



# Impact of Maternal Early Life Maltreatment and Maternal History of Depression on Child Psychopathology: Mediating Role of Maternal Sensitivity?

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## Abstract

The study addresses the impact of maternal early life maltreatment (ELM) and maternal history of depression (HoD) on offspring's mental health. Maternal sensitivity was examined as a potential mediator explaining the relationship between maternal ELM, maternal HoD and child psychopathology. Participants were 194 mothers with and without HoD and/or ELM as well as their children between 5 and 12 years. Maternal sensitivity was assessed using the Emotional Availability Scales. Parent and teacher ratings were utilized to assess child psychopathology. Path analyses showed an indirect effect of maternal HoD on parents' ratings of child psychopathology with maternal sensitivity as mediating variable. In contrast, maternal ELM was directly linked to teachers' ratings of child psychopathology; this effect was not mediated by maternal sensitivity. Our results indicate that the impact of maternal HoD, maternal ELM, and maternal sensitivity on offspring psychopathology might vary depending on the context in which child psychopathology is assessed.

**Keywords** Child maltreatment · Maternal depression · Parenting · Child psychopathology

## Introduction

The experience of early life maltreatment (ELM) is not only associated with emotional or behavioral impairments in the victims themselves [1, 2] but it may also affect the mental health of upcoming generations. While the process

of transmission of traumatic experiences had long been described and accounted for both in the psychodynamic literature [3, 4] and in attachment research [5], recent studies provided evidence for an intergenerational transmission of risk in the case of ELM documenting a negative impact of maternal ELM on offspring mental health [6–12].

A further prominent risk factor for the development of mental health problems in offspring is maternal history of depression (HoD). Intergenerational transmission of risk in case of maternal HoD has been one of the best replicated findings in developmental psychopathology research [13].

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Children of mothers with HoD have been shown to display higher levels of internalizing, externalizing, and general psychopathology [14]. HoD in turn is associated with ELM, as studies consistently report a link between ELM and depressive disorders in adulthood [15–17].

In conclusion, both maternal ELM and maternal HoD pose a risk for offspring mental health problems, which will be referred to as “psychopathology” in this study. Since ELM is often associated with maternal mental health issues, and especially with HoD, research on transgenerational effects of ELM might be confounded by effects of HoD and vice versa [18, 19]. The present study thus included both factors in order to disentangle their effects and to understand their specific contribution. Previous research on intergenerational effects of maternal ELM has examined whether self-perceived acute depressive symptoms represent a pathway of risk transmission accounting for the association between maternal ELM and child psychopathology [12, 20–23]. However, the majority of studies were not conducted within clinical samples, but within at risk populations for ELM. In these studies, self-rating scales were mostly used to evaluate acute depressive symptoms in the mothers, while information about mothers’ psychiatric diagnoses (including major depressive disorder) is often missing and effects of remitted depression have not been studied. Conversely, studies demonstrating adverse effects of maternal depressive disorders on offspring mental health did not control for maternal ELM as a possible confounding risk factor. The present study sought to fill this gap. By addressing the factors maternal ELM and maternal HoD in one study, it was possible to disentangle potential effects of both risk factors on child psychopathology.

Intergenerational transmission of both maternal HoD and ELM has been studied on different levels of description [13, 24]. Besides genetic, neuroendocrine or psychosocial investigations of transmission, behavioral studies focusing on the quality of mother–child interaction may provide insights how maternal ELM and maternal HoD impact on the mental health of the next generation [25–27].

Both maternal ELM and maternal HoD have been associated with impairments in different domains of maternal behavior. Depressive mothers have been reported to display more negative or hostile parenting behavior and to hold a more critical perception of their children [27, 28]. Similarly, maternal ELM was associated with harsher and more hostile parenting practices [29, 30] or with more emotionally distant behavior [31].

An observational measure of mother–child interaction focusing specifically on the emotional context of the caregiver–child dyad is represented by the “Emotional Availability Scales” (EAS) [32]. The EAS focus on the dyad’s capacity for emotional connection and the extent to which the connection is affectively positive [32, 33], with

sensitivity representing a key dimension. Going back to attachment theory, the concept of sensitivity originally designated the capacity of the caregiver to clearly perceive and to respond appropriately to the child’s signals, emotions and needs [34]. Incorporating a more general and dyadic perspective, sensitivity in the context of EA refers to positive, genuine and appropriate emotional exchanges between child and caregiver [33, 35].

Only few studies have investigated the impact of maternal ELM or HoD on emotional availability in mother–child interaction. Lower sensitivity [26, 36, 37] and higher hostility have been reported for mothers with experiences of ELM [38], while lower sensitivity and less optimal structuring were found in mothers with depression [39–42]. At the same time, lower levels of maternal sensitivity have consistently been linked with higher levels of psychopathology in the children [39, 40, 43, 44]. As maternal sensitivity is regarded as one of the main determinants of a secure attachment relationship between mother and child [45], the quality of attachment might account for the association between sensitivity and children’s behavioral adaptation [46].

In order to assess whether maternal behavior serves as a mechanism of transmission by which maternal ELM or HoD affect child mental health, the majority of studies utilized mediation analysis as a statistical approach. In this case, mediation means that the distant variable, i.e. maternal ELM or HoD (predictor), impacts on a current maternal variable (mediator), which in turn affects child mental health (outcome variable). For maternal HoD, previous research mostly confirmed a mediating effect of parenting for children of different age groups [28]. In case of primary school children, Foster et al. [47] found positive maternal behavior, as assessed by a self-created coding system, to partially mediate the association between maternal HoD and child psychopathology. However, studies examining maternal emotional availability as a potential mediator of the link between maternal HoD and children’s mental health are lacking.

For maternal ELM, evidence regarding the impact of maternal behavior on child outcome is still sparse and inconsistent. Discrepancies may partly be due to measurement issues: while studies utilizing self-report measures found parenting or mother–child relationship quality to explain the association between maternal ELM and child mental health [8, 11, 48], studies applying observational measures mostly fail to confirm a mediational role of maternal caregiving or parenting [6, 44]. Up to now, no studies exist that have used the EAS to study psychological mechanisms underlying the intergenerational effects of maternal ELM onto the next generation.

Following best practice recommendations, multiple informant ratings should be employed in the assessment of child adjustment [49]. Considering information from different raters seems especially relevant when studying maternal risk factors

such as ELM or HoD, as both might give rise to significant response biases on part of the mother [50]. Discrepancies between different raters often occur in reports of children's behavioral and emotional problems with associations between parent and teacher ratings of child psychopathology falling into the low to middle range [51, 52]. While cross-informant discrepancies have long been regarded as pure "measurement error", recent research could demonstrate that rating discrepancies might reflect the fact that children's behavior varies as a function of different situations [53]. These findings highlight the advantages of integrating multiple ratings in the study of child mental health. However, only few studies examining the effects of maternal ELM and HoD on child mental health so far have made the effort of deploying a multi-rater design to measure child outcome [11, 20, 22, 54].

In summary, both maternal ELM and maternal HoD may constitute a risk for offspring mental health. As existing research suggests, disturbances in maternal behavior could represent possible ways of risk transmission between generations. The aims of the present study were as follows: first, we examined direct effects of maternal HoD and maternal ELM on child psychopathology. By including both maternal risk factors in the same study, we were able to disentangle their potential effects on child psychopathology. Secondly, we examined possible indirect effects of maternal HoD and maternal ELM on child psychopathology with maternal sensitivity acting as a mediator. We conducted mediational path analysis using a test of indirect effects and bootstrapping. It was hypothesized that maternal sensitivity would serve as a mediator between both maternal ELM and maternal HoD and child psychopathology. To our knowledge, this is the first study using maternal emotional availability to test the mediational role of mother-child interaction for effects of maternal ELM and HoD on offspring mental health.

In the present study, only mothers currently remitted from acute depressive episodes were included. This approach was taken in order to allow causal inferences within a cross-sectional design and to rule out potential maternal rating biases due to actual depressive symptoms. In light of findings on rater-dependent effects for child psychopathology, we utilized two ratings—mother and teacher—to assess child psychopathology. The present study investigated the impact of maternal ELM and HoD on children's behavioral adaptation in middle childhood, as all children included in the study were pupils of primary schools (5–12 years).

## Method

### Participants

The study was part of a large multicenter project which investigated the intergenerational transmission of ELM

(*Understanding and Breaking the Intergenerational Cycle of Abuse, UBICA*). Please note that there may be overlaps between the samples of the current study and other studies which originate from the UBICA consortium.

The current study included data from 194 mothers and their children. Mother-child dyads were recruited in two German study sites, Berlin and Heidelberg, by advertisement (e.g., pediatric and psychiatric outpatient clinic, public youth or health services). Furthermore, in Heidelberg, participants of a previous project [55] were recontacted.

In the present study, we included mothers with remitted depression, i.e. mothers with a lifetime diagnosis of a depressive disorder who did currently not fulfill criteria of a depressive disorder anymore, with or without experiences of childhood abuse (sexual or physical). In addition, mothers with experiences of childhood abuse without any life-time psychiatric disorders and healthy control mothers without any life-time psychiatric disorders or childhood abuse experiences were included. As further inclusion criteria, mother and child had to live together, also in case of separated parents. Children had to be between 5 and 12 years of age and had to attend primary school. All mothers were required to have a Hamilton Rating Scale for Depression (HAM-D) score below or equal seven to assure full remission in case they had had an episode of depression in the past. Exclusion criteria for mothers were as follows: neurological diseases, acute psychiatric axis I disorders, lifetime history of schizophrenia or manic episodes as assessed by the Mini International Neuropsychiatric Interview (M.I.N.I.), one of the following three personality disorders: emotional-unstable, anxious-avoidant, antisocial personality disorder (based on the International Personality Disorder Examination), and intake of benzodiazepine within the last 6 months. Children were excluded if they had a previous diagnosis of autism spectrum disorder or in case of an IQ below 70. In order to assess children's intellectual abilities, either the CFT 1-R (children between 5 and 8 years of age) or the CFT 20-R (children older than 8 years) were administered.

Among the mothers included in the study, 45.9% reported a major depressive disorder in the past ( $n=89$ ). The majority of mothers were German (90.7%) and middle class (84.5%). Mothers with remitted depression had the following comorbid lifetime diagnoses: panic disorder ( $n=9$ ), obsessive compulsive disorder ( $n=1$ ), social phobia ( $n=2$ ), posttraumatic stress disorder ( $n=2$ ), generalized anxiety disorder ( $n=1$ ), anorexia nervosa ( $n=2$ ), and bulimia nervosa ( $n=2$ ). Out of the mothers in the remitted depression group, 21 (23.9%) received antidepressant medication, 3 (3.4%) received atypical antipsychotic medication, and 2 (2.2%) received mood stabilizers. Further demographic and clinical information is presented in Table 1. Mothers with currently remitted major depression (HoD) did not differ significantly from healthy control mothers with respect to maternal age,  $F(1,$

192) = 0.98,  $p > 0.05$ , socioeconomic status,  $\chi^2(2) = 0.88$ ,  $p > 0.05$ , or years of education,  $F(1, 192) = 1.52$ ,  $p > 0.05$ , children's age,  $F(1, 192) = 3.11$ ,  $p > 0.05$ , or children's IQ,  $F(1, 192) = 1.73$ ,  $p > 0.05$ . Healthy control mothers, however, were more likely to cohabit with the child's father than mothers with HoD,  $\chi^2(1) = 25.58$ ,  $p < 0.01$ . No significant associations were found between ELM and maternal age, children's age, socioeconomic status, years of education, children's IQ, or mothers' cohabitation with the child's father when maternal HoD was controlled for.

## Procedure

The study was approved by the ethics committee of the Charité Universitätsmedizin Berlin and by the ethics committee of the Faculty of Medicine in Heidelberg. Mothers and children provided written consent after the aim of the study and procedures were explained. Data were collected during two laboratory visits. During the first visit, two structured clinical interviews, the M.I.N.I. and the HAMD, were administered to the mothers, and the interaction between mother and child was assessed in a laboratory setting. Information about maternal experiences of abuse was collected with the Childhood Experiences of Care and Abuse (CECA) interview in the second session. During the time between both visits, which were scheduled 1–4 weeks apart on average, mothers completed the Child Behavior Checklist (CBCL). Mothers received 100 EURO for participating in the study. Information about the children's behavior at school was obtained from the children's teachers. After mothers and children had given permission to contact the school, teachers were mailed the Teacher Report Form (TRF) along with information about the study and its aims. Furthermore, we sent them the written release from confidentiality obligation as well as the information that the Berlin school board gave

permission to our study. The teachers did not receive any monetary compensation for contributing to the study.

## Measures

### Maternal Depression

The M.I.N.I. was used to assess maternal depressive disorders as well as further life-time axis-I diagnoses. During the interview, information on the number of episodes, the duration of illness, and on medication was collected. The MINI is a structured diagnostic interview for DSM axis-I psychiatric disorders that showed good psychometric properties, i.e., reliability and validity, in previous studies [56, 57]. Additionally, the HAMD was administered to ensure full remission from depression. A meta-analysis reported good to excellent reliability of the instrument [58]. We used the German version of the Hamilton Depression Scale, 21 Items version. Possible sum scores of this scale range from 0 to 52, whereby scores between 0 and 7 are considered in the normal range, 17–23 represent moderate depression, scores over 24 indicate severe depression [59]. All mothers participating in the study had to have a HAMD score below or equal seven in order to assure full remission, mean score in our sample was 1.82 ( $SD = 1.98$ ). Both interviews were conducted by trained and experienced raters.

### Maternal Abuse History

In order to collect information on maternal childhood experiences of abuse and neglect, the CECA interview was administered [60]. The CECA is an extensive semi-structured interview of childhood experiences up to an age of 17, including assessments of childhood adversities such as physical, sexual or psychological abuse, neglect, role-reversal, or domestic violence. Five core scales include information on neglect, physical or psychological abuse, and antipathy from different parent figures as well as sexual abuse from any perpetrator. Following the original coding system, all experiences were rated by the interviewers on 4-point scales of severity (1 = 'marked', 2 = 'moderate', 3 = 'mild' or 4 = 'little/none') according to predetermined criteria and manualized threshold examples. We used the German version of the CECA interview [61]. Previous studies [60, 62] found reliability scores ranging from good to excellent (Sexual abuse  $\kappa = 1.00$ ; antipathy  $\kappa = 0.83$ ; neglect  $\kappa = 0.78$ ; physical abuse  $\kappa = 0.83$ ; psychological abuse  $\kappa = 0.80$ ). Interviewers in our study were four clinical psychologists (two in Berlin, two in Heidelberg), one of them holding a Ph.D. degree, and three of them having master degrees. All of the interviewers participated in the same training held by the author of the interview (Antonia Bifulco). For the present analyses,

**Table 1** Demographic characteristics of participants

Mothers (N = 194)	
Mean age (SD)	39.78 (5.62)
SES (%)	
Upper/middle upper	40.3
Middle/lower middle	44.2
Lower	15.5
Mean years of education	17.2 (3.6)
Living together with child's father (% yes)	60.8
Children	
Mean age	8.03 (1.58)
Sex (boys %)	44.3
IQ (SD)	105.79 (13.11)

SES Socio-economic status determined by mothers' professional status, IQ Scores in the Culture Fair Test (CFT)

the peak value of the five core scales was used to indicate a history of childhood abuse.

### Maternal Sensitivity

The sensitivity scale from the EAS, 4th edition [32], was used to measure maternal sensitivity. The EAS are a well-established measure of dyadic interaction between a caregiver and a child, especially focusing on the emotional quality of a relationship. Parental sensitivity, according to the EAS, refers to the caregiver's behaviors and emotions used to establish a positive and healthy emotional connection to the child [35]. According to the 4th edition of the EAS, sensitivity is coded on a Likert-type continuous scale ranging from 1 (lowest) to 7 (highest). The EAS have shown good psychometric properties in previous studies [33]. In accordance with the recommendations of the EAS manual, mother–child interaction was observed in a videotaped session lasting at least 20 min. Mother and child were placed in a laboratory playroom. During the first 15 min of the session, mother and child were instructed to play as they normally would in a free play situation. For the last 6 min, the child had to work on a hardly solvable puzzle task. In the puzzle task adapted from the game “Shape by Shape”®, the child had to arrange puzzle pieces according to a given pattern. The mother was instructed to assist, but not to solve the task on her own. EAS were coded by three researchers (one senior clinical psychologist and two psychologists holding Master degrees in clinical psychology), who had been trained in the EAS and were approved as reliable by Z. Biringen. Every video was rated independently by at least two coders, discrepancies were resolved through discussion. Mean values of the four maternal EA scales can be found in Table 2. For the maternal subscales, interrater reliability (intra-class correlations) for pairs of raters in the present study ranged between  $r=0.78$  and  $r=0.86$  for Sensitivity,  $r=0.81$  and  $r=0.87$  for Structuring,  $r=0.82$  and  $r=0.86$  for Nonintrusiveness, and  $r=0.84$  and  $r=0.90$  for Nonhostility, indicating good agreement.

### The Child Behavior Checklist (CBCL)

The CBCL parents' form [63] is a well-established, widely used standardized measure for the assessment of behavioral and emotional problems in 4–18 year old children and adolescents. Good reliability and validity have been demonstrated for the German version of the CBCL [64, 65]. In accordance with other studies investigating the impact of maternal ELM or depression on child mental health [6, 66], the total problem score including 118 items was used in the present study. It showed excellent internal consistency (Cronbach's  $\alpha=0.99$ ). The total problem score has been demonstrated to correlate well with child psychiatric

**Table 2** Rates of ELM, mean and standard deviations of main study variables

	N	%
<b>Maternal abuse experiences</b>		
Sexual abuse	36	18.7
Physical abuse	58	29.9
Emotional abuse	15	7.7
Parental hostility	56	28.9
Neglect	20	10.3
Total abuse experiences	91	46.9
	Mean	SD
<b>Mothers</b>		
Mean CECA value	4.28	0.97
EAS Sensitivity	2.65	1.10
EAS Structuring	4.28	0.97
EAS Nonintrusiveness	4.59	0.77
EAS Nonhostility	5.17	0.98
5.62	1.07	
<b>Children</b>		
Total problem score—mother rating (CBCL)	54.01	9.58
Total problem score—teacher rating (TRF)	47.64	9.46

Abuse experience rated “moderate (2)” or “marked (1)” according to the CECA interview, lower scores indicate higher severity of abuse. Sensitivity rated by the EAS. *CBCL* Child Behavior Checklist, T-scores; *TRF* Teacher Rating Form, T-scores

diagnoses in children [67, 68], and thus to provide a valid indicator for mental health problems in children. The high correlation between the internalizing and the externalizing scales on the CBCL in the present study ( $r=0.59$ ,  $p<0.001$ ) indicates that the use of the total problem score did not result in undue aggregation of divergent information [66]. Raw CBCL scores were converted to T-scores using German norms.

### The Teacher Report Form (TRF)

The TRF is a teacher version of the CBCL 4–18, which measures teacher-reported emotional and behavioral problems [64]. Good psychometric characteristics of the German version have been reported in previous studies [69]. Analogous to the CBCL, T-converted total scores were utilized in the following analyses. Internal consistency of the total score was high in the current study (Cronbach's  $\alpha=0.99$ ).

### Data Analysis Plan

Preliminary analyses in IBM SPSS 22 were conducted to screen the data for missings and outliers, to control for possible effects of child gender and age on mediating and outcome variables, and to assess normality and multicollinearity.

Of the 194 participants, CBCL questionnaires had been received from 183 mothers (94.3%), TRF questionnaires had been returned for 137 cases (70.6%). Maternal remitted depression or abuse experiences were unrelated to missing questionnaires. No outliers (scores greater 3 SD from the mean) were found for the mediating and dependent variables. All endogenous variables were normally distributed with skewness and kurtosis values  $< |0.5|$ . Multivariate collinearity was tested with several multiple regressions, using each variable as a criterion and the rest as predictors [70]. With  $R^2 < 0.70$  in all regressions, no indications for multicollinearity were found.

Descriptive analyses included means and standard deviations for maternal sensitivity and ratings of child problem behavior, as well as rates of abuse and neglect. Bivariate correlations were conducted to examine associations between all relevant study variables.

In order to establish mediation, the popular causal steps approach advocated by Baron and Kenny [71] specified several criteria, one of them being a significant direct effect between predictor and outcome variable. However, the causal steps approach has been criticized more recently, especially the requirement of a significant direct effect between predictor and outcome has been called into question with regard to power and type I error [72, 73]. Modern approaches to study mediation favor the use of bootstrapping techniques for testing indirect effects over the causal steps approach and the Sobel test [74]. In view of these developments, we used path analysis and bootstrapping in order to assess the main research hypotheses concerning mediation. Study design was cross-sectional, hypothesized relations between variables were based upon theoretical considerations and temporal order. The level for statistical significance was set at  $p = 0.05$ .

In order to examine our mediation hypotheses, two alternative path analytic models were computed for the parental and for the teacher ratings, respectively. In model 1, maternal HoD and maternal ELM were hypothesized to directly affect child psychopathology and maternal sensitivity. Thus, model 1 comprised only direct paths between maternal HoD and maternal ELM on the one hand, and maternal sensitivity and child psychopathology on the other hand, as well as a correlation between maternal HoD and maternal ELM. Model 2, in contrast, tested whether the effect of maternal HoD and maternal ELM on child psychopathology operates exclusively through maternal sensitivity. Maternal sensitivity was included as a mediator in model 2, but direct paths from maternal HoD and maternal ELM on child psychopathology were dropped. In order to identify the most parsimonious model with appropriate model fit, nonsignificant paths were removed until either all remaining paths were significant or model fit significantly decreased in comparison to the previous model. Path analyses were conducted

in IBM AMOS 22 with Maximum Likelihood Estimation. Full Information Maximum Likelihood was used in order to account for missing data.

In accordance with methodological recommendations [70, 75], a combination of Fit indices was used to assess model fit. The Chi square statistic tests the exact-fit-hypothesis by evaluating the discrepancy between the observed covariance matrix and the covariance matrix predicted by the model. As the Chi square test is susceptible to sample size, we used the Root Mean Square Error of Approximation (RMSEA) [76], the Standardized Root Mean Square Residual (SRMR) [77] and the Comparative Fit Index (CFI) [78] as further indices of model fit. A nonsignificant model Chi square statistic, a CFI value  $> 0.90$ , SRMR  $< 0.08$  and a RMSEA value  $< 0.06$  were taken indicators of good model fit. Nonparametric bootstrapping ( $n = 5000$  bootstrap samples) was employed to calculate the mediational effect for maternal sensitivity. Bootstrapping is based on an examination of the empirical distribution of the indirect effect, with confidence limits being computed for the sampling distribution. Bootstrapping techniques are particularly useful for testing the significance of indirect effects, as they require less statistical assumptions than other tests and provide more accurate estimates of confidence intervals [79, 80].

## Results

### Descriptive and Bivariate Analyses

The rates of ELM in mothers as well as means and standard deviations of main study variables are presented in Table 2. In total, 46.9% of all mothers (66.3% of the mothers with remitted depression and 30.5% of healthy control mothers) reported moderate or marked childhood abuse experiences on at least one of the five CECA core scales (physical abuse, sexual abuse, psychological abuse, antipathy, neglect), with physical abuse and antipathy representing the forms of maltreatment most frequently mentioned. Significant differences between mothers with versus without HoD were found for the total rate of childhood abuse,  $\chi^2(1) = 24.81$ ,  $p < 0.001$ , as well as for four of the five CECA core scales (physical abuse:  $\chi^2(1) = 5.41$ ,  $p < 0.05$ ; neglect:  $\chi^2(1) = 7.62$ ,  $p < 0.01$ ; sexual abuse:  $\chi^2(1) = 17.86$ ,  $p < 0.001$ ; parental antipathy:  $\chi^2(1) = 10.75$ ,  $p < 0.001$ ). Means of CBCL and TRF total scores were in the normal range. For the CBCL scores, 14.8% of the children fell into the clinical range (cut-off  $T > 63$ ) and for the TRF scores 6.1%.

Intercorrelations between study variables, children's age and gender are displayed in Table 3. Maternal sensitivity and CBCL total problem score were significantly correlated with maternal HoD and ELM. Both maternal HoD and higher severity of maternal ELM were associated with lower

sensitivity and higher CBCL problem ratings. However, higher scores on the TRF were associated with higher severity of maternal ELM, but no intercorrelation between TRF and maternal HoD was found. We found significant negative correlations between maternal sensitivity and CBCL ratings, as well as significant negative correlations between maternal sensitivity and TRF ratings. Child age was negatively correlated with maternal sensitivity and positively correlated with total scores of the CBCL and TRF. Boys displayed significantly higher ratings on the TRF than girls. Given these significant effects for gender and age, we controlled for both variables in all subsequent analyses of the study.

### Path Analyses for CBCL Total Problems Ratings

In model 1, we tested whether associations between study variables could be explained by direct effects from maternal HoD and maternal ELM on maternal sensitivity and on CBCL problem ratings. We found a significant association between maternal sensitivity and maternal remitted depression ( $\beta = -0.23$ ; S.E. = 0.08,  $p < 0.01$ ), but all remaining direct paths—especially associations between maternal HoD resp. ELM and CBCL total problem ratings—were not significant (Remitted depression to CBCL problem rating:  $\beta = 0.10$ , S.E. = 0.08,  $p = 0.22$ ; ELM to CBCL problem rating:  $\beta = -0.11$ , S.E. = 0.08,  $p = 0.18$ ; ELM to maternal sensitivity:  $\beta = 0.11$ ; S.E. = 0.07,  $p = 0.15$ ). Inspection of the fit indices revealed that the fit of model 1 was not satisfying:  $\chi^2(1) = 6.02$ ,  $p < 0.05$ , CFI = 0.93, RMSEA = 0.16, SMRM = 0.035. In model 2, we assessed whether associations between CBCL ratings and HoD resp. ELM could be accounted for by associations with maternal sensitivity acting as a mediator. Model 2 provided a good fit to the data:  $\chi^2(2) = 2.56$ ,  $p = 0.28$ , CFI = 0.99; SRMR = 0.028, RMSEA = 0.037, but still contained one non-significant path from ELM to maternal sensitivity ( $\beta = 0.11$ , S.E. = 0.07,  $p = 0.15$ ). By constraining this path to zero, we tested whether maternal ELM as a predictor could be

eliminated from the model. The revised model 2 fitted the data well:  $\chi^2(3) = 4.56$ ,  $p = 0.21$ , CFI = 0.98, SRMR = 0.036, RMSEA = 0.052. Furthermore, dropping the path from ELM to maternal sensitivity did not lead to a significant change in model fit:  $\Delta\chi^2 = 2.04$ ,  $p = 0.15$ . Path coefficients of the final model are displayed in Fig. 1. As a further test of the indirect effect of maternal sensitivity, we conducted further analyses using bias corrected bootstrapping. As the results indicate, maternal sensitivity was a significant mediator of the relation between maternal HoD and CBCL total problem score (indirect effect:  $\beta = 0.062$ , 95% CI [0.018, 0.128],  $p = 0.004$ ).

### Path Analyses for TRF Total Problems Ratings

Model 1, which contained only direct paths from maternal HoD and maternal ELM on maternal sensitivity and on TRF problem ratings, fitted the data well:  $\chi^2(1) = 0.61$ ,  $p = 0.44$ , CFI = 1.00, RMSEA = 0.00; SMRM = 0.013. However, model 2, which assessed full mediation through maternal sensitivity, provided inadequate model fit:  $\chi^2(2) = 6.96$ ,  $p < 0.05$ , CFI = 0.93, RMSEA = 0.11; SMRM = 0.048. Therefore, we rejected model 2 in favor of model 1 for the TRF ratings.

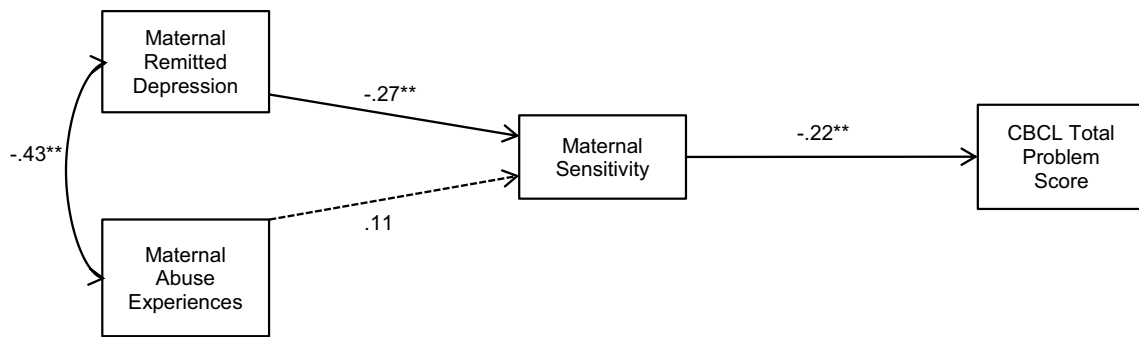
Model 1 still contained non-significant paths. Maternal HoD was not significantly associated with TRF total problem ratings and maternal ELM was not significantly related to maternal sensitivity. We eliminated both paths for the final model 1. The revised model 1 provided good model fit:  $\chi^2(3) = 2.67$ ,  $p = 0.45$ , CFI = 1.00, SRMR = 0.027, RMSEA = 0.00, furthermore, dropping the paths from ELM to maternal sensitivity and from remitted depression to TRF problem ratings did not lead to a significant change in model fit:  $\Delta\chi^2 = 2.06$ ,  $p = 0.36$ . Path coefficients of the final model are displayed in Fig. 2. As the results indicate, maternal ELM, but not maternal remitted depression was associated with TRF problem ratings. This association was not mediated by maternal sensitivity.

**Table 3** Bivariate correlations for main study variables, age and gender

	1.	2.	3.	4.	5.	6.
1. Remitted depression	–	–	–	–	–	–
2. Childhood abuse experiences (CECA)	–0.43**	–	–	–	–	–
3. Maternal sensitivity	–0.27**	0.20**	–	–	–	–
4. Total problem score—mother rating (CBCL)	0.18*	–0.16*	–0.24**	–	–	–
5. Total problem score—teacher rating (TRF)	0.09	–0.23**	–0.20*	0.31**	–	–
6. Gender	0.11	–0.05	0.16*	0.09	–0.26**	–
7. Age of children	0.13	–0.04	–0.18*	0.21**	0.18*	–0.08

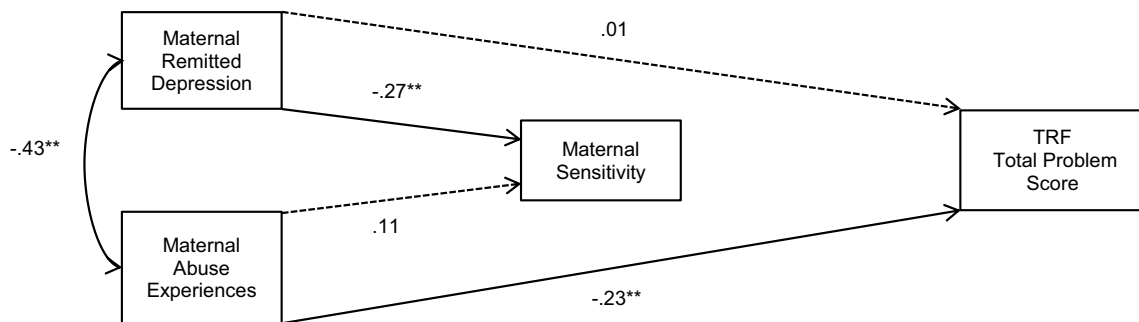
CECA Childhood Experience of Care and Abuse Interview, lower scores indicate higher severity of abuse; CBCL Child Behavior Checklist; TRF Teacher Report Form

\* $p < 0.05$ ; \*\* $p < 0.01$



**Fig. 1** Model 2 testing indirect effects of maternal HoD and maternal ELM on CBCL ratings with maternal sensitivity as mediator. In our path analyses, we tested a model with direct effects (model 1) against a model with indirect effects (model 2). Model 2 was the preferred

model for the CBCL ratings and is therefore illustrated in this figure. Standardized path coefficients are presented. Dashed lines represent effects that were not statistically significant and were eliminated from the final model. \*p < 0.05; \*\*p < 0.01. CBCL Child Behavior Checklist



**Fig. 2** Model 1 testing direct effects of maternal remitted depression and ELM on TRF ratings. Standardized path coefficients are presented. In our path analyses, we tested a model with direct effects (model 1) against a model with indirect effects (model 2).

Model 1 was the preferred model for the TRF ratings and is therefore illustrated in this figure. Dashed lines represent effects that were not statistically significant and were eliminated from the final model. \*p < 0.05, \*\*p < 0.01. TRF Teacher Report Form

**Discussion**

The current study investigated effects of both maternal HoD and maternal ELM on child psychopathology. To highlight possible mechanisms accounting for the relationship between maternal HoD and ELM as maternal risk factors on the one hand, and child psychopathology on the other hand, the role of maternal sensitivity was addressed. Our results underline the importance of maternal HoD and ELM in regard to the health status of the following generation. The mediational role of maternal sensitivity was partially confirmed. However, our results also indicate that associations between maternal HoD, maternal ELM, maternal sensitivity and child psychopathology might vary according to the area of life (family vs. school) in which children’s psychopathology is assessed.

For maternal HoD, an indirect effect was found for maternal sensitivity. In accordance with our hypothesis, sensitivity acted as a mediator between maternal HoD and maternal assessments of child psychopathology, as HoD was related to

lower sensitivity, which in turn was associated with elevated child psychopathology in maternal assessments. This is in line with previous research demonstrating that past maternal depression might lead to impairments in positive maternal behaviors which predict child behavior problems [47]. For teachers’ assessment of child psychopathology, neither direct nor indirect effects for maternal HoD were found in the present study. Several reasons might explain the differences in maternal and teacher ratings. First, consistent with a “depressive rating bias” discussed in the literature [81, 82], the presence of maternal depressive symptoms might have led to maternal overestimation of child behavior problems, resulting in higher associations between maternal depression and maternal ratings of child psychopathology. However, as all mothers included in our study were fully remitted from depression, it is unlikely that a maternal “depressive rating bias” could fully account for our findings. The associations between maternal HoD, sensitivity and maternal ratings of child psychopathology rather suggest that children of formerly depressed mothers might show problem behavior



within the family rather than at school. Such context-specificity of children's problem behavior can often be elucidated by its functional role within the system in question. Due to deficiencies in maternal emotional responsiveness, children of depressed mothers might rely on excessive clinging or on defiant or aggressive behavior—to name only a few examples—in order to obtain any kind of emotional response in the mother–child dyad.

For maternal ELM, results showed yet a different pattern. When teachers reported on child psychopathology, maternal ELM was directly linked to child psychopathology, and this effect was not mediated by maternal sensitivity. Neither direct nor indirect effects of maternal ELM on child psychopathology occurred for maternal ratings. The direct effect of maternal ELM on teacher ratings differs from previous findings. Morrel et al. [22] and Koverola et al. [20] both reported maternal ELM to be unrelated to teacher assessment of offspring mental health. Apart from methodological differences concerning measurement of maternal ELM, differences in sampling might account for the divergent results. While Morrel et al. [22] and Koverola et al. [20] included a high-risk sample with elevated numbers of both socioeconomic and medical risk factors, our sample was predominantly middle class. Moreover, in the studies of Morrel et al. [22] and Koverola et al. [20], sexual and physical abuse were the only forms of ELM investigated, whereas we additionally included experiences of emotional abuse, parental hostility or neglect. While there is no further research investigating the impact of parental ELM on children's behavior in school apart from the studies cited, the detrimental effect of child abuse on school performance is well documented [83]. Our results suggest that ELM might have transgenerational effects on adaptive behavior in school.

In contrast to our results regarding maternal HoD, our hypothesis of a mediational role of maternal sensitivity was not confirmed for the association between maternal ELM and child psychopathology. This finding contrasts with previous evidence indicating parenting or mother–child relationship quality to explain the association between maternal ELM and offspring mental health [8, 11, 48, 84]. However, those studies exclusively relied on maternal ratings to assess parenting behavior, and for the most part also to measure offspring adjustment. As our study aimed at circumventing the issue of shared method variance by using an observation based assessment of mother–child interaction, our results might differ from previous studies. Furthermore, it might be that maternal HoD and maternal ELM impact on different aspects of maternal behavior. As our data demonstrate, maternal sensitivity is significantly influenced by maternal HoD. This result might be accounted for by the strong focus of the EAS on the emotional exchange between mother and child. This instrument might be particularly sensitive for disturbances of affective communication between mother and

child related to maternal HoD such as a flat affect. Possibly, maternal history of ELM stronger affects aspects of parenting that are not covered by maternal sensitivity. For instance, maternal disciplinary practices might be a case in point, as previous studies reported maternal general discipline [11] or physical discipline [85] to mediate the association between maternal ELM and offspring's problem behavior. Especially the association between maternal ELM and teacher ratings of child psychopathology should be elucidated in further studies. It might be conceivable that the effect of maternal ELM on children's school performance is mediated by aspects of maternal parenting that are not captured by maternal sensitivity. Alternatively, the effect might be attributable not to maternal behavior alone, but to paternal characteristics. Several studies could demonstrate that women with ELM tend to chose partners or husbands who are prone to aggressive behavior [86] and thus run a considerable risk to be revictimized in intimate relationships [87, 88]. Paternal behavior, especially harsh discipline and hostility, on the other hand, were shown to partially explain the association between maternal ELM and children's problem behavior in a recent study of Rijlaardsdam et al. [11]. Hence, the association between maternal ELM and children's problem behavior in school might be due to factors not covered in the present study.

### Strengths and Limitations

The study examined intergenerational effects of two often co-occurring maternal risk factors—of maternal HoD and ELM. By addressing maternal HoD and ELM in one study, it was possible to disentangle both factors and to explore their unique contribution to mental health impairments of the second generation. In contrast to past research in the field of intergenerational transmission, well-validated interview measures instead of self-report-questionnaires were utilized to evaluate maternal risk factors. Current and past mental disorders were determined with clinical interviews providing thorough assessments of the mother's psychiatric status and clinical history. The trauma interview covered a wide range of different forms of child maltreatment.

Furthermore, by testing the mediational role of maternal sensitivity, the study focused on an aspect of mother–child interaction which has hardly been considered in previous research on intergenerational effects of maternal ELM. By combining clinical interviews, the well-established observational framework of the EAS, and clinical assessments of children by different raters, the problem of shared-method variance, prevalent in past research, could be circumvented in the present study.

Regardless of these strengths, several limitations of the present study may be considered. First, since part of our sample was recruited through advertisement, the sample

needs to be considered self-selected rather than non-random. Therefore, caution should be exercised when generalizing our results to the wider population. Further, a clinical sample was used with maternal HoD and/or ELM as major inclusion criteria. Despite of extensive advertising efforts, we faced problems to recruit mentally healthy mothers with experiences of serious ELM. Thus, maternal HoD and history of ELM—the major predictor variables—were associated. However, preliminary data inspection could rule out multicollinearity problems, and as the standard errors were limited, there was no indication for biases in the estimation of path coefficients.

A further limitation is that, due to the cross-sectional design, causal interpretations must be undertaken with caution. Although both maternal risk factors—HoD and ELM—lay in the past, the assessment of maternal sensitivity and child problem behavior both occurred at the same time-point. Therefore, the causal direction underlying the association between sensitivity and offspring psychopathology could not be established unambiguously. It is even considerable that long-lasting impairments in mother–child interaction, resulting in compromised sensitivity, might have contributed to past maternal depression. Bearing these limitations in mind, prospective longitudinal studies applying objective measures of mother–child interaction, maternal psychiatric status and maltreatment ELM are needed to highlight the exact mechanisms of transmission processes via mother–child interaction.

Another limitation is that, apart from maternal factors, more general family variables have not been investigated in the present study. As mentioned above, also paternal characteristics might exert a significant influence on children's adaptive behavior. Furthermore, it is acknowledged that the present study did not consider prenatal forms of maternal neglect and abuse, i.e. tobacco and alcohol consumption, poor nutrition and maternal stress during pregnancy. A further limitation is that several mothers in the remitted depression group received psychotropic medication. Although none of the mothers was medicated with benzodiazepines (which would very likely have impacted on mother–child interaction) and although compromised maternal sensitivity does not necessarily suggest itself as a side effect of antidepressant medication (antidepressants might even be expected to improve emotional availability), we cannot exclude that medication might have influenced our findings.

Despite the above-mentioned limitations, our findings have valuable clinical implications. In line with previous research disclosing intergenerational effects of maternal distress, our study underscores the relevance of maternal ELM and HoD for child problem behavior in the family as well as in the school context. Careful assessment of both parental ELM and psychiatric status should become an integral part

of the diagnostic procedures for children displaying behavioral problems.

In addition, the study provides indications on how child-directed treatments should be complemented by interventions aiming at improving the quality of mother–child interaction. Given our findings of a mediational effect of maternal sensitivity in the case of maternal HoD, interaction focused interventions should be recommended for mothers with depression, as they might contribute to reduce the children's risk of developing problem behavior. Parenting interventions in this target group should especially aim at enhancing maternal sensitivity. Several sensitivity-directed interventions for caregivers are available [35], most of them targeting mothers and infants [89], such as Attachment and Biobehavioral Catch-Up [90], or Promoting First Relationships [91]. Though interventions with a focus on sensitivity are scarce for school children, there are well-validated parent–child treatment programs for families with children in this age group which have been shown to have positive effects on caregiver sensitivity, such as Parent–Child-Interaction-Therapy [92]. However, considering our results, fostering sensitivity in mothers with a history of ELM only might not be the optimal approach to reduce their children's risk of developing problem behavior. Further research is needed to explore which aspect of parenting might affect problem behavior in children of these mothers.

## Summary

Maternal ELM and maternal depressive disorders are associated with adverse outcomes in offspring. Little is known about their interplay and about possible mechanisms underlying intergenerational effects. Main focus of the present study was the impact of maternal ELM and maternal HoD on offspring's mental health. In order to investigate mechanisms of risk transmission, maternal sensitivity, which was assessed by the EAS, was examined as a potential mediator. We found an indirect effect of maternal HoD on maternal ratings of child psychopathology with maternal sensitivity acting as a mediating variable: maternal HoD was related to lower sensitivity which in turn was associated with elevated child psychopathology in maternal assessments. Thus, impairments in the affective exchange between mother and child taking place after maternal depression might have a lasting impact on children's well-being. In contrast, we found a direct association between maternal ELM and teacher ratings of child psychopathology; this effect was not mediated by maternal sensitivity. Our results indicate that the impact of maternal HoD, maternal ELM, and maternal sensitivity on offspring psychopathology might vary depending on the context in which child psychopathology is assessed.

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## Compliance with Ethical Standards

**Conflict of interest** We have no conflicts of interest to disclose.

**Ethical Approval** All research had approval from the appropriate Institutional Review Board and is in accordance with the Declaration of Helsinki.

**Informed Consent** Informed consent was obtained from all participants.

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