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Childhood maltreatment and depressed mood in female college students: A daily diary analysis

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ABSTRACT

Background: Childhood maltreatment has well-documented relations with depressed mood. However, few studies have used a daily diary methodology to investigate the association between all five forms of childhood maltreatment (emotional, physical, and sexual abuse, emotional and physical neglect) and depressed mood, and the mechanisms underlying the association remain unclear.

Objective: The current study sought to examine the associations of multiple forms of childhood maltreatment with depressed mood via a 14-day daily diary methodology, and investigate the mediating effects of self-compassion and perceived social support.

Methods: A sample of 220 Chinese female college students ($M_{\text{age}} = 19.13$ years) participated in this study and completed questionnaires regarding childhood maltreatment, self-compassion, perceived social support and depressed mood.

Results: The multilevel regression analysis indicated that only emotional abuse was slightly associated with depressed mood, while emotional neglect, physical abuse, physical neglect, or sexual abuse were not associated with depressed mood. The multilevel mediation analysis further revealed that self-compassion and perceived social support independently mediated the association of childhood emotional abuse with depressed mood.

Conclusions: Overall, these results emphasize the specific association between childhood emotional abuse and daily depressed mood, and further support self-compassion and perceived social support as explanatory mechanisms linking childhood emotional abuse with later depressed mood.

1. Introduction

Childhood maltreatment is a global issue, which affects the lives of millions of children all over the world in various regions and cultures (Stoltenborgh et al., 2015). The disability and mortality caused by childhood maltreatment result in massive economic losses, social burdens and human distress (Fang et al., 2015; Gilbert et al., 2009). The World Health Organization outlines a general definition of childhood maltreatment: Any behavior that causes harm or potential harm to a child's health, survival, development, or dignity, and is perpetrated by someone in a position of responsibility, trust, or power (World Health Organization, 1999). Specifically, Bernstein et al. (2003) divided childhood maltreatment into five types, namely physical abuse, sexual abuse, emotional abuse, physical neglect,

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and emotional neglect. In previous research, childhood maltreatment has been linked to various adverse health outcomes, such as height deficit (Abajobir et al., 2017), headache disorders (Tietjen, 2016), asthma (Gaietto & Celedón, 2022), depressive symptoms (Tao et al., 2021) and anxiety disorders (Cogle et al., 2010), as well as post-traumatic stress disorders, eating disorders, and substance use disorders (Messman-Moore & Bhuptani, 2017). Childhood maltreatment can leave individuals with hidden wounds that can accompany individuals as they grow up and into adulthood, thus causing far-reaching detrimental effects on their mental health (Bomhof-Roordink et al., 2015; Hagan et al., 2014; Kaplow & Widom, 2007; Li et al., 2016; Wark et al., 2003).

1.1. Childhood maltreatment and depressed mood

Depressive disorder is one of the most prevalent mental disorders, and it accounts for the largest contributor to non-fatal health loss worldwide and the major cause of suicide deaths (Brundtland, 2000; World Health Organization, 2017). Almost half of the patients with depressive disorder have experienced maltreatment in their childhood, and maltreated individuals have 2.66 to 3.73 times higher risks of developing depressive disorders as adults than non-maltreated ones (Nelson et al., 2017). As one central feature of a depressive disorder, depressed mood generally comprises “empty, sad, hopeless, discouraged, down in the dumps, or irritable mood” and is one core diagnostic criterion of depressive disorders (American Psychiatric Association, 2022; Berlim et al., 2021).

Previous studies have linked childhood maltreatment to depressed mood. First, cross-sectional studies have reported that individuals who suffered more serious maltreatment in their childhood are more prone to develop depressive symptoms, including depressed mood, in adolescence (Ding et al., 2017; Shah et al., 2021; Zhang et al., 2018) and adulthood (Lagdon et al., 2018; Tao et al., 2021; Zhou et al., 2019). Second, several longitudinal studies have also shown that childhood maltreatment can predict depressive symptoms, including depressed mood, after 5 weeks to two years (Mayer et al., 2021; Nguyen-Feng et al., 2017; Wrobel et al., 2022; Yu et al., 2021). In a prospective study, it was found that childhood maltreatment predicted a higher likelihood of depressive symptoms (Sousa et al., 2018). Third, meta-analysis studies have also revealed that people who suffered maltreatment in childhood have a higher level of depression and are more likely to suffer from depressive disorders in adulthood (Lindert et al., 2014; Nelson et al., 2017).

Childhood maltreatment may affect depressed mood by disrupting neurobiological development. In particular, heightened amygdala response to negative stimuli has been suggested as a mechanism linking multiple forms of adversity to depressive episodes (McLaughlin et al., 2019). The internal working model of attachment (Bowlby, 1977) offers another plausible explanation for the link between childhood maltreatment and depressed mood from the perspective of individual development. This model assumes that caregiving figures are essential to the development of children's representation of the world, and the interactions with caregivers will gradually be internalized into the children's internal working models of attachment which will affect their subsequent cognition about themselves and others and guide their actions toward themselves and others (Bowlby, 1977). Specifically, children would form secure internal working models if caregivers were careful, correctly interpreted children's signals and responded quickly. On the contrary, caregivers who were uncaring, misread signals and failed to respond led children to develop insecure internal working models (Lamb, 1981). Different forms of childhood maltreatment have different impacts on a child's development (Egeland et al., 1983). Childhood emotional abuse is usually characterized by taunts, verbal hostility, belittlement, and blame against the child (Egeland, 2009). In these cases, it may lead to feelings of powerlessness in the child, which can fuel depression in the future (Abramson et al., 1989). Given these negative comments are imposed directly by the attachment figures, children who have lived with emotional abuse may be more effectively activated to have more negative models of the self and others and become susceptible to internalized symptoms such as depressed mood (Shapero et al., 2014). Moreover, a meta-analysis revealed that emotional abuse had the highest likelihood of being positively associated with depression compared with other forms of maltreatment (Infurna et al., 2016). Therefore, it is rational to suppose that emotional abuse is more strongly associated with depressed mood when focused on multiple forms of childhood maltreatment.

Given that the clinical manifestations of depressive disorders are usually significant and persistent depressed mood or the loss of interest or pleasure (American Psychiatric Association, 2022), it is necessary to investigate the depressed mood of individuals in daily life to prevent and intervene in the onset of depression, particularly in those who have suffered from childhood maltreatment. Depressed mood is more prevalent and easier to relieve than major depressive disorder, which requires a minimum of 2 weeks to meet the DSM-5-TR diagnostic criteria (American Psychiatric Association, 2022), and identifying depressed mood within a shorter time frame (e.g., one day) might assist in regulating emotions as quickly as feasible.

To the best of our knowledge, one recent study has shown evidence linking childhood maltreatment to daily depressed mood (Price et al., 2022). This study found that childhood maltreatment was associated with depressive symptom severity (including depressed mood) within 30 days in a sample of 61 young adults when investigating the mechanism between daily exposure to pandemic-related media and symptom severity for depression. However, they measured the aggregate effect of childhood maltreatment by combining all subtypes, so the unique effects of multiple forms of childhood maltreatment on depressed mood were still uncertain. Additionally, Gabriel et al. (2018) recommend a sample size of at least 83 participants and a diary period of 10 days or more in a daily diary study. However, this study only had a small sample of 61 adults. Therefore, the present study investigated the effects of five forms of childhood maltreatment on daily depressed mood using a 14-day diary methodology in a larger sample of college students, providing further support for this research subject.

1.2. Self-compassion and perceived social support as mediators

The mechanism behind the relation between childhood maltreatment and depressed mood is still unclear. Elucidating the mechanism may aid in reducing the far-reaching effects of depressed mood. According to Beck's cognitive model of depression,

negative cognitive patterns resulting from adverse experiences may be one mechanism for the increased risk of depression (Beck, 2008). Young et al. (2003) further refer to such negative cognition in the early stage of individuals as early maladaptive schema. This universal and broad pattern encompasses physical sensations, emotions, and memories regarding oneself and interpersonal relationships. It typically forms during childhood or adolescence and may persist throughout one's lifetime, resulting in severe dysfunction. According to Young's schema theory, it is mainly harmful early experiences such as maltreatment that cause individuals to develop maladaptive schemas about themselves and others, which in turn have detrimental effects on their physical and mental health. Specifically, individuals who suffered childhood maltreatment tend to dwell on negative events rather than positive ones, and they may even make internal attributions to negative events, blaming themselves for the awful situations (Wetzler, 2005). In the long run, they tend to excoriate themselves, believe they are unlovable and worthless, and develop maladaptive patterns toward themselves (Rose & Abramson, 1992), which manifest as low levels of self-compassion (Neff, 2003). Simultaneously, individuals who experienced childhood maltreatment may attribute the maltreatment to their caregivers, which can breed resentment and blame toward them. As a result, these individuals may develop negative cognitions of others or social relationships, such as believing others to be untrustworthy or hostile and thus tend to withdraw or refuse to socialize (Bowby, 1977), and exhibit low levels of perceived social support (Zimet et al., 1988). These maladaptive cognitions toward oneself and others can further increase susceptibility to mental health problems (Beck, 2008). Therefore, this study specifically aimed to examine whether the association between childhood maltreatment and depressed mood could be mediated by poor personal (i.e., self-compassion) and social (i.e., perceived social support) functioning.

As an affirmative attitude toward oneself, self-compassion refers to being receptive and benevolent to one's own distress, appeasing and caring for oneself, and non-judgmentally acknowledging oneself when faced with difficulties, setbacks, and pains. It comprises three interrelated connotations: (1) treating oneself with kindness and understanding, rather than harsh self-criticism, (2) accepting one's own pain and difficulties as part of shared human experience, rather than viewing them in isolation, and (3) viewing distress from a balanced perspective of mindfulness, rather than over-identifying with it (Neff, 2003). Based on previous research, self-compassion has been suggested as a mediator between childhood maltreatment and depressed mood. First, childhood maltreatment has been linked to lower levels of self-compassion (Tanaka et al., 2011). Research has also shown that childhood maltreatment can predict poor self-compassion in youth (Reffi et al., 2019; Vettese et al., 2011). Furthermore, lower levels of depressive symptoms have been associated with higher levels of self-compassion among young people in China (Chu et al., 2018), the United States (Lathren et al., 2019), and Belgium (Raes, 2010). A study utilizing a two-week ecological momentary assessment also found that self-compassion was related to less daily negative affect (Krieger et al., 2015). In an intervention study, self-compassion was shown to be an effective antecedent in preventing depression by enhancing self-kindness, calming self-criticism, and promoting a more caring, understanding, and supportive stance toward oneself, thereby improving negative emotions and intervening in depressive symptoms (Greenberg et al., 2018). These findings highlight self-compassion as a possible mediator in the process of childhood maltreatment affecting depressed mood.

Perceived social support denotes the subjective cognitive appraisal of the adequacy of supportive connections provided by family, friends, and significant others (Zimet et al., 1988). It is conceivable that perceived social support might serve as a mediator in the relation between childhood maltreatment and depressed mood. A study has documented that American college students reporting more serious childhood maltreatment tend to report less perceived social support from friends and family (Pepin & Banyard, 2006). Similarly, childhood maltreatment has been found to be negatively associated with perceived social support among Chinese college students (Li, Pan, et al., 2020; Zhao et al., 2019). In addition, in a sample of 2038 adolescents who participated in the Adolescent Mental Health Cohort (AMHC) study, Väänänen et al. (2014) found that those with lower levels of perceived social support were more likely to display depressive symptoms. More importantly, some studies have demonstrated the significant mediating function of perceived social support between childhood maltreatment and adult depressive symptoms (Lagdon et al., 2018; Sperry & Widom, 2013). Therefore, it is reasonable to posit that the relation between childhood maltreatment and depressed mood may be mediated by perceived social support.

1.3. The present study

At present, there is a pressing need for further evidence regarding the relation between multiple forms of childhood maltreatment and depressed mood arising from everyday life with a sufficient sample size. Furthermore, the underlying mechanisms behind this connection warrant exploration. As mentioned above, it is necessary to investigate daily depressed mood in order to prevent its continuous deterioration. In addition, most previous studies on childhood maltreatment and depressed mood asked individuals to report their past global depressed mood over a longer period (e.g., two weeks) based on retrospective assessments of depressed mood (Schneider & Stone, 2016). Since memory-based evaluations of emotions tend to rely on the most intense peak moments or recent experiences (Kahneman, 2000), retrospective measures of emotions over a longer time span are prone to recall biases. Therefore, the daily diary methodology, which can decrease recall biases (Cranford et al., 2006; Langguth et al., 2016), was utilized in this study to measure depressed mood. Specifically, as compared to traditional methods, an advantage of the daily diary methodology lies in that it collects data on individuals' spontaneous, natural and continuous experiences in daily life, thus enhancing the ecological validity, reducing the effect of recent or peak experiences and decreasing the biases caused by global depressed mood estimations (Reis, 2012). Moreover, daily diary-keeping greatly shortens the time gap between an emotional experience and its report, thus reducing the memory biases caused by long periods of time (Bolger et al., 2003). Therefore, compared to conventional retrospective measures approaches, the daily diary methodology is more objective and reliable for estimating the average degree of depressed mood over a period of time.

On the whole, the study examined the association between five forms of childhood maltreatment and depressed mood in college

students using a daily diary methodology, and tested the mediating roles of self-compassion and perceived social support in this association. In detail, we proposed the following hypotheses: (1) Each form of childhood maltreatment would be associated with depressed mood in college students, and in particular, emotional abuse would be more strongly associated with depressed mood compared with other forms of maltreatment; (2) self-compassion would serve as a mediator in the association between childhood maltreatment and depressed mood in college students; and (3) perceived social support would serve as a mediator in the association between childhood maltreatment and depressed mood in college students.

2. Methods

2.1. Participants and procedure

A total of 274 postgraduate and undergraduate students of non-psychology majors were recruited via flyers posted on the campus of a local college. They voluntarily participated in this study and were paid 30 RMB after completing the study. 31 participants were excluded from analyses because they (a) withdrew from the study at the beginning and did not complete any daily diaries ($n = 17$); (b) finished <10 diaries ($n = 14$; Morelli et al., 2015). In addition, due to the underrepresentation of males (9.47 %) in the remaining 243 participants, 23 male participants were also excluded. Finally, 220 female participants ($M_{\text{age}} = 19.13$ years, $SD_{\text{age}} = 2.05$ years, range 16–30 years) were incorporated in the subsequent analysis.

This study was approved by the local university's ethics committee. All participants' written informed consent was obtained before data collection. All data were gathered via an online survey tool (www.wjx.cn). Participants were first asked to complete a survey of demographic variables and between-person variables which included childhood maltreatment, self-compassion, and perceived social support. They then completed a daily diary survey for 14 nights in a row. Each day around 18:00, we reminded participants to assess their daily depressed mood before 24:00. The next morning at around 10:00, we provided a follow-up link to the participants who did not complete the previous day's diary. We replaced the term "today" in this link with "yesterday" to evaluate yesterday's mood. This part of data was taken into the analyses if they finished the follow-up survey before noon of the next day. In the daily diary survey, 15 diary entries from 9 participants were removed due to incomplete responses. A total of 3065 diaries were included in the analyses, with an average of 13.93 days per individual (ranging from 10 to 14 days). To test whether a sample of 220 participants with a mean of 13.93 daily diaries was adequate to detect the relation between childhood maltreatment and daily depressed mood in multilevel analysis, we performed Monte Carlo simulation (1000 replications) via Mplus (Muthén & Muthén, 2017). The result demonstrated that this sample size was sufficient to reach 98.1 % power ($\alpha = 0.05$, two-tailed) to identify even a small effect ($\beta = 0.10$).

2.2. Measures

2.2.1. Between-person level variables

Childhood maltreatment. The Childhood Trauma Questionnaire-Short Form (CTQ-SF) compiled by Bernstein et al. and revised by Zhao et al. (Bernstein et al., 2003; Zhao et al., 2005) was used to assess childhood maltreatment. It is a 28-item retrospective self-report scale and includes five categories of childhood maltreatment: emotional neglect, physical neglect, emotional abuse, physical abuse, and sexual abuse. Each subscale has five items which are scored on a 5-point Likert scale from 1 (*never true*) to 5 (*very often true*). Higher total scores indicate more serious maltreatment suffered before the age of 16 years. The Chinese version of CTQ-SF was valid and reliable (Kong et al., 2023; Li et al., 2023). Internal consistency for the CTQ-SF was excellent in the present study, with a Cronbach's α coefficient of 0.91. The Cronbach's α for each subscale was acceptable (emotional abuse: 0.78, emotional neglect: 0.88, physical abuse: 0.87, physical neglect: 0.68, sexual abuse: 0.91). In this study, the cut-off scores for low to moderate exposure were used to estimate the prevalence of each form of childhood maltreatment: emotional abuse ≥ 9 , emotional neglect ≥ 10 , physical abuse ≥ 8 , physical neglect ≥ 8 , and sexual abuse ≥ 6 . These cut-off scores had good sensitivity and specificity, reaching 89 % and 97 % respectively (Tietjen et al., 2010).

Self-compassion. We evaluated self-compassion through the Self-Compassion Scale-Short Form (SCS-SF) compiled by Raes et al. (2011). The SCS-SF has 12 items measuring six components of self-compassion (three negative aspects are reverse coded): self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identification. Items are rated on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The Chinese version of SCS-SF demonstrated high validity and reliability (Luo et al., 2019). The Cronbach's α coefficient of the SCS-SF in this study was 0.75.

Perceived social support. The Multi-Dimensional Scale of Perceived Social Support (MSPSS) consists of 12 items measuring individual perceived social support from friends, family, and significant others (Zimet et al., 1988). The items are scored using a 7-point Likert scale from 1 (*very strongly disagree*) to 7 (*very strongly agree*). The Chinese version of MSPSS has good validity and reliability (Wang, Wan, et al., 2017; Yan et al., 2021; Yan et al., 2022). The Cronbach's α coefficient of the MSPSS in the current study was 0.92.

2.2.2. Within-person level variable

Daily depressed mood. Daily depressed mood was measured using three items (sad, discouraged, hopeless) from the Profile of Mood States (POMS; McNair et al., 1992). These items were particularly selected for daily diary studies and have adequate reliability for assessing within-person change (Cranford et al., 2006). Participants were required to evaluate the intensity of these moods during that day using a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). The total score of these items was higher representing a stronger depressed mood. The reliability of this within-person variable was examined in accordance with the recommendations of Geldhof et al. (2014). In this study, the Cronbach's α coefficient for the three POMS items was 0.79 (within-person) and 0.92 (between-

Table 1

Descriptive results and correlations among core variables at the between-person level.

Variables	<i>M</i>	<i>SD</i> _b	<i>SD</i> _w	ICC	1	2	3	4	5	6	7	8	9
1 Age	19.13	2.05	–	–	1								
2 Emotional abuse	7.34	3.22	–	–	0.16	1							
3 Emotional neglect	8.99	4.11	–	–	0.20 [*]	0.55 ^{***}	1						
4 Physical abuse	5.69	2.13	–	–	0.16	0.67 ^{***}	0.37 ^{***}	1					
5 Physical neglect	6.82	2.47	–	–	0.17 [*]	0.48 ^{***}	0.70 ^{***}	0.40 ^{***}	1				
6 Sexual abuse	5.64	2.03	–	–	0.16	0.48 ^{***}	0.21 ^{**}	0.51 ^{***}	0.29 ^{**}	1			
7 Self-compassion	39.52	5.56	–	–	–0.02	–0.17 [*]	–0.11	–0.11	–0.17 ^{**}	–0.03	1		
8 PSS	65.22	10.74	–	–	–0.10	–0.29 ^{***}	–0.41 ^{***}	–0.10	–0.32 ^{***}	–0.08	0.49 ^{***}	1	
9 Depressed mood	1.97	1.63	1.66	0.49	0.13	0.18 [*]	0.11	0.21	0.16 [*]	0.08	–0.51 ^{***}	–0.44 ^{***}	1

Note. PSS = perceived social support, *SD*_b = standard deviation at between-person level, *SD*_w = standard deviation at within-person level, ICC = intraclass correlation coefficient.

^{*} $p < .05$.

^{**} $p < .01$.

^{***} $p < .001$.

person).

2.3. Data analysis

The participant data (level 2, $N_2 = 220$) derived the diary data (level 1, $N_1 = 3065$), so we carried out multilevel data analyses on the nested data using Mplus 8 (Muthén & Muthén, 2017) software. First, we launched a null model for all variables' descriptive and correlation analyses. Second, we performed multilevel regression analyses to test whether each form of childhood maltreatment is positively associated with depressed mood separately. Third, following the procedure suggested by Preacher et al. (2010), we conducted multilevel 2-2-1 multiple mediation analyses for forms of childhood maltreatment that were significantly associated with depressed mood in regression analysis to examine the independent contribution of mediators. In these models, one form of childhood maltreatment was considered as the level 2 independent variable, daily depressed mood was the level 1 dependent variable, and self-compassion and perceived social support were the level 2 mediators. Fourthly, age and four other forms of childhood maltreatment were included in the 2-2-1 mediation models as the level 2 control variables to ascertain whether the mediating effects can remain stable. All between-person level (level 2) variables were grand-mean centered, and all missing values were filled with 999 to allow Mplus to perform full information maximum likelihood (FIML) estimation.

3. Results

3.1. Preliminary analysis

Descriptive statistics and Pearson correlations among core variables at the between-person level are shown in Table 1. Among 220 female college students, 22.27 % reported exposure to emotional abuse, 36.82 % to emotional neglect, 7.73 % to physical abuse, 25.45 % to physical neglect, and 16.82 % to sexual abuse. 50.91 % of participants indicated having experienced at least one form of childhood maltreatment. Of them, 19.09 % reported having experienced one form, 15.45 % reported two forms, 9.55 % reported three forms, 3.64 % reported four forms, and 3.18 % reported all five forms. The average scores for self-compassion and perceived social support items were 3.29 and 5.44, respectively, indicating that most participants had a relatively high general level of self-compassion and perceived relatively more social support. The average score of depressed mood items was 0.66, indicating that the general level of depressed mood was relatively low.

Correlation results suggested that emotional abuse and physical neglect were significantly negatively correlated with self-compassion and perceived social support, and they were also significantly positively correlated with depressed mood. Self-compassion and perceived social support were negatively correlated with depressed mood. However, there was no significant correlation between emotional neglect, physical abuse, or sexual abuse and depressed mood. The intraclass correlation coefficient (ICC) of depressed mood was 0.49 in this study, which means the ratio of between-person variance to the combined within-person and between-person variance (Sonntag et al., 2019) was 0.49, suggesting that this level 1 variable has a sufficient between-person variance to justify the multilevel analysis.

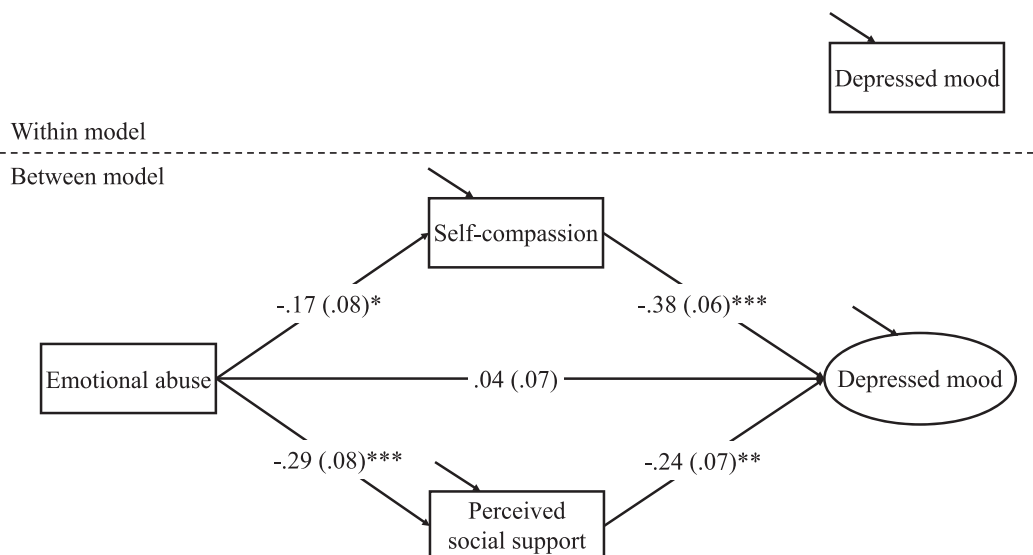


Fig. 1. The multilevel 2-2-1 model with emotional abuse as the independent variable, self-compassion and perceived social support as the mediators, and depressed mood as the dependent variable.

Note. The standardized multilevel regression coefficients and standard errors are displayed. For the sake of simplicity and clarity, the residuals for the mediator variables and the dependent variable are not shown. * $p < .05$, ** $p < .01$, *** $p < .001$.

3.2. The multilevel multiple mediation analysis

First, we carried out multilevel regression analyses and verified that emotional abuse ($\beta = 0.18, p = .018$), instead of emotional neglect ($\beta = 0.11, p = .094$), physical abuse ($\beta = 0.21, p = .066$), physical neglect ($\beta = 0.16, p = .056$), or sexual abuse ($\beta = 0.08, p = .321$), was significantly positively associated with depressed mood. Then, we carried out a multilevel mediation analysis to confirm the potential indirect effect of emotional abuse on depressed mood (through self-compassion and perceived social support). The parameter estimates and paths of the model are presented in Fig. 1. As predicted, the association between emotional abuse and depressed mood was mediated by self-compassion ($\beta = 0.07, p = .033, 95\% \text{ CI} = [0.01, 0.13]$) and perceived social support ($\beta = 0.07, p = .007, 95\% \text{ CI} = [0.02, 0.12]$). Moreover, when age and the other four forms of childhood maltreatment were controlled for, the mediating effects of self-compassion ($\beta = 0.06, p = .034, 95\% \text{ CI} = [0.01, 0.12]$) and perceived social support ($\beta = 0.09, p = .003, 95\% \text{ CI} = [0.03, 0.15]$) in the association between emotional abuse and depressed mood remained significant.

In addition, there are scholars who contend that psychological resources such as self-compassion and perceived social support may be more likely to serve as protective factors to moderate the impact of risk factors on negative outcomes (Masten, 2001; Wright et al., 2013). Hence, we additionally examined the moderating effects of self-compassion and perceived social support. The results found that the moderating effects of the two kinds of psychological resources were not significant in the current study. Specifically, self-compassion did not moderate the association between emotional abuse and depressed mood ($\beta = -0.05, p = .406, 95\% \text{ CI} = [-0.17, 0.07]$). And the interaction of perceived social support with emotional abuse on depressed mood was not significant ($\beta = 0.03, p = .716, 95\% \text{ CI} = [-0.12, 0.17]$). Such results might be explained by the fact that the protective factor mechanism is only effective in certain types of risk and protective factors (Dangmann et al., 2021).

4. Discussion

The current study investigated the relation between five forms of childhood maltreatment and depressed mood among female college students utilizing the 14-day diary methodology, and clarified the mediating effects of self-compassion and perceived social support. The results revealed that emotional abuse and physical neglect but not emotional neglect, physical abuse, or sexual abuse displayed a significant correlation with depressed mood. And the multilevel regression analysis demonstrated only emotional abuse was associated with depressed mood. In addition, the multilevel mediation analysis found that self-compassion and perceived social support exhibited an independent mediating effect on the association of emotional abuse with depressed mood, even when age and the other four forms of childhood maltreatment were controlled for. These results suggest that self-compassion and perceived social support serve as significant mediators in the process of specific forms of childhood maltreatment linking to depressed mood among female college students.

The prevalence of childhood maltreatment followed an equivalent ranking order to that of a meta-analysis of Chinese college students (Fu et al., 2018) and previous studies in Chinese youth groups (Wang, Yang, et al., 2017; Yu et al., 2020): the highest rate was two forms of neglect, followed by emotional abuse, and finally sexual abuse and physical abuse. The level of self-compassion was comparable to that in previous studies using samples of Chinese college students (Song et al., 2023) and Chinese adolescents (Chu et al., 2018). The mean level of perceived social support was consistent with the previous research on Chinese college students (Li, Pan, et al., 2020; Zhao et al., 2019). The level of depressed mood was also similar to the research conducted in China and other countries (Adiyaman & Meier, 2022; Langguth et al., 2016; Li, Zha, et al., 2020). Therefore, these comparisons indicated that the findings of this study were well-generalizable in China.

4.1. Different forms of childhood maltreatment and depressed mood

Since distinct forms of childhood maltreatment have different effects on individual development (Egeland et al., 1983), attention should not be focused on one form of maltreatment alone, but on a wide variety of childhood maltreatment, which may help to explain potential early pathways leading to subsequent depression (Infurna et al., 2016). This study investigated the relation between all five forms of maltreatment and depressed mood among college students using the daily diary methodology to measure depressed mood with greater ecological validity. The findings demonstrated that emotional abuse, but not the other four forms of childhood maltreatment, was associated with depressed mood. This is the first study to examine the relation between all five forms of childhood maltreatment and daily depressed mood in college students.

A previous meta-analysis has suggested that emotional abuse is most strongly associated with depression when other types of childhood maltreatment are considered (Infurna et al., 2016). The internal working model can provide an explanation for the findings. Given that children's cognitions about themselves and others are significantly influenced by the caregiving figures and the interactions between the child and the caregiver (Bowlby, 1977), childhood maltreatment from caregivers presents serious challenges to the development and preservation of secure attachments and results in children potentially developing insecure internal working models (Lamb, 1981). These negative internal working models regarding themselves or others could be linked to depressive symptoms through maladaptive emotion regulation strategies (Malik et al., 2015). Compared with other forms of childhood maltreatment, emotional abuse may be more effective in activating negative models of self and others and prone to internalizing symptoms like depression (Infurna et al., 2016) because children receive negative evaluations directly from the closest attachment figures. The association between emotional abuse and depressed mood is particularly prominent when multiple forms of childhood maltreatment are examined simultaneously. Not entirely consistent with previous studies (Infurna et al., 2016; Lindert et al., 2014; Shah et al., 2021; Sousa et al., 2018), this study did not find a significant association between emotional neglect, physical abuse, physical neglect or sexual abuse and

depressed mood, and the strength of the association between emotional abuse and depressed mood was small, which may be explained by the following reason. The daily diary methodology may eliminate the false effect of the previous retrospective global reports after reducing the recall bias, causing the effect to return to the truth, and such results are purer and have greater ecological validity (Newman et al., 2021).

4.2. Mediating roles of self-compassion and perceived social support

The current study further confirmed that self-compassion and perceived social support independently mediated the association of emotional abuse with depressed mood, providing deeper insight into the mechanism through which emotional abuse links to daily depressed mood. The results suggested that emotional abuse had an indirect impact on depressed mood through self-compassion and perceived social support among college students. In other words, individuals who experienced more severe childhood emotional abuse were less likely to learn positive attention and care for themselves and to perceive supportive social resources, which increased their likelihood of developing depressed mood. From a theoretical standpoint, these findings are in line with Beck's cognitive model of depression and Young's schema theory. They jointly pointed out that early harmful experiences, such as childhood maltreatment, could cause the formation of maladaptive cognitions about oneself and relationships, undercut the progression of personal and social resources, and ultimately have a long-term negative impact on one's mental health, particularly increasing the risk of depression (Beck, 2008; Young et al., 2003). Thus, the childhood experience of emotional abuse might link to subsequent depressed mood via self-compassion and perceived social support. From an empirical standpoint, the results of this study corroborate the evidence that childhood maltreatment has a detrimental impact on self-compassion (Reffi et al., 2019; Vettese et al., 2011) and perceived social support (Li, Pan, et al., 2020; Pepin & Banyard, 2006; Zhao et al., 2019). Additionally, prior studies have similarly reported that lower levels of self-compassion (Chu et al., 2018; Krieger et al., 2015; Lathren et al., 2019; Raes, 2010) and perceived social support (Lagdon et al., 2018; Sperry & Widom, 2013; Väänänen et al., 2014) are associated with higher levels of depressed mood. It is important to note that this is the first study to use the daily diary methodology to examine the mediating roles of self-compassion and perceived social support in the association between childhood maltreatment and daily depressed mood. By using the daily diary methodology that reduces recall bias, the findings of the mediating effects were more credible.

4.3. Limitations and future directions

This study has several limitations. First, the results were obtained from data on Chinese female college students, and future studies might determine whether our conclusions hold for male groups, other populations (e.g., older people and clinical samples), or other cultures. Second, because of the nature of the correlational method used in this study, causal inferences cannot be drawn from this study. Therefore, further studies employing longitudinal or experimental approaches are necessary to confirm the results of this study. Third, solely self-report instruments were used to gather the study's data. Therefore, future research should include other assessment methods (e.g., interviews). Fourth, a retrospective measure of childhood maltreatment was adopted in this study, and the prospective measures of childhood maltreatment should be used in future research to verify the findings of this study. Fifth, although the mediating effects of self-compassion and perceived social support on the link between childhood emotional abuse and depressed mood are reasonable, future studies can verify the possibility that self-compassion and perceived social support may mediate the relation between individuals' previous depressed mood and subsequent depressed mood. Sixth, the strength of the associations of the main results is small, so it is imperative to repeat the findings of this study by utilizing the daily diary methodology and other experience sampling methods in the future.

4.4. Implications

The current study contributes to the comprehension of how childhood maltreatment is associated with the increase of daily depressed mood and bears important practical implications. First, the results of this study reveal the differences between various forms of childhood maltreatment: Emotional abuse rather than other forms of maltreatment was related to depressed mood through self-compassion and perceived social support. In view of the fact that emotional abuse is a prevalent form of childhood maltreatment and is closely related to attachment figures (Stoltenborgh et al., 2015), caregivers should concentrate on avoiding verbal aggression against children and increasing emotional care for them so that they are more likely to experience less daily depressed mood in their subsequent lives. In addition, families, schools, and communities can unite to promote community education on childhood maltreatment and organize caregivers to learn positive and effective parenting courses. Second, the results indicate that self-compassion and perceived social support both serve as crucial mediators in the relation between emotional abuse and depressed mood. Therefore, interventions that strengthen personal and social resources can be considered when treating victims of childhood maltreatment, especially emotional abuse. On one hand, communities and schools may implement programs that foster self-compassion (e.g., mindful self-compassion program; Neff & Germer, 2013). These programs encourage young people to show a kind and understanding attitude toward their pain, which may promote their adoption of adaptive coping strategies, thus improving their depressed mood. On the other hand, mental health experts and educators may assist students in identifying and evaluating the social support that is available to them as well as in learning how to build a strong social network through group counseling, thus effectively reducing depressed mood (Bagley & Young, 1999; Su et al., 2003). Moreover, this study enlightened subsequent intervention studies aimed at reducing depressive symptoms to measure depressive symptoms using a daily diary approach rather than a globally reported approach when evaluating the effects of interventions.

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Informed consent

All participants in the study gave written informed consent before taking part.

Declaration of competing interest

The authors declare that they have no potential conflicts of interest or financial conflicts regarding the research, authorship, and/or publication of this article.

Data availability

Data will be made available on request.

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