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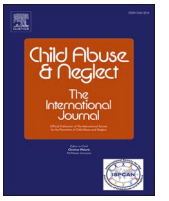

# How do physical and emotional abuse affect depression and problematic behaviors in adolescents? The roles of emotional regulation and anger

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ABSTRACT

*Background:* Rates of physical and emotional abuse are high among Chinese adolescents and elicit distinct psychopathologies. However, it remains unclear whether physical and emotional abuse relate to depression and behavior problems similarly or differently. In addition, few studies have examined if they share underlying mechanisms in adolescents.
*Objective:* This study used longitudinal data to examine the mechanisms underlying the effect of physical and emotional abuse on depression and problematic behaviors through emotional regulation and anger in Chinese adolescents.
*Participants and settings:* Participants were 1689 adolescents (with age ranging from 12 to 17 years) from junior and senior high schools in Zhejiang Province, China.
*Methods:* Participants completed a childhood trauma questionnaire and an emotion regulation strategies questionnaire at time 1 (T1), and they completed an anger scale, a depression scale, and a problematic behaviors questionnaire one year later (T2). Structural equation modeling was used to examine the research hypotheses.
*Results:* Physical abuse had direct positive effects on problematic behaviors but not on depression. However, emotional abuse had direct effects on depression and problematic behaviors, and indirect effects on both psychopathologies through expressive suppression and anger.
*Conclusions:* Physical and emotional abuse had distinct effects and influencing mechanisms on adolescents' externalizing and internalizing problems. Compared with physical abuse, emotional abuse elicited more harms and subsequent psychopathologies.

## 1. Introduction

Childhood maltreatment includes physical, emotional, and sexual abuse as well as neglect, and is a major global public health and social problem (Abbasi et al., 2015). It also imposes economic burdens on society and increases peoples' risk for depression and behavioral problems (Fry et al., 2012; Holshausen et al., 2016; Liu et al., 2017; Yang et al., 2021). Research indicates that childhood maltreatment, particularly physical and emotional abuse, is highly prevalent in China (Cui & Liu, 2020; Ip et al., 2016) because some forms of physical (i.e., physical punishment) and emotional (i.e., scolding and terrorizing) abuse are considered normal parenting practices in Chinese societies. Depression and problematic behaviors among Chinese adolescents induced by physical and emotional

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abuse have attracted research interest (Cui & Liu, 2020). However, extant studies had several limitations. First, although physical and emotional abuse are highly prevalent in China and increase an individual's risk for depression and problematic behaviors (Gong et al., 2020; Wang et al., 2019; Zhou et al., 2019), it remains unclear whether these types of abuse relate to depression and problematic behaviors similarly or differently. Second, although physical and emotional abuse have been associated with more depression and problematic behaviors in adolescents, little attention has been directed to whether they share underlying mechanisms. Third, extant studies used cross-sectional designs as Cui and Liu (2020) pointed, and no conclusions were drawn about casual relations in the association between childhood abuse and depression and problematic behaviors. To fill these research gaps, this study used a longitudinal design to examine the mechanisms underlying the effect of physical and emotional abuse on depression and problematic behaviors in adolescents.

Emotion regulation strategies may be a mechanism underlying the relations between abuse (physical and emotional) and depression and behavior problems in adolescents (Heleniak et al., 2016). Attachment theory suggests that children living in abusive environments are more likely to form insecure attachments with their parents (Crittenden, 2006). Insecure attachments may mean children learn to distrust their parents' responsivity to their emotions and have fewer opportunities to learn how to cope with stress. Therefore, they are more likely to adopt maladaptive emotional regulation strategies (i.e., suppression) to handle their experiences and emotions (Hong et al., 2018), which may elicit more depression (Aldao et al., 2010; O'Mahen et al., 2015) and problematic behaviors (Crespo et al., 2017; Roell et al., 2012). Emotional regulation may therefore mediate the relation between childhood abuse and psychopathologies.

The process model of emotion regulation describes two forms of emotion regulation: antecedent-focused regulation (i.e., cognitive reappraisal) and response-focused regulation (i.e., expressive suppression) (Gross, 1998). The former activates an individual's reevaluation of their situation or their capacity to manage that situation (Gross, 1998), which results in active efforts to repair bad moods as well as generating benign or positive interpretations or perspectives of a stressful situation (Gross, 1998; Gross & John, 2003). Antecedent-focused regulation is therefore related to low levels of depression (Schafer et al., 2017) and problematic behaviors (Rodriguez et al., 2019). In contrast, expressive suppression primarily modifies the behavioral aspect of emotional response tendencies. Individuals who suppress their emotional expression may deal with stressful situations by masking their inner feelings and clamping down on outward displays of emotion. This means they are less clear about what they are feeling, less successful at mood repair, view their emotions in a less favorable or accepting light, and ruminate about events that make them feel bad (Gross & John, 2003). In turn, this may lead to higher levels of depression (Beevers & Meyer, 2004; Schafer et al., 2017) and problematic behaviors (Zhang et al., 2019). Individuals that have experienced childhood abuse may have increased bias in attending to, encoding, and interpreting cues (Wolfe et al., 2001), meaning they have difficulty engaging in cognitive reappraisal of a situation (Sistad et al., 2021; Yu et al., 2021). Moreover, abuse experiences may overwhelm an individual's cognitive and emotional regulation capabilities, and they may feel that they can do nothing but temporarily reduce the negative internal states they frequently experience (Whiffen & MacIntosh, 2005). Therefore, they may select to suppress their emotion and experiences, which leads to increased expressive suppression. In such cases, physical and emotional abuse may increase expressive suppression and limit cognitive reappraisal, which are related to more depression and problematic behaviors.

In addition to emotion regulation (i.e., cognitive reappraisal and expressive suppression), anger may mediate the relation between childhood abuse and psychopathologies (Hong et al., 2012). Theoretically, childhood abuse as an early adverse experience for an individual may have a negative impact on their development of social information processing patterns (Dodge et al., 1990), leading to biases and deficits in cognitive processes of relevant cues (Wolfe et al., 2001). Therefore, abused individuals may display biases and errors in over-attributing hostile intentions to others (Dodge et al., 1990), which increase their anger (Dodge, 1991; Hong et al., 2012). Recent empirical studies showed that physical and emotional abuse were associated with increased anger (EunYoung, 2014; EunYoung & Lee, 2015; Plate et al., 2019). Anger reflects greater hostility to cues, which may elicit angry rumination on relevant cues and activate more hostile emotion that is associated with more problematic behaviors, including aggression (Hou et al., 2017; Wilkowski & Robinson, 2008) and other externalizing problem behaviors (Houltberg et al., 2014; Rydell et al., 2003). Moreover, increased anger may lead to vicious interpersonal cycles characterized by increased feelings of frustration and anger toward others, which result in social exclusion, rejection, isolation, and ultimately loneliness and depression (Galambos et al., 2018; Luyten et al., 2012). Therefore, it has been suggested that anger may mediate the effect of emotional and physical abuse on depression and problematic behaviors.

Although emotion regulation (i.e., cognitive reappraisal and expressive suppression) and anger may mediate the relation between childhood abuse and depression and problematic behaviors, extant theories and studies have only discussed the unique mediating role of these factors, and their combined role remains poorly understood. This has limited assessment of the deep mechanisms underlying the influence of childhood abuse on psychopathologies. Previous studies found that poor emotion regulation was associated with greater emotional intensity, difficulty understanding and recognizing emotions, and negative reactivity to certain emotions, which may lead to more anger (Keene & Epps, 2016). However, anger may vary with the type of emotion regulation used. For example, individuals with cognitive reappraisal may rebuild their understanding of the world (Zhou, Wu, et al., 2017) and respond adaptively to a challenging situation (Mauss et al., 2007), and may therefore show less anger (Mauss et al., 2007; Memedovic et al., 2010). In contrast, individuals with expressive suppression may suppress their emotions, including anger; these emotions may continue to linger and accumulate unresolved (Gross & John, 2003), which finally aggravates the severity of these emotions, including anger. Therefore, we suggest that emotion regulation may exert an effect on anger, wherein cognitive reappraisal may decrease anger and expressive suppression may increase anger.

Given the above theoretical assumptions, findings of empirical studies, and limitations in extant studies, this study aimed to: a) examine the competing contributions of physical and emotional abuse to depression and problematic behaviors; and b) elucidate the unique or shared mechanisms underlying the effect of physical and emotional abuse on depression and problematic behaviors via

emotion regulation and anger. Specifically, we hypothesized that physical and emotional abuse may lead to less cognitive reappraisal and more expressive suppression, which increases an individual's anger; in turn, this results in more depression and problematic behaviors. It is noteworthy that from a broad perspective, problematic behaviors include externalizing problematic behaviors such as aggressive or disruptive behaviors, and internalizing problematic behaviors such as depression and anxiety. In this study, the problematic behaviors we focused on are the former.

## 2. Methods

### 2.1. Participants and procedures

The investigation of this study was carried out in Zhejiang Province, China. Located in the southeast coast of China, Zhejiang Province is an important birthplace of Chinese civilization (e.g., Hemudu culture 7, 000 years ago) with 65.4 million permanent residents, and both the economy and education level of Zhejiang Province rank the forefront of China. We firstly contacted the local bureau of education of Wenling city in Zhejiang Province, China, and informed them of the purpose and methods of our investigation. After obtaining the approval of the local bureau of education and the principals of two junior and senior high schools in this city, 52 classrooms and 2169 students were recruited in November 2019 (Time 1 [T1]). All students attended school on the assessment date, and all students agreed to participate in the investigation and complete self-report questionnaires. We explained the purpose of the study to students and highlighted the voluntary nature of participation before the survey. Written informed consent was obtained from all students and their guardians. Assessments were conducted under the supervision of trained psychology postgraduate students. This study was approved by the Research Ethics Committee of Hangzhou Normal University and the principals of the participating schools.

In November 2020 (T2), we conducted a longitudinal investigation among the same groups of students using similar procedures as the T1 investigation. At T2, 1987 students participated in this study. This attrition was because some students did not attend school on the T2 assessment days or had transferred to other schools. Moreover, some students who did not participate at T1 participated the investigation at T2. To ensure the accuracy of estimation in the results, only students that participated in both measurement waves ($N = 1689$) were included in the sample for analysis. The mean age of participating students was 14.03 years (standard deviation [SD]: 1.60 years; range: 12–17 years) at T1. Of the 1689 students, 792 (46.9%) were male.

### 2.2. Measures

#### 2.2.1. Emotional and physical abuse

Emotional and physical abuse were assessed by the emotional and physical abuse subscales drawn from a revised version of the Childhood Trauma Questionnaire (CTQ). The original CTQ was developed by Bernstein et al. (1997), and has been commonly used to assess physical and emotional neglect, physical and emotional abuse, and sexual abuse experienced by an individual before age 18 years. The original questionnaire has 28 items with a 3-item minimization-denial subscale, and five abuse/neglect subscales, each with five items. Responses to items are on a 5-point Likert scale from 0 (never) to 4 (always). The CTQ showed good reliability and validity in a sample of Chinese adolescents (Wang et al., 2017). To ensure the questionnaire was applicable to the participants in this study, we deleted some items with overlapping meanings, and formed a revised questionnaire with 15 items. The revised questionnaire had five 3-item subscales: physical neglect, emotional neglect, physical abuse, emotional abuse, and sexual abuse. The revised questionnaire showed good validity at T1: $\chi^2/df = 11.91$, comparative fit index (CFI) = 0.951, Tucker-Lewis index (TLI) = 0.933, root mean square error of approximation (RMSEA) (90% confidence interval [CI]) = 0.070 (0.066–0.074), and standardized root mean squared residual (SRMR) = 0.040. The items also had good reliability (Cronbach's alpha coefficient [$\alpha$] = 0.75) at T1. Given the aim of this study, we selected the emotional and physical abuse subscales, which had good reliability (Cronbach's $\alpha = 0.73$ and 0.82, respectively) at T1 for the present analysis.

#### 2.2.2. Emotion regulation

Emotion regulation strategies were assessed using a 10-item questionnaire (Chinese revised version; Wang et al., 2007). This questionnaire has six items that measure cognitive reappraisal (e.g., "When confronting with negative emotions, I can change the way I think") and four items that measure expressive suppression (e.g., "I did not disclose my emotions"). All items are rated on a 7-point Likert scale from 1 (completely disagree) to 7 (completely agree). The questionnaire previously exhibited good reliability and validity (Wang et al., 2007). In this study, the cognitive reappraisal and expressive suppression subscales had good internal reliability at T1 (Cronbach's $\alpha = 0.90$ and 0.85, respectively).

#### 2.2.3. Anger

Luo et al.'s (2011) anger scale was used to assess adolescents' anger. This scale has 10 items (e.g., "When I'm frustrated, I want to hit people"), with each item rated on a 4-point Likert scale from 1 (never) to 4 (always). The internal reliability of this scale at T2 was good (Cronbach's $\alpha = 0.93$) in the present study.

#### 2.2.4. Depression

Wang (1993) introduced and translated the Center for Epidemiologic Studies Depression Scale for Children (Fendrich et al., 1990) and formed the Chinese version scale. In the current study, we used Wang's (1993) Chinese version scale. This 20-item self-report measure assesses emotional, cognitive, and behavior-related symptoms of depression. For each item, participants are instructed to

assess the frequency of their reactions during the last week. All items are evaluated on a 4-point scale (0 = "not at all," 1 = "a little," 2 = "sometimes," and 3 = "a lot"). Total scores range from 0 to 60, and a high score indicates a high level of depressive symptoms. Previous studies showed that this scale was suitable for Chinese adolescents (Qi et al., 2021; Ying et al., 2012; Zhou & Wu, 2021). In the present study, the CES-DC had good reliability at T2 (Cronbach's $\alpha = 0.92$).

#### 2.2.5. Problematic behaviors

A self-developed problematic behaviors scale was used to assess adolescents' externalizing problematic behaviors. This scale was developed by revising the Child Behavior Problems Questionnaire (Zhou, An, et al., 2017) and the delinquency subscale of the youth-reported Child Behavior Checklist (Achenbach & Edelbrock, 1987). Our scale had 12 items on three dimensions (aggressive behavior, suicidal ideation, and antisocial behaviors). All items are rated on a 5-point Likert-type scale from 0 (never) to 4 (always). This scale showed adequate reliability at T2 in the present study (Cronbach's $\alpha = 0.91$).

### 2.3. Data analysis

Descriptive analyses were conducted for all administered measures. Pearson's correlations were calculated to examine the associations between major variables. The statistical analyses were performed with Mplus version 7.0 (Muthén & Muthén, 2012). To evaluate model fit, we used chi-square, CFI, TLI, RMSEA, and SRMR values. A non-significant chi-square value indicated good model-data fit. The general cutoff values for accepting a model were $\geq 0.90$ for the CFI and TLI, and $< 0.08$ for the SRMR and RMSEA.

In the present study, we used several procedures to test our hypotheses. First, a direct effects model was established to test the direct effect of physical and emotional abuse at T1 on both depression and problematic behaviors at T2. Second, based on the direct effects model, we included emotion regulation (i.e., cognitive reappraisal and expressive suppression) at T1 and anger at T2, and built a multiple indirect effects model. In this model, we added paths from physical and emotion abuse at T1 to emotion regulation at T1 and anger at T2, from emotion regulation at T1 to anger at T2, and from emotion regulation at T1 and anger at T2 to both depression and problematic behaviors at T2. We also added the correlations between physical and emotional abuse, cognitive reappraisal and expressive suppression, and depression and problematic behaviors to avoid type I errors. Third, we removed the non-significant paths in the multiple indirect effects model and obtained a parsimonious model of multiple indirect effects. Finally, we used bias-corrected bootstrap CIs to assess the significance of the indirect effects of physical and emotional abuse at T1 on depression and problematic behaviors at T2, in which a 95% CI of the path coefficient that did not include 0 indicated significance.

## 3. Results

### 3.1. Descriptive analysis and correlations between the main variables

We firstly assessed the prevalence of childhood physical and emotional abuse and T2 depression and problematic behaviors. In this study, adolescents who scored the 3 points ("often") or greater on at least one item of physical or emotional abuse subscale were considered as experiencing with abuse, and at least one item of problematic behaviors questionnaire were considered as having problematic behaviors. Based on this criterion, 7.1% ($n = 120$), 12.7% ($n = 214$), and 18.2% ($n = 308$) adolescents suffered from childhood physical abuse, emotional abuse, and showed problematic behaviors, respectively. A cutoff score of 28 was used to indicate probable depression, and 30.1% ($n = 508$) adolescents showed depression. Moreover, the mean value and SD for all the variables were presented in the Table 1. Next, we carry out the correlations analysis between the main variables (see Table 1). The results of correlation analysis suggested that both emotional and physical abuse at T1 had positive and significant relations with cognitive reappraisal and expressive suppression at T1, anger at T2, depression at T2, and problematic behaviors at T2. Cognitive reappraisal at T1 had a negative and significant relation with problematic behaviors at T2, and non-significant relations with anger and depression at T2. Expressive suppression at T1 had positive and significant relations with anger, depression, and problematic behaviors at T2. Finally, anger at T2 had positive and significant relations with depression and problematic behaviors at T2.

**Table 1**
Correlations between the main variables.

| | *M* (*SD*) | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| 1. T1 Emotional abuse | 1.56 (2.38) | 1.00 | | | | | |
| 2. T1 Physical abuse | 1.02 (2.09) | 0.68*** | 1.00 | | | | |
| 3. T1 Cognitive reappraisal | 24.93 (10.13) | 0.05* | 0.03 | 1.00 | | | |
| 4. T1 Expressive suppression | 14.71 (6.95) | 0.18*** | 0.12*** | 0.56*** | 1.00 | | |
| 5. T2 Anger | 20.99 (7.32) | 0.21*** | 0.11*** | 0.00 | 0.09*** | 1.00 | |
| 6. T2 Depression | 22.88 (11.59) | 0.28*** | 0.18*** | 0.02 | 0.24*** | 0.45*** | 1.00 |
| 7. T2 Problematic behaviors | 4.99 (6.71) | 0.30*** | 0.23*** | −0.06* | 0.05* | 0.37*** | 0.38*** |

*Note.* *M* = Mean; *SD* = Standard deviation.
*** $p < 0.001$.
* $p < 0.05$.

### 3.2. Multiple indirect effects of cognitive reappraisal and anger

Based on the procedures in our data analysis strategy, we first tested the direct effect model underlying physical and emotional abuse at T1 that predicted depression and problematic behaviors at T2. We found that the direct effect model completely fit the data: $\chi^2(0) = 0$, CFI = 1.00, TLI = 1.00, RMSEA (90% CI) = 0.0 (0.00–0.00), and SRMR = 0.00. The results showed that emotional abuse at T1 had positive effects on both depression and problematic behaviors at T2 ($\beta = 0.26$ and 0.30, $p < 0.001$), but physical abuse at T1 only had a positive effect on problematic behaviors at T2 ($\beta = 0.06$, $p = 0.057$).

Based on the direct effects model, we built a multiple indirect effects model by inserting emotion regulation at T1 (i.e., cognitive reappraisal and expressive suppression) and anger at T2; this model also completely fit the data: $\chi^2(0) = 0$, CFI = 1.00, TLI = 1.00, RMSEA (90% CI) = 0.0 (0.00–0.00), and SRMR = 0.00. The results revealed several significant direct paths: from physical abuse at T1 to problematic behaviors at T2; from emotional abuse at T1 to depression and problematic behaviors at T2; and from cognitive reappraisal at T1 to depression and problematic behaviors at T2. Moreover, several indirect paths were significant: from emotional abuse at T1 to depression at T2 via expressive suppression at T1; from emotional abuse at T1 to depression and problematic behaviors at T2 via anger at T2; and from emotional abuse at T1 to depression and problematic behaviors at T2 via expressive suppression at T1 followed by anger. Except for these significant paths, all other paths were non-significant.

Next, to obtain a parsimonious model of multiple indirect effects, we removed the non-significant paths and re-ran the model. The final parsimonious model (see Fig. 1) showed good fit indices: $\chi^2(7) = 12.719$, CFI = 0.997, TLI = 0.990, RMSEA (90% CI) = 0.022 (0.000–0.041), and SRMR = 0.015. The path analysis results identified the significant paths described above. Furthermore, these findings suggested that physical abuse at T1 only had a positive and direct effect on problematic behaviors at T2. Emotional abuse at T1 had direct positive effects on both depression and problematic behaviors at T2, as well as indirect positive effects on both depression and problematic behaviors at T2 through the mediating role of anger at T2 or via a multiple indirect path from expressive suppression at T1 to anger at T2. However, emotional abuse at T1 only had an indirect positive effect on depression at T2 through expressive suppression at T1.

Next, we used bias-corrected bootstrap CIs to assess the significance of these indirect paths. If the 95% CI of the path coefficient did not include 0, we considered that path was significant. Based on this criterion and the bootstrap analysis results (see Table 2), we found that the paths in the parsimonious model did not include 0, which confirmed these paths were significant.

## 4. Discussion

To our knowledge, this is the first study to examine the competing effects of childhood physical and emotional abuse on depression and problematic behaviors and elucidate the shared or unique underlying mechanisms. The findings showed that physical abuse directly elicited adolescents' problematic behaviors, whereas emotional abuse not only had direct effects on depression and problematic behaviors, but also directly affected these two psychopathologies through expressive suppression and anger as mediators. These indicated that physical and emotional abuse have distinct effects on externalizing and internalizing problems among adolescents.

To be specific, we found that physical abuse had a direct and positive effect on problematic behaviors but not on depression. Our finding that physical abuse had a positive effect on problematic behaviors was consistent with previous studies (Greene et al., 2020; Peng et al., 2021; Van Wert et al., 2017) and supported the hypothesis of a cycle of violence (Widom, 1989). Social learning theory (Bandura, 1978) offers a potential explanation, in that individuals may learn (at least in part) by observing others' behaviors (Akers & Sellers, 2004). This learning may be reinforced when the model or observer is rewarded. Adolescents may therefore learn to “do what

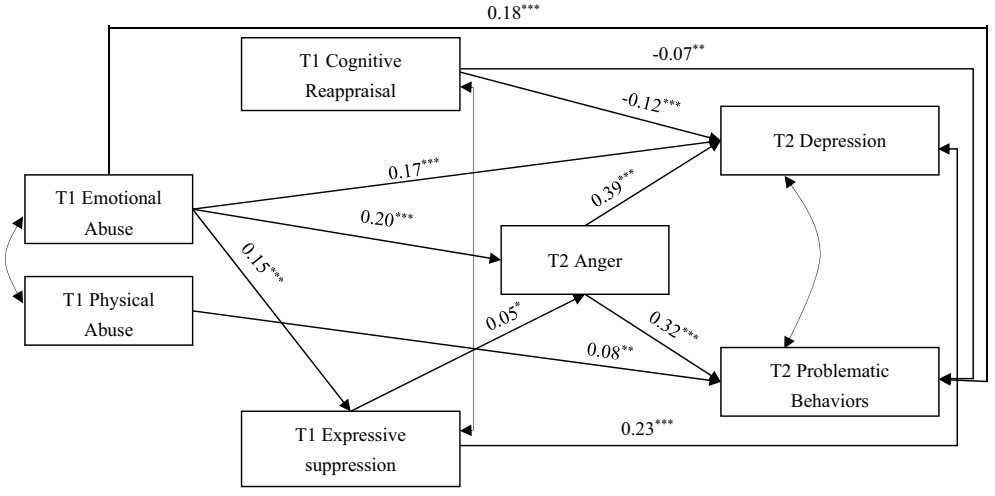


**Fig. 1.** Multiple indirect effects model. $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$.

**Table 2**
Bias-corrected bootstrap tests of mediating effects.

| Paths from emotional and physical abuse to depression and problematic behaviors | 95% CI | $\beta$ |
|---|---|---|
| Direct effects | | |
| T1 Emotional abuse to T2 Depression | 0.115–0.219 | 0.17 |
| T1 Emotional abuse to T2 Problematic behaviors | 0.101–0.259 | 0.18 |
| T1 Physical abuse to T2 Problematic behaviors | 0.002–0.151 | 0.08 |
| Indirect effects | | |
| T1 Emotional abuse to T2 Depression by T1 Expressive suppression | 0.020–0.047 | 0.33 |
| T1 Emotional abuse to T2 Depression by T2 Anger | 0.053–0.101 | 0.08 |
| T1 Emotional abuse to T2 Problematic behaviors by T2 Anger | 0.042–0.083 | 0.06 |
| T1 Emotional abuse to T2 Depression by T1 Expressive suppression and T2 Anger | 0.000–0.006 | 0.003 |
| T1 Emotional abuse to T2 Problematic behaviors by T1 Expressive suppression and T2 Anger | 0.000–0.005 | 0.002 |

Note. A 95% confidence interval for an indirect path coefficient that did not include 0 suggested that the indirect path was significant.

has been done to them," meaning adolescents who experienced physical abuse may show more problematic behaviors (Felson & Lane, 2009). However, because the modeled behavior is often similar to the behavior observed (Bandura, 1978), physical abuse may be associated with more behavioral problems but not with more emotional problems (e.g., depression). This supported the conclusion of previous studies that children that had experienced physical abuse reported more externalizing behavioral problems (Fagan & Novak, 2018; Vahl et al., 2016). Furthermore, the learning process mainly involves behavioral modeling and observing, which may be realized by a reinforcing process rather than an emotional process. Therefore, physical abuse may directly induce problematic behaviors without the mediating role of emotion regulation or anger.

In contrast to the effect of physical abuse, we found that emotional abuse had direct and positive effects on both depression and problematic behaviors. This suggested that emotional abuse may be an important risk factor for internalizing and externalizing problems, which was consistent with previous studies (Christ et al., 2019; Humphreys et al., 2020; Li et al., 2020; McCabe et al., 2018; Smith et al., 2018). A potential explanation for this finding is that adolescents living in a persistently emotionally abusive family (i.e., scolding, insulting, and terrorizing) may have more stable and global self-denigration attributions, and consider themselves worthless and think that no one cares for or loves them (Rose & Abramson, 1992). This means they experience more depression (Hamilton et al., 2013). They also discount self-esteem, which weakens their communication with society and decreases conformity to social norms, thereby eliciting more problematic behaviors (Donnellan et al., 2005; Trzesniewski et al., 2006).

Moreover, we found emotional abuse was related to depression via expressive suppression but not to problematic behaviors. This finding may be attributed to the possibility that adolescents are likely to be emotionally, socially, or financially dependent on their parents, meaning they may suppress rather than disclose negative emotions brought about by emotional abuse to avoid rejection and abandonment by their parents. Furthermore, suppression of emotion indicates that the suppressed emotion continues to linger and accumulate in an unresolved state (Gross & John, 2003), and suppression efforts paradoxically increase the accessibility of the target for suppression (Wegner, 1994). This increases negative emotions but not behavioral problems, finally resulting in more depression.

We also found that emotional abuse had positive effects on both depression and problematic behaviors via anger. This finding supported the social information processing theory of abuse (Dodge et al., 1990), and suggested that emotional abuse makes individuals over-attribute hostile intentions, thereby increasing their anger (Dodge, 1991; Hong et al., 2012). Moreover, emotional abuse reflects a situation where parents vent their negative emotions, particularly anger, to their children. In the context of social learning theory (Bandura, 1978), when one of a child's primary models expresses large amounts of anger, that child may adopt those standards of expression (Plate et al., 2019), and therefore show anger. Once anger feelings are elicited, an individual may have more hostile intentions to others, which creates more interpersonal conflict (Smith, 1992) and increases individual's problematic behaviors (Hou et al., 2017; Wilkowski & Robinson, 2008) and undermines their interpersonal relations and social support. In turn, this leads to social exclusion and further increases the individual's depression (Galambos et al., 2018). Furthermore, when expressive suppression was once activated by emotional abuse, an individual may learn to suppress their anger because they fear that expressing anger may result in more abuse or harm to others (Scott & Day, 1996). Consistent with the theory of ironic processes of mental control (Wegner, 1994), suppression effort paradoxically increases the accessibility of the target for suppression, which finally leads to more anger. Therefore, this study also found that emotional abuse affected both depression and problematic behaviors through a multiple indirect path from expressive suppression to anger.

Interestingly, we found that both physical and emotional abuse had non-significant relations with cognitive reappraisal, which was inconsistent with our hypothesis. This may be attributed to a possibility that emotional and physical abuse may be persistent and pervasive, and individuals who experience abuse tend to perceive their environment as threatening and unpredictable, with little opportunity to change (Sheffler et al., 2019). This may overwhelm individuals' cognitive regulation capabilities, and they may feel that all they can do is temporarily reduce the negative internal states they frequently experience (Whiffen & MacIntosh, 2005). Therefore, childhood abuse may have a non-significant effect on cognitive reappraisal. However, cognitive reappraisal had negative effects on depression and problematic behaviors. This may be because cognitive reappraisal represents a more effortful, deliberate cognitive process, which can serve as an adaptive coping strategy (Salsman et al., 2009). It may also provide opportunity for producing thoughts about the positive implications of a stressful experience (Cann et al., 2010; Zhou, Wu, et al., 2017), and relieve an individual's depression and problematic behaviors.

Several limitations in this study should be noted. First, there are many possible mediators between childhood abuse and internalizing and externalizing problems, but we only considered emotion regulation and anger based on relevant theories. Further studies should examine more mediators to elucidate the complex mechanisms underlying the effect of childhood abuse on subsequent psychopathologies. Second, although this was a longitudinal study, we only included two time points (with a 1-year interval), meaning we cannot draw conclusions about the longer-term effects of childhood abuse on depression and problematic behaviors. A further longitudinal study with more time points is necessary to fill this gap. Third, the outbreak of the COVID-19 pandemic between T1 and T2 might exert impact on adolescents' mental and behavioral problems, but we did not take the pandemic into consideration in this research design. Relevant studies involving internalizing and externalizing problems should take the COVID-19 pandemic and accompanied isolation and uncertainty conditions as important background variables. Moreover, our participants were Chinese adolescents, and it remains unclear whether our conclusions may be extended to adolescents in other cultural contexts. Further studies should try to replicate the present findings in diverse samples.

Despite these limitations, this study extended the findings of previous studies about the relations between abuse experiences and internalizing and externalizing problems, which provides important implications for practice. First, attention should be paid to adolescents' externalizing behavioral problems if they ever experienced physical abuse, while for adolescents with emotional abuse, in addition to externalizing behavioral problems, attention should be also paid to their internalizing emotional problems. Second, encouraging adolescents with emotional abuse to disclose their negative emotions or anger helps to relieve their depression and behavioral problems. In practice, on the one hand, we can develop some preventive measures to reduce potential domestic abuse, for instance, designing a training program for parents to improve their parenting skills such as praise (e.g., provide a praise as soon as possible after a positive and specific behavior occurs), selective attention (e.g., ignore selectively children's negative rather than dangerous behaviors), and time-out (e.g., interrupt children's negative behaviors and deprive the child of the opportunity to receive any type of attention) (Cohen et al., 2006). On the other hand, we need to establish targeted intervention programs for these adolescents to reduce potential negative psychological and behavioral outcomes. For example, creating a safe and trustful environment for them to disclose and vent emotions, guiding them to identify and reconstruct their feelings and thoughts, to help adolescents use more effective emotion regulation strategies and timely lessen their negative emotions.

## 5. Conclusions

The findings indicated that physical abuse directly elicited adolescent externalizing problems, while emotional abuse led to both externalizing behaviors and internalizing problems (e.g., depression). This finding indicates that compared with physical abusive experiences, experiencing emotional abuse was associated with more harms and subsequent psychopathologies among adolescents. In addition, our results revealed differences in the influencing mechanisms underlying the effects of physical and emotional abuse on subsequent psychopathologies, wherein expressive suppression and anger played important mediating roles in the latter effect. Furthermore, cognitive reappraisal and expressive suppression have different roles in explaining the relations between abuse experiences and psychopathologies. This study contributes to the existing literature by providing a new framework and approach to better understand how physical and emotional abuse shape adolescents' later internalizing and externalizing problems, and highlights the efforts to carry out targeted intervention for parents and adolescents with different abuse experiences.

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## Declaration of competing interest

None.

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