship between CM and adult mental disorders has been well researched, there is limited evidence on the underlying pathways through which CM might lead to the development of mental disorders later in life. Research in this area has proposed multiple potential mechanisms by which CM increases the risk for psychopathology ranging from epigenetic processes and gene expression to neuroendocrine, immune, and neurotransmitter systems, brain structure and function, social cognition (Jaffee, 2017) and recently, personality functioning (Dagnino et al., 2020; Krakau et al., 2021).

Personality functioning – also called structure – is a comprehensive model composed of different dimensions, such as identity, the quality of interpersonal relationships, and coping strategies (Gruber et al., 2020). One of the first classification systems which defined personality functioning systematically was the Operationalized Psychodynamic Diagnosis system (Arbeitskreis, 1996). This classification system – meanwhile updated to a second edition (OPD-2) – characterized personality functioning as a person's abilities in four domains related to capacities of cognition/perception, regulation, communication, and attachment. Each of these capacities is directed toward the self and others – resulting in eight basic psychological functions (e.g., self-perception, self-regulation and regulation of relationships) (Arbeitskreis 2006). In the form of a diagnostic concept it was already included in the Alternative Model for the Assessment of Personality Disorders in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association and American Psychiatric Association, 2013; Bender et al., 2011) or the International Classification of Diseases, 11th version (ICD-11) (Tyrer et al., 2011).

Given that personality functioning usually develops in early childhood (Beebe et al., 2010), CM might impair this developmental process (Luyten et al., 2020). Individuals with impairments in personality functioning tend to suffer from severe disturbances of the self and their interpersonal relations, and have an increased risk for developing mental disorders like depression and anxiety (Crempien et al., 2017; Doering et al., 2018). Recent studies found a mediating effect of personality functioning in the association between only two CM types (physical and sexual abuse) and depression in a clinical sample (Dagnino et al., 2020) as well as between multiple CM and somatic symptoms, mental distress and body dysmorphic concern in a population-based sample (Krakau et al., 2021).

There is evidence that the association between CM and psychopathologies is mediated by personality functioning. However, the findings are based on screening instruments for CM. Thus, a population-based investigation with a detailed measure of CM could extend the evidence on the mediating role of personality functioning in the association between different types of CM and symptoms of depression/anxiety.

The aim of this study was to test the mediator model of personality functioning in the relationship between different types of CM (namely emotional, physical and sexual abuse as well as emotional and physical neglect) and depression/anxiety symptoms in a representative German sample. The study is based on earlier research investigating this mediator. Based on this previous findings, it was expected that the severity of each CM type would be positively associated with symptoms of depression/anxiety and that this effect would be mediated by impairments in personality functioning.

2. Method

Between September and November 2016, a representative sample of

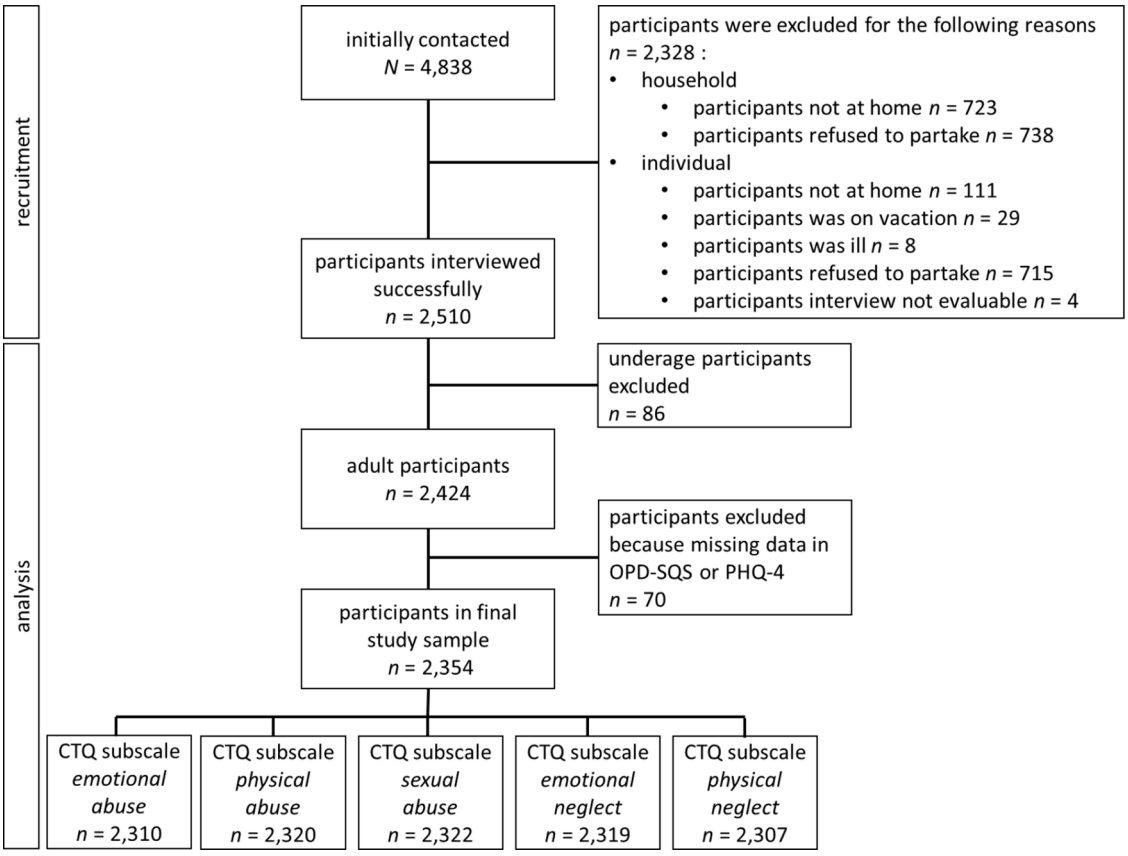

Fig. 1. Flowchart showing an overview of the study sample of participants included in the investigation, reasons why excluded during recruitment and analysis, and showing the final study samples for the CTQ subscales.
Note. OPD-SQS = Operationalized Psychodynamic Diagnosis - Structure Questionnaire Short. PHQ-4 = Patient Health Questionnaire. CTQ = Childhood Trauma Questionnaire.

the German population was acquired by a demography consulting company (USUMA, Berlin, Germany) as part of a broader survey on different aspects of mental health. Inclusion criteria were a minimum age of 14 and sufficient knowledge of the German language, responses were given anonymously. In the first step $N = 4838$ households were contacted (Fig. 1). A study assistant visited all participants at home, informed them about the investigation, and the participants provided written informed consent. In the next step, socio-demographic information was obtained in an interview format by research staff. Then the survey was conducted via paper and pencil. The study assistant was present to offer help if the meaning of questions was not clear. The sample was representative with regard to age, gender, education, and the geographic region of the participants.

2.1. Participants

A total of $N = 2510$ persons were successfully interviewed in the study. Given that personality functioning is a developmental process and might not be valid in underage persons, we excluded people under the age of 18 years. Other participants were excluded due to missing values in the assessment of personality functioning and in the questionnaire of depression/anxiety symptoms ($n = 70$). The final study sample was $N = 2354$. Missing values in the questionnaire of CM types did not lead to the complete exclusion of a participant's data, but only on the respective CM type. For a detailed description of reasons for exclusion of participants, see Fig. 1.

2.2. Assessment

2.2.1. Child maltreatment

The Childhood Trauma Questionnaire (CTQ) was used for self-reporting of CM (Bernstein et al., 2003; German version: Wingenfeld et al., 2010). The CTQ is a reliable and valid screening measure for child maltreatment, including subscales for emotional abuse, physical abuse and sexual abuse, as well as emotional neglect and physical neglect. In the CTQ, 28 items about childhood events are quantified on a 5-point Likert scale (1 = "never true" – 5 = "very often true"), with a high score indicating a high degree of traumatic experiences. The internal consistency ranged between Cronbach's $\alpha = 0.55$ and $\alpha = 0.89$, with the physical neglect scale showing the weakest internal consistency. The other subscales are high with $\alpha \geq 0.80$ (Klinitzke et al., 2012). In addition to a dimensional scoring procedure, a degree of severity rating was used. Based on norm data by Häuser et al. (2011), severity scores for each subscale can be calculated, providing threshold scores for each subscale to determine the severity of abuse and neglect in the following degrees: "none", "minimal", "moderate", and "severe". In order to calculate prevalence's for each type of maltreatment, a cut-off of at least "moderate" was chosen.

2.2.2. Depression/anxiety symptoms

Symptoms of depression/anxiety were assessed with the 4-item Patient Health Questionnaire (PHQ-4) (Kroenke et al., 2009). Two PHQ-4 items measure two of the DSM-IV (American Psychiatric Association, 1998) criteria for major depression on a 4-point scale (0 = "not at all" – 3 = "nearly every day"). The other two items measure two DSM-IV criteria for general anxiety disorder. The total score of the PHQ-4 ranges from 0 to 12. The PHQ-4 has shown acceptable reliability with an internal consistency of $\alpha = 0.78$ in the general population (Löwe et al., 2010).

2.2.3. Personality functioning

Personality functioning was measured with the 12-item version of the OPD Structure Questionnaire (OPD-SQS) (Ehrenthal et al., 2015). This is a short version of the OPD-SQ (Ehrenthal et al., 2012), originally consisting of 95 items. It is similar to other methods used to measure personality pathologies (König et al., 2016; Zimmermann et al., 2015) and appropriate for screening personality dysfunctions in patients (Obbarius et al., 2019). In addition, a recent study reported good reliability and validity for the general population independent of gender and age (Ehrenthal et al., under review). The OPD-SQS consists of a 0–4 Likert scale (0 = "fully disagree" – 4 = "fully agree"). It measures three highly correlated subscales: self-perception, shaping contact, and key relationship models. The total score of the PHQ-4 ranges from 0 to 12. Lower scores on the OPD-SQS indicate better personality functioning, whereas higher scores on the OPD-SQS indicate impairments in personality functioning.

2.3. Statistical analysis

The data analysis was conducted in R (Version 4.0.2; R Core Team, 2013). Descriptive statistics were calculated for sociodemographic variables, depression/anxiety symptoms, CM types and personality functioning. Pearson correlation analyses were carried out to examine the association between CM types, depression/anxiety symptoms and personality functioning. For the mediation analyses, we standardized the variables of depression/anxiety symptoms, personality functioning and CM types, and used the package lavaan (Rosseel, 2012). The total effect of a mediation describes the association between each of the CM types and depression/anxiety symptoms. The total effect consists of two components; the direct and the indirect effect. The direct effect refers to the part of the total effect that occurs without the mediating variable, and the indirect effect refers to the part of the total effect that is the result of mediation alone. The proportion of the mediating (indirect) effect as a proportion of the total effect was also calculated (Pieters, 2017; Shrout and Bolger, 2002). As outlined in Preacher and Hayes (2004), mediation emerges when the indirect effect is significant and the confidence intervals (CI) exclude zero.

3. Results

3.1. Participant characteristics

Characteristics of the final study sample are presented in Table 1. The mean age was 49.3 years (range 18–94 years). 53.2% of participants were female. 39.2% of participants completed 10 years of education, followed by 33.3% with less and 26.7% with more than 10 years of education. The full or part-time employment rate was 58.6%, and the unemployment rate was 5.5%. Most of the participants (59.1%) had a personal income of € 1000–2500. The generalizability of the results to the general German population has been verified in previous studies (Schmalbach et al., 2020; Witt et al., 2017).

In this study, 44.5% of the participants reported any type of CM, ranging from minimal to extreme severity (55.5% reported no CM). At least moderate severity of CM was reported by 6.0% of participants for emotional abuse, 6.3% for physical abuse, 7.5% for sexual abuse, 12.9% for emotional neglect, and 22.8% for physical neglect.

3.2. Associations between personality functioning, depression/anxiety symptoms and CM

To explore the associations between depression/anxiety symptoms, CM and personality functioning, Pearson correlations were calculated and presented in Table 2. The strongest association was found between personality functioning and depression/anxiety symptoms ($r = 0.554$), indicating that the higher the impairments in personality functioning, the more severe symptoms of depression/anxiety are reported. All CM types were positively correlated with depression/anxiety symptoms, ranging from $r = 0.239$ to $r = 0.372$. Personality functioning and the CM types also show positive correlations ranging from $r = 0.194$ to $r = 0.457$.

For a better illustration of the association between the different types of CM and personality functioning, each type of CM was classified

Table 1
Sociodemographic and measures characteristics.

Variable	n	(%)	M	(SD)
total N	**2354**	**(100)**		
age			**49.5**	**(17.4)**
sex				
female	1253	(53.2)		
male	1101	(46.8)		
marital status				
married, living together	1061	(45.1)		
married, living separated	52	(2.2)		
unmarried	678	(28.8)		
divorced	341	(14.5)		
widowed	214	(9.1)		
not stated	8	(0.3)		
education status				
≤ 9 years	785	(33.3)		
10 years	923	(39.2)		
≥ 11 years	630	(26.7)		
pupil/student	7	(0.3)		
other (e.g., special school) or not stated	9	(0.5)		
employment status				
full-time employment	1047	(44.5)		
part-time employment	332	(14.1)		
unemployment	130	(5.5)		
pensioners	613	(26.0)		
other (e.g., student, parental leave)	232	(9.8)		
personal income				
under 1000 €	739	(31.4)		
1000 – 2500 €	1390	(59.1)		
over 2500 €	225	(9.5)		
depression/anxiety symptoms (PHQ-4)			**5.38**	**(2.14)**
personality functioning (OPD-SQS)			**10.62**	**(8.07)**
child maltreatment (CTQ)				
subscale emotional abuse			6.80	(2.97)
subscale physical abuse			5.88	(2.34)
subscale sexual abuse			5.57	(2.01)
subscale emotional neglect			9.47	(4.39)
subscale physical neglect			7.71	(2.97)

Note. OPD-SQS = Operationalized Psychodynamic Diagnosis - Structure Questionnaire Short. PHQ-4 = Patient Health Questionnaire. CTQ = Childhood Trauma Questionnaire.

Table 2
Pearson correlations of PHQ-4, OPD-SQS, and CTQ subscales.

	PHQ-4	OPD-SQS
OPD - SQS	.554***	
CTQ - emotional abuse	.372***	.457***
CTQ - physical abuse	.265***	.290***
CTQ - sexual abuse	.265***	.312***
CTQ - emotional neglect	.247***	.251***
CTQ - physical neglect	.239***	.194***

Note. *$p < .05$; **$p < .01$; ***$p < .001$; OPD-SQS = Operationalized Psychodynamic Diagnosis - Structure Questionnaire Short. PHQ-4 = Patient Health Questionnaire. CTQ = Childhood Trauma Questionnaire.

according to the degrees of severity: none, minimal, moderate and severe. The associations between the scores of OPD-SQS and the five CM subscales are presented in Fig. 2 and Table 3. The CTQ subscales emotional abuse, physical abuse and physical neglect showed continuous increases in the impairments in personality functioning. Thus, the more severe the CM, the more impairments in personality functioning could be found. This was not the case for the subscale emotional neglect and the subscale sexual abuse. For the subscale emotional neglect, a change from "moderate" to "severe" did not result in more impaired personality functioning but remained stable. The same was the case for sexual abuse for the change from "minimal" to "moderate". Furthermore, in the case of the CTQ subscale sexual abuse a large increase in the impairments in personality functioning between "moderate" and "severe" was found (additional statistical analyses can be found in a supplementary data article, see (Freier et al., under review).

3.3. Mediation analysis

The mediation analyses showed that significant associations between CM and values of depression/anxiety symptoms are mediated by impairments in personality functioning to a similar degree (see Fig. 3). The total effects between scores of the CTQ subscales and values of depression/anxiety symptoms were significant and vary in a range between $\beta = 0.238$, 95% CI [0.192–0.284], $p < .001$) for physical neglect and $\beta = 0.371$, 95% CI [0.314–0.427], $p < .001$) for emotional abuse. In all subscales there was a significant mediating (indirect) effect of CM on values of depression/anxiety symptoms through impairments in personality functioning: emotional abuse ($\beta = 0.219$, 95% CI [0.187–0.251], $p < .001$), physical abuse ($\beta = 0.151$, 95% CI [0.123–0.178], $p < .001$), sexual abuse ($\beta = 0.163$, 95% CI [0.138–0.188], $p < .001$), emotional neglect ($\beta = 0.131$, 95% CI [0.104–0.159], $p < .001$) and physical neglect ($\beta = 0.102$, 95% CI [0.078–0.127], $p < .001$). This indicates that impairments in personality functioning mediate about two-thirds of the associations between all scores of the CTQ abuse subscales and values of depression/anxiety symptoms. In the CTQ neglect subscales, the mediating effects are less strong, 53% for emotional neglect and 43% for physical neglect. Only minor associations (direct effects) between the scores of the CTQ subscales and values of depression/anxiety symptoms remain (range: $\beta = 0.102$ for sexual abuse and $\beta = 0.152$ for emotional abuse). Post-hoc analyses conducted separately for symptoms of anxiety and depression showed no considerable differences, neither were there any notable gender differences (post-hoc analyses can be found in a supplementary data article, see (Freier et al., under review).

4. Discussion

The major finding of the present investigation shows the mediating effect of personality functioning in the association between emotional, physical and sexual abuse as well as emotional and physical neglect and symptoms of depression/anxiety. Our results suggest that up to two-thirds of the association is mediated by personality functioning. Higher levels in CM of any type correspond with higher impairments in personality functioning and more severe symptoms of depression/anxiety.

This result is consistent with the findings obtained by Dagnino et al. (2020), who found a mediating effect of personality functioning in the association between sexual and physical abuse and depression in a clinical sample. Our findings indicate that this might apply to symptoms of anxiety as well. Further, the results for depression and anxiety are not limited to clinical samples, but are also transferable to the general population. This is in line with the study by Krakau et al. (2021), who found a mediation effect of personality functioning in the association between multiple CM and different mental health outcomes in the general population. The present study added to this result by using a more recent representative sample and examining different types of CM.

In contrast to previous studies (Dagnino et al., 2020; Krakau et al., 2021) this investigation was based on a more detailed measure of CM, which allowed the examination of different types of CM. The mediation effect of personality functioning was stable for the different types of CM and ranged between 43% and 62%. The strongest mediation effect was found for abuse types. Neglect types showed a slightly weaker mediation effect, and a weaker association with impairments in personality functioning than abuse types. In particular, physical neglect had the weakest association with personality functioning and also the weakest mediation effect. This could be related to the weak internal consistency of the physical neglect scale in the CTQ (Klinitzke et al., 2012), leading to a distortion of the scale, especially among participants over 60 years of age. Klinitzke et al. (2012) suggest that the circumstances for people growing up in post-war Germany often included physical neglect (malnutrition, insufficient clothing, etc.), which could lead to a possible bias in the results. However, further investigations especially in other

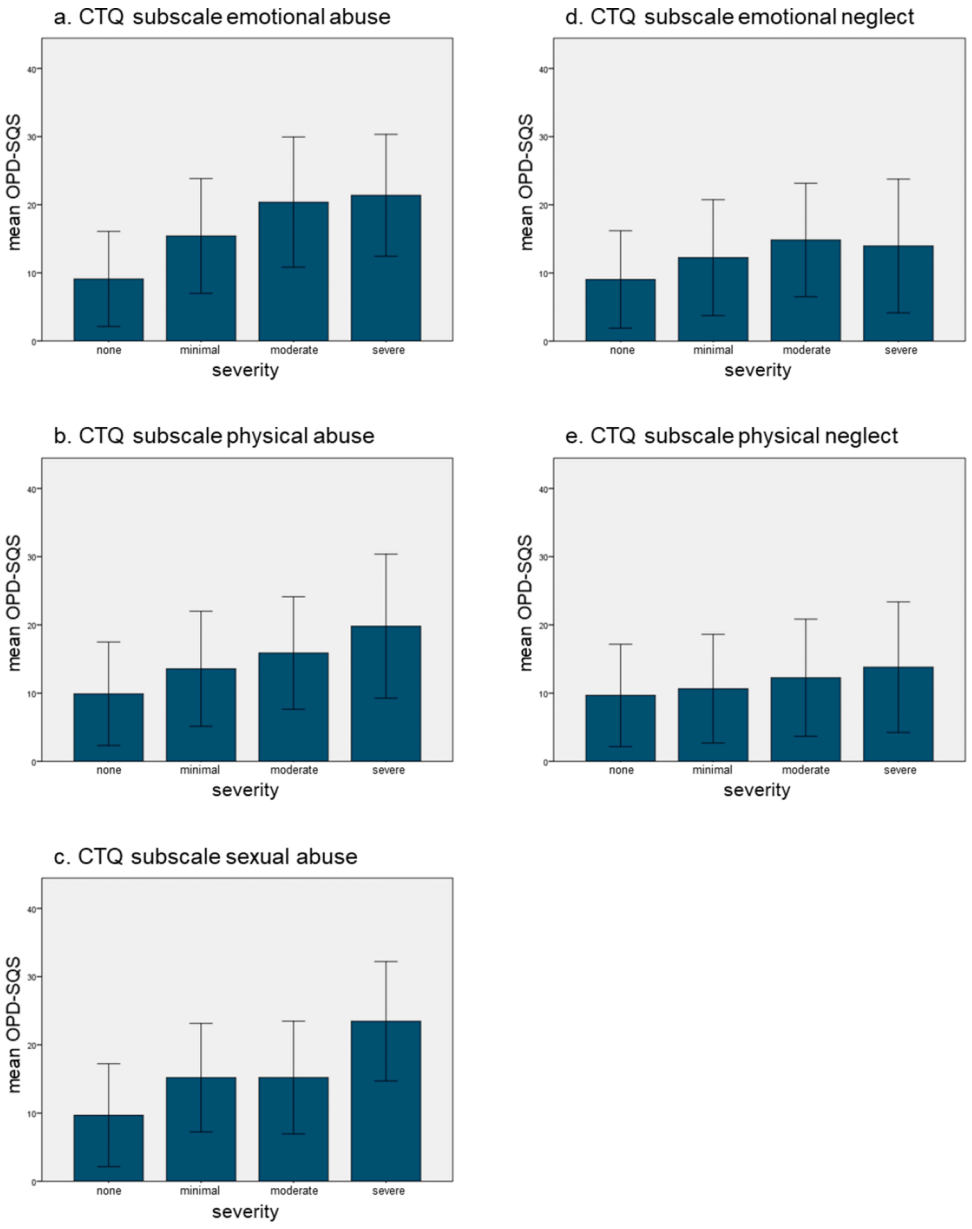

Fig. 2. Means of personality functioning in relation to the severity of CM (none, minimal, moderate, severe). Error bars represent +/- 1 standard deviation.
Note. OPD-SQS = Operationalized Psychodynamic Diagnosis - Structure Questionnaire Short. CTQ = Childhood Trauma Questionnaire.

Table 3
CTQ subscales presented as numbers and percentages for each severity degrees. Means (M) and standard deviations (SD) are reported for scores of OPD-SQS.

CTQ severity	None				Minimal				Moderate				Severe			
CTQ subscale	**n**	**(%)**	**M**	**(SD)**	**n**	**(%)**	**M**	**(SD)**	**n**	**(%)**	**M**	**(SD)**	**n**	**(%)**	M	(SD)
Emotional abuse $n = 2310$	1890	81.8	9.10	(6.99)	281	12.2	15.41	(8.42)	82	3.5	20.38	(9.56)	57	2.5	21.39	(8.04)
Physical abuse $n = 2320$	2038	87.8	9.90	(7.59)	136	5.9	13.57	(8.43)	71	3.1	15.89	(8.25)	75	3.2	19.81	(10.55)
Sexual abuse $n = 2322$	2008	86,5	9.70	(7.54)	141	6.1	15.20	(7.94)	120	5.2	15.21	(8.26)	53	2.3	23.45	(8.75)
Emotional neglect $n = 2319$	1382	59.6	9.04	(7.15)	638	27.5	12.25	(8.51)	137	5.9	14.84	(8.32)	162	7.0	13.96	(9.81)
Physical neglect $n = 2307$	1336	57.9	9.67	(7.50)	445	19.3	10.65	(7.97)	315	13.7	12.25	(8.59)	211	9.1	13.81	(9.57)

Note. OPD-SQS = Operationalized Psychodynamic Diagnosis - Structure Questionnaire Short. CTQ = Childhood Trauma Questionnaire.

countries are needed.

The present study shows a clear association between impairments of personality functioning and different types of CM. However, there does not always seem to be a direct dose-response relationship. All types of CM showed increases in impairments of personality functioning with increasing severity of CM, but to a different extent. Sexual abuse showed a large increase in impairments in personality functioning, especially for severe sexual abuse. It should be noted that if someone experienced severe sexual abuse, they will probably also have experienced other CM types like emotional abuse or emotional neglect. Therefore, it can be assumed that in this cases multiple CM are especially often. An alternative consideration is that the type of CM might have a differential

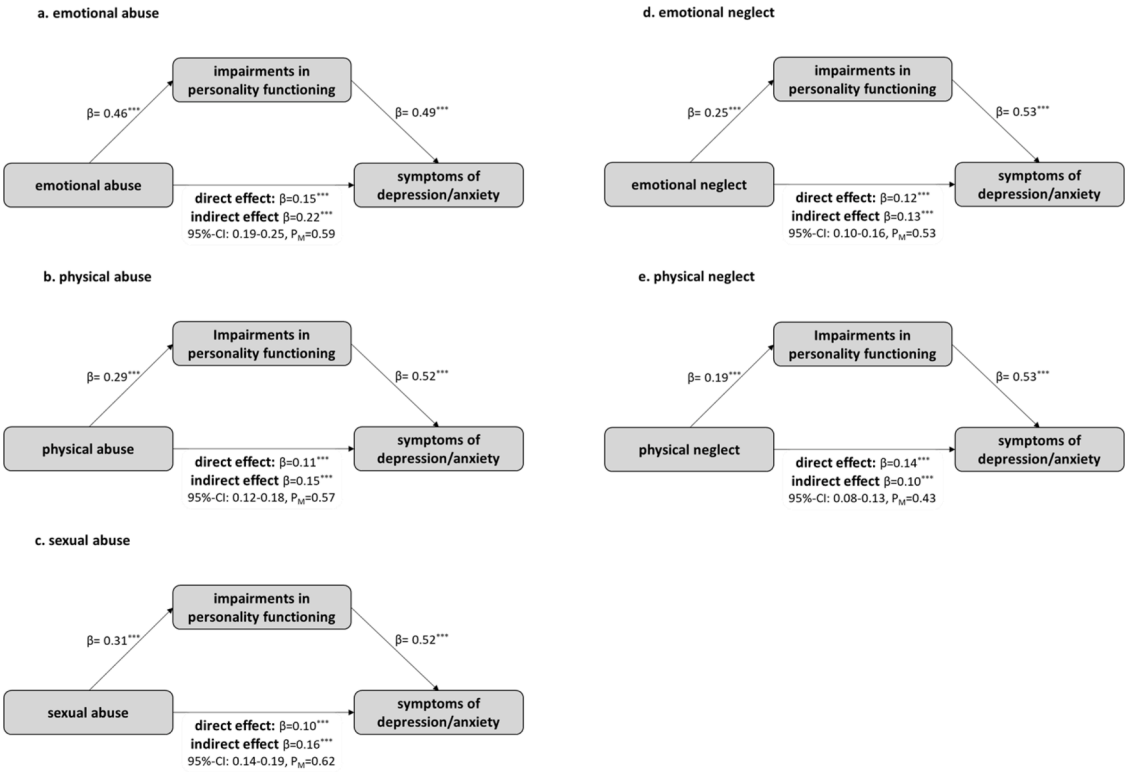

Fig. 3. Mediating model of personality functioning in the relationship between CM and depression/anxiety symptoms. Standardized β-coefficients are reported. *Note.* $*p < .05$; $**p < .01$; $***p < .001$; CI = confidence interval; P_M = proportion of the mediating effect as proportion of the total effect.

impact on the development of personality functioning. Previous findings suggest that different types of CM can predict the development of different types of psychopathologies in adults (Carr et al., 2020, 2013; Hengartner et al., 2013). For example, there was a particularly strong association between emotional abuse and bipolar disorder (Palmier--Claus et al., 2016). Therefore, it is possible that emotional abuse impairs different capacities of personality functioning than e.g., physical neglect.

Consistent with previous studies and meta-analyses, participants with more severe experiences in CM showed more severe depression/anxiety symptoms (e.g., Carr et al., 2020; Li et al., 2016). Moreover, impairments in personality functioning were also strongly associated with depression/anxiety symptoms. This might correspond to the fact that CM is associated with impairments in the emotional development (Harms et al., 2019) resulting in e.g. impaired emotional awareness and coping and also impaired personality functioning. Given that the emotional status is highly relevant for depression/anxiety and plays a key role in personality functioning, it might be – at least in part – one of the underlying mechanisms regarding the associations between CM, personality functioning, and depression/anxiety symptoms. Evidence has shown that personality functioning is modifiable through psychotherapy (Kraus et al., 2021; Leichsenring et al., 2019; Lindfors et al., 2015), and therefore, it might prove useful to assess personality functioning in patients with depression/anxiety symptoms and a history of CM. Guidelines with specific implications for treatment planning with a focus on personality functioning (for OPD-2 see e.g. Ehrenthal and Benecke, 2019; Rudolf, 2020) or related approaches like mentalization-based therapy (Volkert et al., 2019) and schema therapy (Bach and Bernstein, 2019) could be used, emphasizing the clinical implications of assessing and treating impairments in personality functioning. If impairments in personality functioning are found, they should be regarded in the in the planning of psychotherapy as relevant elements. Further intervention studies are needed to prove the benefit for these patients.

4.1. Strengths and limitations

Some potential limitations must be acknowledged regarding this study. First, the findings are based on cross-sectional data, therefore, no interpretation of causal associations is possible. Hence, there is a need for further investigations of the theoretical considerations between CM, personality functioning and symptoms of depression/anxiety. Second, for depression/anxiety symptoms only screening measures were used in the survey. More detailed diagnostic assessment instruments exist for symptoms of depression/anxiety and could confirm our findings. Third, the results are based on retrospective self-reported CM. But there is evidence that retrospectively and prospectively assessed CM elevated the risk of psychopathology to a similar degree (Scott et al., 2012). Furthermore, a recent study found that the risk for psychopathology (e.g., depression and generalized anxiety) linked to subjective reports of CM is high, regardless whether the reports are consistent with objective measures (Danese and Widom, 2020). Therefore, the influence of biases such as false negative or positive answers seems to be slight.

Major strengths of our study were the inclusion of different types of CM in the large population-based sample size. The representative sample allows limited transferability (generalizability) of this result, i.e., the transfer of the clinical observation to the "real life" population. Further, the extent of the mediation effect in our study was comparable to the clinical result, which suggests a stable effect. Lastly, this study included depression and anxiety symptoms, while other studies only investigated depression (Dagnino et al., 2020).

5. Conclusion

The present investigation adds to the evidence that the association between CM and depression/anxiety symptoms is mediated by personality functioning, and that this association can be found in the general population as well as clinical samples. Our results show that the types of CM are of relevance as the mediating effects are slightly stronger in CM

abuse types (emotional, physical, and sexual) than in CM neglect types (emotional and physical). Knowledge about impaired personality functioning in general as well as different types of impaired personality functioning might prove to be an angle for clinical interventions and inspire future research.

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Ethics

The study was approved by the Ethics Committee of the Medical Department of the University of Leipzig (ref: 297/16-ek). The study was conducted in accordance with the Declaration of Helsinki and fulfilled the ethical guidelines of the International Code of Marketing and Social Research Practice of the International Chamber of Commerce, and of the European Society of Opinion and Marketing Research.

CRediT authorship contribution statement

Anna Freier: Conceptualization, Formal analysis, Methodology, Writing – original draft. **Johannes Kruse:** Project administration, Conceptualization, Data curation, Supervision, Writing – review & editing. **Bjarne Schmalbach:** Methodology, Writing – review & editing. **Sandra Zara:** Writing – review & editing. **Samuel Werner:** Writing – review & editing. **Elmar Brähler:** Data curation, Writing – review & editing. **Jörg M. Fegert:** Data curation, Writing – review & editing. **Hanna Kampling:** Project administration, Conceptualization, Supervision, Writing – review & editing.

Declaration of Competing Interest

All authors declare to have no conflict of interest.

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