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Full Text

Preamble

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The Relationship Between Childhood Trauma and Empathy: A Three-Level Meta-Analysis

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Abstract

This study employed three-level meta-analysis to systematically examine the relationship between childhood trauma and empathy and its moderating factors. Through literature search and screening, 46 studies with 352 effect sizes were obtained, comprising 23,039 participants. The meta-analysis revealed a significant negative correlation between childhood trauma and empathy ($r = -0.076$). Childhood trauma type showed a moderating effect: both physical neglect ($r = -0.095$) and emotional neglect ($r = -0.128$) were significantly negatively correlated with empathy, whereas physical abuse ($r = 0.005$), emotional abuse ($r = -0.051$), and sexual abuse ($r = -0.058$) showed no significant correlation with empathy. Empathy components also moderated the relationship: within cognitive empathy, childhood trauma was significantly negatively correlated with perspective-taking ($r = -0.127$) but not with fantasy ($r = -0.044$); within affective empathy, childhood trauma was significantly negatively correlated with empathic concern ($r = -0.148$) but significantly positively correlated with personal distress ($r = 0.153$). This study is the first to systematically compare the relationships between different types of childhood trauma and empathy and to examine the effects of childhood trauma across empathy components, offering recommendations for cultivating empathy.

Keywords: childhood trauma, empathy, perspective-taking, personal distress, meta-analysis
Classification Codes: B844; C912.6

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1. Introduction

1.1 Theoretical Perspectives on How Childhood Trauma Affects Empathy

Empathy refers to understanding, feeling, and sharing others' emotions while maintaining self-other distinction (Eklund & Meranius, 2021). As a crucial component of emotional and social development, empathy influences the quality of interpersonal relationships (McDonald & Messinger, 2011). Individuals with higher empathy can accurately comprehend others' emotions and cognitions, which helps reduce conflict and maintain relationships (Chow et al., 2013). The empathy-altruism hypothesis posits that empathy is a key motivator for helping

behavior (Batson, 2017). Among various factors influencing empathy, childhood maltreatment is widely recognized as having a significant impact (Shaver et al., 2016). Childhood maltreatment encompasses all forms of abuse and neglect experienced by children and adolescents under 18 (World Health Organization, 2022). While most theories suggest that childhood trauma impairs empathy (Adelmann & Zajonc, 1989; Meltzoff, 2005; Shaver et al., 2016), some argue that it may actually foster empathy (Preston, 2007). Empirical studies have reported correlation coefficients between childhood trauma and empathy ranging from −0.451 to 0.86, yielding highly inconsistent results. Consequently, whether and to what degree childhood trauma correlates with empathy has become an urgent question requiring resolution. Meta-analysis can integrate findings across multiple studies, effectively reducing measurement and sampling errors present in individual studies while exploring factors contributing to heterogeneity (Harrer et al., 2021). To address these controversies and derive more generalizable and precise conclusions, this study employed meta-analysis to quantitatively synthesize the relationship between childhood trauma and empathy and examine factors that may moderate this association, thereby providing scientific evidence for reducing the harm of childhood trauma and promoting empathy development.

Attachment theory identifies emotion regulation and internal working models as primary mechanisms through which early experiences influence later empathy capacity (Shaver et al., 2016). Childhood trauma predisposes individuals to insecure attachment styles (Lo et al., 2019). Individuals with insecure attachment tend to employ suppressive and avoidant emotion regulation strategies (Mikulincer & Shaver, 2019), making it more difficult to empathize with others in distress because they are more likely to avoid or suppress negative emotions from others (Henschel et al., 2020). Additionally, the internal working models of insecurely attached individuals tend to amplify threats and perceive themselves as lacking the capacity to cope with them (Mikulincer & Shaver, 2010), leading them to maintain distance from others to avoid becoming entangled in their difficulties, which further hinders empathy (Izhaki-Costi & Schul, 2011). Yang et al. (2020) found that insecure attachment mediates the relationship between childhood trauma and empathy.

The facial feedback hypothesis and "like-me" hypothesis emphasize that imitation forms the foundation of empathy, positing that facial expression imitation enables individuals to internalize and understand others' emotional experiences (Adelmann & Zajonc, 1989; Meltzoff, 2005). Children who have experienced maltreatment often grow up in cold, neglectful environments with limited opportunities to imitate others' facial expressions (e.g., through face-to-face interaction) (Buisman et al., 2021), making it more difficult for them to empathize with others (McDonald & Messinger, 2011). Research has shown that individuals with childhood trauma exhibit poorer facial expression imitation abilities (Ardizzi et al., 2016), which positively predict empathy capacity (Drimalla et al., 2019; Holland et al., 2021).

The perception-action model highlights the importance of similarity in prior experiences for empathy (Preston, 2007). Similar prior experiences help individuals form emotional representations aligned with others, thereby improving the accuracy of understanding and experiencing others' emotions (Preston, 2007). Studies have shown that prior experiences similar to another's situation can promote empathic responses toward that person (Barnett et al., 1986; Gerace et al., 2015). Individuals with childhood trauma may be better able to "feel for" others in similar situations because of their own traumatic experiences. For example, Jones et al. (2020) found that mock jurors who had experienced childhood sexual abuse showed greater empathy toward victims in sexual abuse cases.

De Waal and Preston's (2017) Russian doll model posits that empathy exists at different hierarchical levels that are nested within one another. The most basic level is emotional contagion based on the perception-action model, where individuals experience emotions similar to those of the target person through emotional cues. Higher-level empathy builds upon emotional contagion but requires emotion regulation of the basic-level response. This theoretical model suggests that the relationship between childhood trauma and empathy may not be unitary. Specifically, individuals with childhood trauma may be more susceptible to emotional contagion due to their prior experiences, generating more basic-level empathy, while simultaneously lacking effective emotion regulation strategies, resulting in less advanced-level empathy. However, this view awaits empirical confirmation.

1.2 Moderating Variables in the Childhood Trauma-Empathy Relationship

Childhood trauma can be categorized into five types: physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional neglect (Juruena et al., 2020). Different types of childhood trauma may lead to different attachment styles. For instance, Struck et al. (2020) found that individuals who experienced emotional abuse were more likely to develop anxious attachment, whereas those who experienced emotional neglect were more likely to develop avoidant attachment. The relationship between different attachment styles and empathy is inconsistent. A recent meta-analysis showed that anxious attachment was not significantly correlated with empathy, while avoidant attachment was significantly negatively correlated with empathy (Xu et al., 2022). These findings suggest that different types of childhood trauma may have different relationships with empathy, a phenomenon confirmed by numerous studies (Berzenski & Yates, 2022; Hou et al., 2021; Sesar et al., 2022). For example, Flasbeck et al. (2018) found that emotional abuse was not significantly correlated with empathic concern, whereas emotional neglect was significantly negatively correlated with empathic concern. Therefore, trauma type may moderate the childhood trauma-empathy relationship.

Empathy comprises cognitive empathy and affective empathy. Cognitive empa-

thy involves understanding and inferring others' emotions, feelings, thoughts, and motivations, including perspective-taking and fantasy (Zhou et al., 2019). Perspective-taking refers to the spontaneous tendency to adopt another person's psychological point of view, while fantasy refers to the tendency to imagine oneself as a fictional character in movies or books (Ingoglia et al., 2016). Affective empathy involves feeling others' emotions, including empathic concern and personal distress (Zhou et al., 2019). Empathic concern refers to sympathy and concern for unfortunate others, while personal distress refers to the tendency to feel pain and discomfort due to others' suffering (Ingoglia et al., 2016). In the Russian doll model, personal distress is considered a basic level of empathy, while empathic concern and perspective-taking are considered advanced levels (de Waal & Preston, 2017). Different levels of empathy have different underlying mechanisms and may be differentially affected by childhood trauma. Research has shown inconsistent relationships between different empathy components and childhood trauma (Flasbeck et al., 2017; Milone et al., 2019; Xu et al., 2010). For example, Yang et al. (2020) found that emotional neglect was significantly negatively correlated with empathic concern but not with personal distress. Therefore, empathy components may moderate the childhood trauma-empathy relationship.

Different measurement tools often vary in their dimensional structure or assessment methods. For example, among childhood trauma measures, Bernstein et al.'s (2003) Childhood Trauma Questionnaire (CTQ) divides childhood trauma into five dimensions (physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional neglect), whereas Pan et al.'s (2010) Child Psychological Maltreatment Scale (CPMS) includes intimidation, neglect, denigration, interference, and indulgence. Among empathy measures, Davis's (1980) Interpersonal Reactivity Index (IRI) is a self-report scale, while Dadds et al.'s (2008) Griffith Empathy Measure (GEM) is an other-report scale. Different tools may not measure identical constructs, potentially affecting the childhood trauma-empathy relationship. Therefore, measurement tools for both childhood trauma and empathy may moderate this relationship.

Certain demographic characteristics may also moderate the childhood trauma-empathy relationship. Emotion regulation is a crucial factor promoting post-traumatic recovery (Polizzi & Lynn, 2021). Research indicates that emotion regulation abilities improve with age (Martin & Ochsner, 2016). Individuals with good emotion regulation skills can effectively reduce excessive focus on their own distress when facing others' difficulties and instead focus more on others (Thompson et al., 2019). Therefore, the impact of childhood trauma on empathy may gradually weaken as individuals mature. Consistent with this, Luke and Banerjee's (2013) meta-analysis showed that the impairing effect of childhood trauma on interpersonal emotion recognition and understanding decreased with age. Thus, age may moderate the childhood trauma-empathy relationship. Given that childhood trauma has a greater impact on social cognitive development in females (Crawford et al., 2022) and that social cognitive abilities are closely related to empathy (Lockwood, 2016), gender may moderate

the childhood trauma-empathy relationship. Additionally, research has found that the relationship between childhood trauma and empathy differs depending on trauma severity (Locher et al., 2014). Clinical and non-clinical samples often differ in childhood trauma severity (Stein et al., 1996). Therefore, sample type may moderate the childhood trauma-empathy relationship (Flasbeck et al., 2018).

1.3 Research Purpose and Questions

In summary, the relationship between childhood trauma and empathy is not only theoretically controversial but also empirically inconsistent. Given the significant real-world impact of both factors on people's work and lives, clarifying their relationship is crucial for prevention, intervention, and empathy cultivation. However, no study has yet examined this issue from a macro-integrative perspective. Therefore, using meta-analysis to quantitatively establish the direction, magnitude, and potential influencing factors of the childhood trauma-empathy relationship is essential. This will help clarify theoretical controversies, test theoretical applicability, deepen understanding of theoretical boundary conditions, and provide evidence-based support for empathy cultivation. To this end, this study employed meta-analysis to examine the correlation between childhood trauma and empathy and explore whether this relationship varies across empathy components, childhood trauma types, measurement tools, age, gender, and sample type.

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2. Methods

To ensure systematicity and replicability, this study followed the PRISMA 2020 statement for literature search, screening, coding, quality assessment, and publication bias evaluation (Page et al., 2021).

2.1 Literature Search and Screening

Given that "empathy," "sympathy," and "compassion" share similar etymological origins and are often used interchangeably in contemporary research (Yan et al., 2018), we first searched Chinese databases (CNKI, Wanfang, and VIP) using combinations of keywords "共情/移情/同情" (empathy/sympathy/compassion) with "儿童期创伤/儿童期虐待/童年期创伤/童年期虐待" (childhood trauma/childhood maltreatment). We then searched English databases (Web of Science, PubMed, PsycARTICLES, and ScienceDirect) using combinations of "empathy/sympathy/compassion" with "childhood maltreatment/childhood trauma." The search was conducted up to December 10, 2022, yielding 3,326 articles. To avoid omissions, we also supplemented the search by reviewing reference lists of included studies.

We imported all literature into EndNote X9 and applied the following inclusion

criteria: (1) quantitative empirical studies, excluding theoretical reviews, case studies, and qualitative research; (2) studies reporting correlation coefficients (r) between childhood trauma (or subtypes) and empathy (or components), or statistics convertible to r (Cohen's d, ^{2}, F, t, or β from simple linear regression; conversions followed Fritz et al. (2012)); (3) studies where effect sizes were not originally reported but were obtained from authors upon request; (4) studies clearly measuring trauma occurring during childhood (before age 18); (5) when data were published multiple times, only the most comprehensive report was included; (6) studies with clearly reported sample sizes. The screening process is illustrated in Figure 1 [Figure 1: see original paper].

2.2 Literature Coding and Quality Assessment

Two authors independently coded each included study according to the following characteristics: (A) author; (B) publication year; (C) study design (cross-sectional/longitudinal); (D) sample type (studies with clinically diagnosed samples coded as "clinical," those with psychologically healthy samples as "non-clinical"); (E) sample size; (F) gender (percentage of females); (G) mean age (at empathy measurement); (H) empathy components (perspective-taking, fantasy, empathic concern, personal distress); (I) childhood trauma types (physical abuse, emotional abuse, sexual abuse, physical neglect, emotional neglect); (J) empathy measurement tools (e.g., IRI, GEM); (K) childhood trauma measurement tools (e.g., CTQ, CPMS); and (L) effect sizes (correlation coefficients). Coding followed these principles: (1) each independent sample was coded once, with multiple samples reported in a single study coded separately; (2) if a study reported effect sizes separately by participant characteristics (e.g., male/female), each was coded separately; (3) if a study measured multiple variables, each was coded separately. Inter-coder reliability was assessed using Kappa, yielding a coefficient of 0.974, indicating high consistency. Discrepancies were resolved through discussion among all authors.

Study quality was assessed using the National Institutes of Health (NIH) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies. Each criterion was scored as met (1 point) or not met (0 point). Quality scores for cross-sectional studies ranged from 0–8, and for longitudinal studies from 0–14. Quality assessment results are presented in Online Supplementary Table 1 , with higher scores indicating better quality.

2.3 Effect Size Calculation

For each included study, we extracted or calculated each correlation coefficient between childhood trauma (or subtypes) and empathy (or components). Because correlation coefficients are not normally distributed, we converted all correlations to Fisher's z scores (Cooper et al., 2019) when calculating main or moderating effects, then converted them back to correlation coefficients for interpretation. Following Cohen (1992), we used 0.10, 0.30, and 0.50 as thresholds for small, medium, and large effect sizes, respectively.

2.4 Model Selection

Traditional meta-analysis assumes independence among effect sizes, extracting only one effect size per study (Assink & Wibbelink, 2016). However, most studies included in this meta-analysis reported multiple effect sizes from the same sample, which are correlated. Traditional meta-analysis ignores this dependence, potentially overestimating the overall effect size (Lipsey & Wilson, 2001). In contrast, three-level meta-analysis can handle dependence among effect sizes from the same study, maximizing information retention and improving statistical power (Assink & Wibbelink, 2016). Therefore, this study used a three-level random-effects model for main effect testing, heterogeneity testing, moderation testing, publication bias testing, and sensitivity analysis.

2.5 Heterogeneity and Moderation Testing

Three-level meta-analysis examines three sources of variance: sampling variance of observed effect sizes (Level 1), variance among effect sizes extracted from the same study (Level 2), and variance between different studies (Level 3) (Cheung, 2014). We used one-tailed log likelihood ratio tests to determine whether Level 2 and Level 3 variances were significant. If both were significant, it indicated heterogeneity in the main effect, warranting further moderation analysis to identify sources of heterogeneity (Gao et al., 2023). In moderation testing, we entered moderators as covariates into the three-level meta-analysis model to estimate moderation effects (Gao et al., 2023). Moderators included: (1) continuous variables—percentage of female participants and mean age; (2) categorical variables—childhood trauma type, empathy component, empathy measurement tool, childhood trauma measurement tool, and sample type. To ensure representativeness of moderation results, we followed Card's (2012) recommendation that each categorical moderator level include at least 5 effect sizes.

2.6 Publication Bias Control and Assessment

Published literature often fails to represent the complete body of completed research, as significant results are more likely to be published (Franco et al., 2014). This "publication bias" can compromise meta-analytic reliability (Rothstein, 2008). To control for publication bias, we included not only published journal articles but also unpublished theses and conference papers. We qualitatively assessed publication bias using funnel plots. A symmetric inverted funnel shape indicates minimal publication bias (Sterne & Harbord, 2004). We quantitatively assessed bias using Egger-MLMA regression, which more effectively controls Type I error than trim-and-fill or traditional Egger regression when effect sizes are non-independent (Rodgers & Pustejovsky, 2021). Since most included studies reported multiple correlated effect sizes, Egger-MLMA regression was appropriate. A non-significant result indicates minimal publication bias (Rodgers & Pustejovsky, 2021).

2.7 Sensitivity Analysis

The included studies reported correlation coefficients between childhood trauma and empathy ranging from −0.451 to 0.86, suggesting substantial variation. This indicates that outlier effect sizes might influence results, potentially leading to spurious conclusions (Kepes & Thomas, 2018). To assess the impact of outliers and the robustness of our findings, we conducted two sensitivity analyses using the leave-one-out method. First, we removed each effect size individually and re-ran the three-level meta-analysis until all effect sizes had been removed once, to assess the impact of outlier effect sizes (Dodell-Feder & Tamir, 2018). Second, we removed each original study individually and re-ran the analysis until all studies had been removed once, to assess the impact of outlier studies (Dodell-Feder & Tamir, 2018).

All analyses were conducted in R 4.2.0 using the metafor package (Viechtbauer, 2010). R code was adapted from Assink and Wibbelink (2016) and Rodgers and Pustejovsky (2021). All model parameters were estimated using restricted maximum likelihood (Viechtbauer, 2005), with two-tailed $p < 0.05$ considered significant. Formulas used in data processing are provided in the Online Appendix.

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3. Results

3.1 Literature Inclusion and Quality Assessment

This meta-analysis included 46 studies (46 independent samples, 352 effect sizes, N = 23,039 participants), comprising 9 theses, 2 conference papers, and 35 journal articles; 17 were Chinese-language and 29 English-language studies, published between 2002–2022. Basic information for included studies is presented in Table 1. Quality scores for the 45 cross-sectional studies ranged from 5 to 8 (M = 6.47), above the theoretical mean of 4. The one longitudinal study scored 11, above the theoretical mean of 7. Overall, included studies were of good quality.

3.2 Main Effect and Heterogeneity Tests

The three-level meta-analysis revealed a significant negative correlation between childhood trauma and empathy ($r = -0.076$, $df = 351$, $p < 0.001$), 95% CI [−0.116, −0.035]. According to Cohen (1992), this represents a small effect size.

One-tailed log likelihood ratio tests determined the significance of within-study (Level 2) and between-study (Level 3) variance. Results showed significant variance at both Level 2 ($\sigma^2 = 0.028$, $p < 0.001$) and Level 3 ($\sigma^2 = 0.010$, $p < 0.001$). In the total variance decomposition, sampling variance (Level 1) accounted for 7.63%, within-study variance (Level 2) for 67.75%, and between-study variance (Level 3) for 24.61%. These results justified moderation analysis to further

explain heterogeneity in the childhood trauma-empathy relationship.

3.3 Publication Bias and Sensitivity Analyses

The funnel plot (see Online Supplementary Figure 1) showed effect sizes concentrated at the top and evenly distributed around the main effect. Egger-MLMA regression was non-significant ($t = 1.710$, $df = 350$, $p = 0.088$), with an intercept of 0.778, 95% CI [−0.117, 1.673]. Both the funnel plot symmetry and Egger-MLMA results indicated no significant publication bias.

Sensitivity analysis by sequentially removing each effect size showed that after removing the correlation between physical neglect and empathic concern reported by Li (2016), the correlation between childhood trauma and empathy was weakest ($r = -0.076$, $df = 343$, $p < 0.001$); after removing the correlation between physical abuse and personal distress reported by Hou et al. (2021), the correlation was strongest ($r = -0.088$, $df = 341$, $p < 0.001$). Sensitivity analysis by sequentially removing each original study showed that after removing all correlations reported by Wang and Zhang (2022), the correlation was weakest ($r = -0.067$, $df = 347$, $p < 0.001$); after removing all correlations reported by Hou et al. (2021), the correlation was strongest ($r = -0.084$, $df = 350$, $p < 0.001$). In both analyses, the significance of the main effect remained unchanged after removal, indicating robust and reliable results.

3.4 Moderation Tests

Meta-regression analyses examined whether moderators significantly influenced the childhood trauma-empathy relationship (Table 2).

Childhood trauma type significantly moderated the relationship, $F(4, 296) = 4.056$, $p = 0.003$. Physical abuse ($r = 0.005$, $df = 296$, $p = 0.880$), emotional abuse ($r = -0.051$, $df = 296$, $p = 0.121$), and sexual abuse ($r = -0.058$, $df = 296$, $p = 0.073$) were not significantly correlated with empathy. In contrast, physical neglect ($r = -0.095$, $df = 296$, $p = 0.005$) and emotional neglect ($r = -0.128$, $df = 296$, $p < 0.001$) were significantly negatively correlated with empathy, with effect sizes significantly larger than that for physical abuse.

Empathy components significantly moderated the relationship, $F(3, 258) = 83.051$, $p < 0.001$. Within cognitive empathy, childhood trauma was significantly negatively correlated with perspective-taking ($r = -0.127$, $df = 258$, $p < 0.001$) but not with fantasy ($r = -0.044$, $df = 258$, $p = 0.195$). Within affective empathy, childhood trauma was significantly negatively correlated with empathic concern ($r = -0.148$, $df = 258$, $p < 0.001$) but significantly positively correlated with personal distress ($r = 0.153$, $df = 258$, $p < 0.001$).

Age significantly moderated the relationship, $F(1, 259) = 4.415$, $p = 0.037$. The negative correlation between childhood trauma and empathy decreased as sample mean age increased ($\beta = 0.004$, $p = 0.037$).

No other significant moderating effects were found.

4. Discussion

4.1 The Relationship Between Childhood Trauma and Empathy

Previous research has suggested a close relationship between childhood trauma and empathy, but findings have been inconsistent. This study used three-level meta-analysis to integrate relevant research and examine the impact of childhood trauma on empathy and its moderators, providing a comprehensive understanding of their relationship.

The main effect analysis revealed a significant negative correlation between childhood trauma and empathy. Sensitivity and publication bias analyses demonstrated robust, reliable results without significant publication bias. These findings indicate that the overall effect of childhood trauma on empathy is negative, consistent with our first hypothesis. Notably, significant heterogeneity existed at both within-study (Level 2) and between-study (Level 3) levels, suggesting that the main effect should not be viewed in isolation (Harrer et al., 2021). The childhood trauma-empathy relationship may manifest differently across contexts, necessitating analysis of potential moderators to explain heterogeneity and further clarify the relationship.

Moderation analysis revealed that childhood trauma type significantly moderated the relationship, consistent with our first hypothesis. Physical abuse, emotional abuse, and sexual abuse were not significantly correlated with empathy, whereas physical neglect and emotional neglect were significantly negatively correlated with empathy, and their effect sizes were significantly larger than that for physical abuse. These results suggest that different types of childhood trauma differentially impact empathy, with neglect causing greater empathy impairment than abuse. This finding partially supports attachment theory, the facial feedback hypothesis, and the "like-me" hypothesis. Compared to abuse, neglect involves a lack of interaction, making it more likely to lead to avoidant attachment and suppressed social information processing (Dykas & Cassidy, 2011; Kim et al., 2021). Consequently, neglected individuals have greater difficulty imitating others' facial expressions, internalizing others' emotional experiences, and understanding others' emotional states, resulting in poorer empathy. This result is consistent with Weinstein et al. (2016), who found that neglect, but not abuse, predicted prolonged response times in identifying others' mental states.

4.2 Moderators of the Childhood Trauma-Empathy Relationship

The meta-analysis found that empathy components significantly moderated the childhood trauma-empathy relationship, consistent with our hypothesis. Within cognitive empathy, childhood trauma was significantly negatively correlated with perspective-taking but not with fantasy. Within affective empathy, childhood trauma was significantly negatively correlated with empathic concern but

significantly positively correlated with personal distress. These results indicate that childhood trauma and empathy do not have a unitary relationship, supporting the Russian doll model. Previous research has shown that individuals with childhood trauma are more sensitive to negative emotions in others' distress (Dannlowski et al., 2012; Thompson et al., 2014), making them more susceptible to emotional contagion and experiencing higher personal distress. The enhancement of personal distress by childhood trauma aligns with the perception-action model. However, this study did not distinguish whether empathy targets shared similar experiences with participants, so we could not directly test the perception-action model. Future research should examine whether similarity between empathy targets and participants moderates the childhood trauma-empathy relationship to further test this model.

According to the Russian doll model, advanced-level empathic concern and perspective-taking require emotion regulation of basic-level personal distress. Individuals with childhood trauma often lack effective emotion regulation strategies (Gruhn & Compas, 2020), making it more difficult for them to experience empathic concern and perspective-taking. These findings may explain inconsistent results in the literature. When measuring lower-level empathy (e.g., personal distress, pain empathy), childhood trauma enhances these responses (Flasbeck et al., 2018); when measuring higher-level empathy (e.g., perspective-taking, empathic concern), childhood trauma impairs these responses (Flasbeck & Brüne, 2021). The differential relationships between childhood trauma and the four empathy components suggest that theoretical perspectives—attachment theory, facial feedback hypothesis, "like-me" hypothesis, and perception-action model—each lack comprehensiveness in explaining the childhood trauma-empathy relationship. Our findings provide robust support for the Russian doll model, which distinguishes empathy levels and helps integrate previous theoretical explanations while providing a framework for future research.

The meta-analysis also found that age moderated the relationship, consistent with our hypothesis: the negative correlation between childhood trauma and empathy decreased with increasing sample mean age. This suggests that the childhood trauma-empathy relationship weakens with age, similar to longitudinal findings that trauma impact diminishes with time since the event (Spinhoven et al., 2016). This may occur because individuals become more effective at regulating their own distress with age (Martin & Ochsner, 2016), enabling greater empathy toward others. This hypothesis requires future verification.

Contrary to our hypothesis, measurement tools for both childhood trauma and empathy did not moderate the relationship. This may reflect convergence in measurement approaches. Although childhood trauma scales differ in dimensional structure, they all cover core content related to abuse and neglect. Both self-report (e.g., IRI) and other-report empathy measures (e.g., GEM) include cognitive and affective empathy components. Therefore, despite differences in dimensional structure and assessment methods, measurement tools did not af-

fect the childhood trauma-empathy relationship.

No gender moderation effect was found, contrary to our hypothesis. This may indicate a cross-gender convergence effect in the childhood trauma-empathy relationship, consistent with meta-analyses on related topics (de Ruiter et al., 2022; Gallo et al., 2018; Li et al., 2019). For example, de Ruiter et al.'s (2022) meta-analysis on childhood trauma and psychopathic traits found no gender moderation. Additionally, no sample type moderation was found, contrary to our hypothesis. This may suggest that empathy impairment exists across both low- and high-risk childhood trauma samples.

Notably, the correlation between childhood trauma and empathy was weak (Cohen, 1992), so interpretations should be cautious. The weak correlation suggests that other external and internal risk factors influence empathy, such as socioeconomic status (Chen et al., 2012; Götz et al., 2022). Among the 46 included studies, only 11 involved offender or clinical populations. Most participants came from normal families without systematic adverse environments, which may have weakened the childhood trauma-empathy relationship. From a gene-environment interaction perspective, individual traits may play key roles in empathy development. For example, agreeableness predicts empathy (van Heel et al., 2020). Future research should explore whether agreeableness mediates the childhood trauma-empathy relationship. Moreover, empathy development likely results from cumulative risk factors rather than a single factor. From this perspective, when other risk factors are present, a single or multiple childhood trauma experiences may be a decisive risk factor. The relationship between cumulative risk factors and empathy warrants future investigation.

4.3 Theoretical and Practical Implications

This study has several theoretical implications. First, it is the first to use three-level meta-analysis to systematically compare relationships between different childhood trauma types and empathy, finding that neglect causes greater empathy impairment than abuse. This highlights the importance of specific early experiences for empathy development and underscores the roles of imitation, attachment, and internal working models in empathy, partially supporting attachment theory, the facial feedback hypothesis, and the "like-me" hypothesis. Second, it is the first to systematically compare relationships between childhood trauma and empathy components, finding that childhood trauma enhances personal distress while impairing perspective-taking and empathic concern. This demonstrates that how childhood trauma affects empathy is a complex process worthy of deeper exploration. Childhood trauma's impact on empathy cannot be simply characterized as positive or negative, suggesting that researchers should adopt a multi-relational perspective. The differential effects on empathy components also indicate that existing theories lack comprehensiveness, while providing robust support for the Russian doll model. This model not only helps integrate previous theoretical explanations but also provides a theoretical and research framework for future studies.

This study also has practical implications. First, findings indicate that physical and emotional neglect are primary risk factors for empathy. Future research should explore moderators of the neglect-empathy relationship, such as resilience and emotional support (Meng et al., 2018; van der Put et al., 2018). Investigating factors that mitigate neglect's damaging effects on empathy will advance understanding of empathy development mechanisms and inform targeted empathy cultivation programs. Second, findings show that childhood trauma reduces empathic concern while increasing personal distress. Some scholars argue that whether individuals experience empathic concern or personal distress when facing others' suffering depends on emotion regulation strategies (Thompson et al., 2019). Rumination and suppression strategies produce personal distress rather than empathic concern (Grynberg & López-Pérez, 2018; Lebowitz & Dovidio, 2015), whereas cognitive reappraisal produces the opposite pattern (Lebowitz & Dovidio, 2015; López-Pérez & Ambrona, 2015). Therefore, interventions for individuals with childhood trauma should incorporate cognitive reappraisal training to reduce personal distress and increase empathic concern, thereby promoting prosocial behavior (Eisenberg et al., 1989; Eisenberg et al., 2010).

4.4 Limitations and Future Directions

This study has several limitations. First, most included studies used single self-report measures of childhood trauma. This may produce common method variance, affecting result validity (Podsakoff et al., 2012), and participants may exhibit memory bias or social desirability. Future research should use multiple measurement tools, including self-report, other-report, and clinical interviews. Additionally, most included studies were cross-sectional, precluding causal conclusions. Longitudinal designs with adequate time spans are needed to establish causality.

Second, although research suggests that age at trauma occurrence (Teicher et al., 2016), trauma frequency and severity (Locher et al., 2014), children's maternal representations (Brassard et al., 2022), and rs53576 genotype (Flasbeck et al., 2018) moderate the childhood trauma-empathy relationship, most included studies did not report this information, preventing analysis. Future meta-analyses should examine these moderators to better specify conditions under which childhood trauma affects empathy.

Third, childhood trauma includes not only physical abuse, sexual abuse, emotional abuse, emotional neglect, and physical neglect, but also natural disasters such as earthquakes and floods (Falasca & Caulfield, 1999). Research shows that natural disasters traumatize children's cognitive, emotional, and social development (Masten & Narayan, 2012). No included studies reported on natural disasters, so we could not analyze their effects. Future meta-analyses should examine these additional trauma types.

Finally, some moderation tests had uneven effect size distributions across levels. For example, in the moderation test for childhood trauma measurement tools,

the CTQ had 271 effect sizes while other tools combined had only 53. This may affect result stability and requires verification in future research.

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5. Conclusion

This three-level meta-analysis found a significant negative correlation between childhood trauma and empathy. The relationship was moderated by childhood trauma type: emotional neglect and physical neglect were significantly negatively correlated with empathy, whereas physical abuse, emotional abuse, and sexual abuse were not. The relationship was also moderated by empathy components: childhood trauma was significantly negatively correlated with perspective-taking and empathic concern, not significantly correlated with fantasy, and significantly positively correlated with personal distress. Age moderated the relationship, with the negative correlation decreasing with age. These findings advance understanding of the childhood trauma-empathy relationship and provide reference points for empathy cultivation.

References

References marked with an asterisk were included in the meta-analysis.

Adelmann, P. K., & Zajonc, R. B. (1989). Facial efference and the experience of emotion. *Annual Review of Psychology*, 40, 249–280.

Antunes, A., Oliveira, P., Cardoso, J., & Almeida, T. (2021). Adverse childhood experiences and empathy: The role of interparental conflict. Medical Sciences Forum*, 5(1), 30.

Ardizzi, M., Umiltà, M. A., Evangelista, V., di Liscia, A., Ravera, R., & Gallese, V. (2016). Less empathic and more reactive: The different impact of childhood maltreatment on facial mimicry and vagal regulation. *PLOS ONE*, 11(9), Article e0163853.

Assink, M., & Wibbelink, C. J. (2016). Fitting three-level meta-analytic models in R: A step-by-step tutorial. *The Quantitative Methods for Psychology*, 12(3), 154–174.

Batson, C. D. (2017). The empathy-altruism hypothesis: What and so what? In E. M. Seppälä, E. Simon-Thomas, S. L. Brown, M. C. Worline, C. D. Cameron, & J. R. Doty (Eds.), *The Oxford handbook of compassion science* (pp. 27–40). Oxford University Press.

Barnett, M. A., Tetreault, P. A., Esper, J. A., & Bristow, A. R. (1986). Similarity and empathy: The experience of rape. *The Journal of Social Psychology*, 126(1), 47–49.

Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., … Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse & Neglect*, 27(2), 169–190.

Berzenski, S. R., & Yates, T. M. (2022). The development of empathy in child maltreatment contexts. Child Abuse & Neglect*, 133, 105827.

Boccadoro, S., Siugzdaite, R., Hudson, A. R., Maeyens, L., van Hamme, C., & Mueller, S. C. (2019). Women with early maltreatment experience show increased resting-state functional connectivity in the theory of mind (ToM) network. European Journal of Psychotraumatology*, 10(1), 1583528.

Brassard, A., Charbachi, N., Claing, A., Godbout, N., Savard, C., Lafontaine, M.-F., & Péloquin, K. (2022). Childhood sexual abuse, dyadic empathy, and intimate partner violence among men seeking psychological help. Journal of Interpersonal Violence*, 37(23–24), NP22114–NP22134.

Buisman, R. S. M., Bakermans-Kranenburg, M. J., Pittner, K., van IJzendoorn, M. H., van den Berg, L. J. M., Tollenaar, M. S., … Alink, L. R. A. (2021). Child maltreatment and parent−offspring interaction: A multigenerational extended family design. *Journal of Family Psychology*, 35(6), 735–746.

Bujalski, A. S., Chesin, M. S., & Jegilc, E. L. (2019). Cognitive empathy partially mediates the relationship between childhood physical abuse and borderline personality disorder features in college students. Current Psychology*, 38, 121–127.

Card, N. A. (2012). *Applied meta-analysis for social science research.* Guilford Press.

*Ceroni, D. B. (2018). Are childhood maltreatment, temperament, and empathy associated with psychopathy? An empirical examination (Unpublished master's thesis). California State University, Northridge.

Chen, C., Chen, F. F., & Tao, J. H. (2022). The effect of childhood abuse on borderline personality disorder symptom: A chain mediating model. Chinese Journal of Clinical Psychology*, 30(3), 674–678.

Chen, D. C. R., Kirshenbaum, D. S., Yan, J., Kirshenbaum, E., & Aseltine, R. H. (2012). Characterizing changes in student empathy throughout medical school. *Medical Teacher*, 34(4), 305–311.

Chen, L., Kong, X. M., Zhang, X. Q., & Zhang, L. F. (2016). Study on relationship between childhood trauma experience and empathy in patients with schizophrenia. Journal of Qiqihar University of Medicine*, 37(28), 3493–3496.

Cheung, M. W.-L. (2014). Modeling dependent effect sizes with three-level meta-analyses: A structural equation modeling approach. *Psychological Methods*, 19(2), 211–229.

Chow, C. M., Ruhl, H., & Buhrmester, D. (2013). The mediating role of interpersonal competence between adolescents' empathy and friendship quality: A dyadic approach. *Journal of Adolescence*, 36(1), 191–200.

Cohen, J. (1992). Quantitative methods in psychology: A power primer. *Psychological Bulletin*, 112(1), 155–159.

Cooper, H., Hedges, L. V., & Valentine, J. C. (2019). *The handbook of research synthesis and meta-analysis*. Russell Sage Foundation.

Crawford, K. M., Choi, K., Davis, K. A., Zhu, Y., Soare, T. W., Smith, A. D., … Dunn, E. C. (2022). Exposure to early childhood maltreatment and its effect over time on social cognition. *Development and Psychopathology*, 34(1), 409–419.

Dadds, M. R., Hunter, K., Hawes, D. J., Frost, A. D. J., Vassallo, S., Bunn, P., … Masry, Y. E. (2008). A measure of cognitive and affective empathy in children using parent ratings. *Child Psychiatry and Human Development*, 39(2), 111–122.

Dannlowski, U., Kugel, H., Huber, F., Stuhrmann, A., Redlich, R., Grotegerd, D., … Suslow, T. S. (2012). Childhood maltreatment is associated with an automatic negative emotion processing bias in the amygdala. *Human Brain Mapping*, 34(11), 2899–2909.

Davis, M. H. (1980). *Interpersonal reactivity index*. Edwin Mellen Press.

de Ruiter, C., Burghart, M., de Silva, R., Griesbeck Garcia, S., Mian, U., Walshe, E., & Zouharova, V. (2022). A meta-analysis of childhood maltreatment in relation to psychopathic traits. *PLOS ONE*, 17(8), Article e0272704.

de Waal, F. B. M., & Preston, S. D. (2017). Mammalian empathy: Behavioural manifestations and neural basis. *Nature Reviews Neuroscience*, 18(8), 498–509.

Dodell-Feder, D., & Tamir, D. I. (2018). Fiction reading has a small positive impact on social cognition: A meta-analysis. *Journal of Experimental Psychology: General*, 147(11), 1713–1727.

*Dong, J. J. (2022). A study on personality, empathy and emotion recognition in child neglect and their interactions (Unpublished master's thesis). Xinxiang Medical University, Xinxiang, China.

Drimalla, H., Landwehr, N., Hess, U., & Dziobek, I. (2019). From face to face: The contribution of facial mimicry to cognitive and emotional empathy. *Cognition and Emotion*, 33(8), 1672–1686.

Dykas, M. J., & Cassidy, J. (2011). Attachment and the processing of social information across the life span: Theory and evidence. *Psychological Bulletin*, 137(1), 19–46.

Eisenberg, N., Eggum, N. D., & di Giunta, L. (2010). Empathy-related responding: Associations with prosocial behavior, aggression, and intergroup relations.

Social Issues and Policy Review, 4(1), 143–180.

Eisenberg, N., Fabes, R. A., Miller, P. A., Fultz, J., Shell, R., Mathy, R. M., & Reno, R. R. (1989). Relation of sympathy and personal distress to prosocial behavior: A multimethod study. *Journal of Personality and Social Psychology*, 57(1), 55–66.

Eklund, J. H., & Meranius, M. S. (2021). Toward a consensus on the nature of empathy: A review of reviews. *Patient Education and Counseling*, 104(2), 300–307.

Falasca, T., & Caulfield, T. (1999). Childhood trauma. *Journal of Humanistic Counseling, Education and Development*, 37(4), 212–223.

Fang, J., Wang, X., Yuan, K.-H., & Wen, Z. (2020). Childhood psychological maltreatment and moral disengagement: A moderated mediation model of callous-unemotional traits and empathy. Personality and Individual Differences*, 157, 109814.

Flasbeck, V., & Brüne, M. (2021). Association between childhood maltreatment, psychopathology and DNA methylation of genes involved in stress regulation: Evidence from a study in borderline personality disorder. PLOS ONE*, 16(3), Article e0248514.

Flasbeck, V., Enzi, B., & Brüne, M. (2017). Altered empathy for psychological and physical pain in borderline personality disorder. Journal of Personality Disorders*, 31(5), 689–708.

Flasbeck, V., Enzi, B., & Brüne, M. (2019). Childhood trauma affects processing of social interactions in borderline personality disorder: An event-related potential study investigating empathy for pain. The World Journal of Biological Psychiatry*, 20(4), 278–288.

Flasbeck, V., Moser, D., Kumsta, R., & Brüne, M. (2018). The OXTR single-nucleotide polymorphism rs53576 moderates impact of childhood maltreatment on empathy for social pain in female participants: Evidence for differential susceptibility. Frontiers in Psychiatry*, 9, 163.

Franco, A., Malhotra, N., & Simonovits, G. (2014). Publication bias in the social sciences: Unlocking the file drawer. *Science*, 345(6203), 1502–1505.

Fritz, C. O., Morris, P. E., & Richler, J. J. (2012). Effect size estimates: Current use, calculations, and interpretation. *Journal of Experimental Psychology: General*, 141(1), 2–18.

Gallo, E. A. G., Munhoz, T. N., de Mola, C. L., & Murray, J. (2018). Gender differences in the effects of childhood maltreatment on adult depression and anxiety: A systematic review and meta-analysis. *Child Abuse & Neglect*, 79, 107–114.

Gao, S., Yu, D., Assink, M., Chan, K. L., Zhang, L., & Meng, X. (2023). The association between child maltreatment and pathological narcissism: A

three-level meta-analytic review. *Trauma, Violence, & Abuse*, Advance online publication. https://doi.org/10.1177/15248380221147559

Gerace, A., Day, A., Casey, S., & Mohr, P. (2015). Perspective taking and empathy: Does having similar past experience to another person make it easier to take their perspective? *Journal of Relationships Research*, 6, e10.

Götz, F. M., Gosling, S. D., & Rentfrow, P. J. (2022). Small effects: The indispensable foundation for a cumulative psychological science. *Perspectives on Psychological Science*, 17(1), 205–215.

Greenberg, D. M., Baron-Cohen, S., Rosenberg, N., Fonagy, P., & Rentfrow, P. J. (2018). Elevated empathy in adults following childhood trauma. PLOS ONE*, 13(10), Article e0203886.

Gruhn, M. A., & Compas, B. E. (2020). Effects of maltreatment on coping and emotion regulation in childhood and adolescence: A meta-analytic review. *Child Abuse & Neglect*, 103, 104446.

Grynberg, D., & López-Pérez, B. (2018). Facing others' misfortune: Personal distress mediates the association between maladaptive emotion regulation and social avoidance. *PLOS ONE*, 13(3), Article e0194248.

Guarda, R., & Almeida, T. C. (2021). Inmates' empathy: Relationship with childhood victimisation. Annals of Medicine*, 53(1), S127–S128.

Han, F. S., & Shao, S. H. (2019). A study on childhood trauma and empathy ability of college students. The Guide of Science & Education*, (15), 177–178.

Harrer, M., Cuijpers, P., Furukawa, T. A., & Ebert, D. D. (2021). *Doing meta-analysis with R: A hands-on guide.* Chapman and Hall/CRC.

Henschel, S., Nandrino, J.-L., & Doba, K. (2020). Emotion regulation and empathic abilities in young adults: The role of attachment styles. *Personality and Individual Differences*, 156, 109763.

Holland, A. C., O'Connell, G., & Dziobek, I. (2021). Facial mimicry, empathy, and emotion recognition: A meta-analysis of correlations. *Cognition and Emotion*, 35(1), 150–168.

Hou, X. H., Wang, J. D., Wang, S. Q., & Zheng, H. Y. (2021). Effect of childhood trauma on Internet addiction of college students: Chain mediating effect of empathy and gratitude. China Journal of Health Psychology*, 29(10), 1585–1591.

*Huang, G. Q. (2021). Effect of childhood psychological abuse on empathy and its intervention in junior middle school students (Unpublished master's thesis). Central China Normal University, Wuhan.

Ingoglia, S., Lo Coco, A., & Albiero, P. (2016). Development of a brief form of the Interpersonal Reactivity Index (B-IRI). *Journal of Personality Assessment*, 98(5), 461–471.

Izhaki Costi, O. R., & Schul, Y. (2011). I do not know you and I am keeping it that way: Attachment avoidance and empathic accuracy in the perception of strangers. *Personal Relationships*, 18(3), 321–340.

Jones, T. M., Bottoms, B. L., & Stevenson, M. C. (2020). Child victim empathy mediates the influence of jurors' sexual abuse experiences on child sexual abuse case judgments: Meta-analyses. *Psychology, Public Policy, and Law*, 26(3), 312–332.

Juruena, M. F., Eror, F., Cleare, A. J., & Young, A. H. (2020). The role of early life stress in HPA axis and anxiety. In Y.-K. Kim (Ed.), *Anxiety disorders: Rethinking and understanding recent discoveries* (pp. 141–153). Springer Singapore.

Kepes, S., & Thomas, M. A. (2018). Assessing the robustness of meta-analytic results in information systems: Publication bias and outliers. *European Journal of Information Systems*, 27(1), 90–123.

Kim, S. H., Baek, M., & Park, S. (2021). Association of parent−child experiences with insecure attachment in adulthood: A systematic review and meta-analysis. *Journal of Family Theory & Review*, 13(1), 58–76.

Lebowitz, M. S., & Dovidio, J. F. (2015). Implications of emotion regulation strategies for empathic concern, social attitudes, and helping behavior. *Emotion*, 15(2), 187–194.

*Li, H. R. (2016). The mediation role of empathy between childhood psychological maltreatment and children's pro-social behavior (Unpublished master's thesis). South-Central University for Nationalities, Wuhan, China.

Li, S., Zhao, F., & Yu, G. (2019). Childhood maltreatment and intimate partner violence victimization: A meta-analysis. *Child Abuse & Neglect*, 88, 212–224.

*Li, T. (2016). The relationship between child maltreatment and aggressive behavior: The mediating effect of empathy (Unpublished master's thesis). South-Central University for Nationalities, Wuhan, China.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. SAGE publications.

Lo, C. K. M., Chan, K. L., & Ip, P. (2019). Insecure adult attachment and child maltreatment: A meta-analysis. *Trauma, Violence, & Abuse*, 20(5), 706–719.

López-Pérez, B., & Ambrona, T. (2015). The role of cognitive emotion regulation on the vicarious emotional response. *Motivation and Emotion*, 39(2), 299–308.

Locher, S., Barenblatt, L., Fourie, M., Stein, D., & Gobodo-Madikizela, P. (2014). Empathy and childhood maltreatment: A mixed-methods investigation. Annals of Clinical Psychiatry*, 26(2), 97–110.

Lockwood, P. L. (2016). The anatomy of empathy: Vicarious experience and disorders of social cognition. *Behavioural Brain Research*, 311, 255–266.

*Lucas, M. K. (2009). Early childhood abuse, empathy and intimate partner violence (Unpublished master's thesis). Humboldt State University.

Luke, N., & Banerjee, R. (2013). Differentiated associations between childhood maltreatment experiences and social understanding: A meta-analysis and systematic review. *Developmental Review*, 33(1), 1–28.

Maneta, E. K., Cohen, S., Schulz, M. S., & Waldinger, R. J. (2015). Linkages between childhood emotional abuse and marital satisfaction: The mediating role of empathic accuracy for hostile emotions. Child Abuse & Neglect*, 44, 8–17.

Martin, R. E., & Ochsner, K. N. (2016). The neuroscience of emotion regulation development: Implications for education. *Current Opinion in Behavioral Sciences*, 10, 142–148.

Masten, A. S., & Narayan, A. J. (2012). Child development in the context of disaster, war, and terrorism: Pathways of risk and resilience. *Annual Review of Psychology*, 63, 227–257.

McDonald, N. M., & Messinger, D. S. (2011). The development of empathy: How, when, and why. In J. J. Sanguineti, A. Acerbi, & J. A. Lombo (Eds.), *Moral behavior and free will: A neurobiological and philosophical approach* (pp. 333–359). Rome: IF-Press.

Meltzoff, A. N. (2005). Imitation and other minds: The "like me" hypothesis. In S. Hurley & N. Chater (Eds.), *Perspectives on imitation: From neuroscience to social science: Vol. 2. Imitation, human development, and culture* (pp. 55–77). MIT Press.

Meng, X., Fleury, M.-J., Xiang, Y.-T., Li, M., & D'arcy, C. (2018). Resilience and protective factors among people with a history of child maltreatment: A systematic review. *Social Psychiatry and Psychiatric Epidemiology*, 53(5), 453–475.

Metcalf, S., Dickerson, C. L., Milojevich, H. M., & Quas, J. A. (2020). Primary and secondary variants of psychopathic traits in at-risk youth: Links with maltreatment, aggression, and empathy. Journal of Child Psychiatry & Human Development*, 52(6), 1060–1070.

Miano, A., Weber, T., Roepke, S., & Dziobek, I. (2018). Childhood maltreatment and context dependent empathic accuracy in adult romantic relationships. Psychological Trauma: Theory, Research, Practice, and Policy*, 10(3), 309–318.

Mielke, E. L., Neukel, C., Bertsch, K., Reck, C., Möhler, E., & Herpertz, S. C. (2016). Maternal sensitivity and the empathic brain: Influences of early life maltreatment. Journal of Psychiatric Research*, 77, 59–66.

Mikulincer, M., & Shaver, P. R. (2010). *Attachment in adulthood: Structure, dynamics, and change.* Guilford Publications.

Mikulincer, M., & Shaver, P. R. (2019). Attachment orientations and emotion regulation. *Current Opinion in Psychology*, 25, 6–10.

Milone, A., Cerniglia, L., Cristofani, C., Inguaggiato, E., Levantini, V., Masi, G., … Muratori, P. (2019). Empathy in youths with conduct disorder and callous-unemotional traits. Neural Plasticity*, 9638973.

National Institutes of Health. (2014). Study quality assessment tools. Retrieved from: https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *International Journal of Surgery*, 88, 105906.

Pan, C., Deng, Y. L., Guan, B. Q., & Luo, X. R. (2010). Reliability and validity of Child Psychological Maltreatment Scale. *Chinese Journal of Clinical Psychology*, 18(4), 463–465.

Petruccelli, I., D'Urso, G., Cataldi, S., de Risio, A., Grilli, S., Gonçalves, R. A., … Bonaiuto, M. (2022). Adverse childhood experiences related to cognitive and emotional states: A study on sexual offenders in Italy and Portugal. Revista de Cercetare și Intervenție Socială*, 76, 93–110.

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, 63(1), 539–569. https://doi.org/10.1146/annurev-psych-120710-100452

Polizzi, C. P., & Lynn, S. J. (2021). Regulating emotionality to manage adversity: A systematic review of the relation between emotion regulation and psychological resilience. *Cognitive Therapy and Research*, 45(4), 577–597.

Preston, S. D. (2007). A perception-action model for empathy. In T. F. D. Farrow & P. W. R. Woodruff (Eds.), *Empathy in mental illness* (pp. 428–447). Cambridge University Press.

*Qiao, J. S. (2021). The influence of childhood psychological maltreatment on adolescent bullying (Unpublished master's thesis). Shanxi University, Taiyuan, China.

Ren, Y. Z., Zhou, H. B., Yang, H. M., Wang, S. Y., Guo, Q., & Zhou, S. J. (2018). Drug abstainers' childhood trauma and antisocial personality symptoms: Mediating of empathy. Chinese Journal of Clinical Psychology*, 26(4), 701–705.

Rodgers, M. A., & Pustejovsky, J. E. (2021). Evaluating meta-analytic methods to detect selective reporting in the presence of dependent effect sizes. *Psychological Methods*, 26(2), 141–160.

Rothstein, H. R. (2008). Publication bias as a threat to the validity of meta-analytic results. *Journal of Experimental Criminology*, 4(1), 61–81.

Sesar, K., Dodaj, A., & Kovačević, M. (2022). Childhood maltreatment, aspects of emotional processing and borderline personality disorder. Mediterranean Journal of Clinical Psychology*, 10(1), 1–28.

Shaver, P. R., Mikulincer, M., Gross, J. T., Stern, J. A., & Cassidy, J. A. (2016). A lifespan perspective on attachment and care for others: Empathy, altruism, and prosocial behavior. In J. A. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (3rd ed., pp. 878–916). Guilford Press.

Simons, D., Wuetele, S. K., & Heil, P. (2002). Childhood victimization and lack of empathy as predictors of sexual offending against women and children. Journal of Interpersonal Violence*, 17(12), 1291–1307.

Spinhoven, P., Elzinga, B. M., van Hemert, A. M., de Rooij, M., & Penninx, B. W. (2016). Childhood maltreatment, maladaptive personality types and level and course of psychological distress: A six-year longitudinal study. *Journal of Affective Disorders*, 191, 100–108.

Stein, M. B., Walker, J. R., Anderson, G., Hazen, A. L., Ross, C. A., Eldridge, G., & Forde, D. R. (1996). Childhood physical and sexual abuse in patients with anxiety disorders and in a community sample. *The American Journal of Psychiatry*, 153(2), 275–277.

Sterne, J. A., & Harbord, R. M. (2004). Funnel plots in meta-analysis. *The Stata Journal*, 4(2), 127–141.

Struck, N., Krug, A., Feldmann, M., Yuksel, D., Stein, F., Schmitt, S., … Brakemeier, E.-L. (2020). Attachment and social support mediate the association between childhood maltreatment and depressive symptoms. *Journal of Affective Disorders*, 273, 310–317.

Sun, X. H., Chen, L., Wang, Y. D., & Yan, L. (2020). The link between childhood psychological maltreatment and cyberbullying perpetration attitudes among undergraduates: Testing the risk and protective factors. PLOS ONE*, 15(9), e0236792.

Teicher, M. H., Samson, J. A., Anderson, C. M., & Ohashi, K. (2016). The effects of childhood maltreatment on brain structure, function and connectivity. *Nature Reviews Neuroscience*, 17(10), 652–666.

Thompson, K. L., Hannan, S. M., & Miron, L. R. (2014). Fight, flight, and freeze: Threat sensitivity and emotion dysregulation in survivors of chronic childhood maltreatment. *Personality and Individual Differences*, 69, 28–32.

Thompson, N. M., Uusberg, A., Gross, J. J., & Chakrabarti, B. (2019). Empathy and emotion regulation: An integrative account. *Progress in Brain Research*, 247, 273–304.

van der Put, C. E., Assink, M., Gubbels, J., & van Solinge, N. F. B. (2018).

Identifying effective components of child maltreatment interventions: A meta-analysis. *Clinical Child and Family Psychology Review*, 21(2), 171–202.

van Heel, M., Bijttebier, P., Colpin, H., Goossens, L., van Den Noortgate, W., Verschueren, K., & van Leeuwen, K. (2020). Perspective taking, empathic concern, agreeableness, and support: Transactional associations across parental adolescence. *Journal of Adolescence*, 85, 21–31.

Viechtbauer, W. (2005). Bias and efficiency of meta-analytic variance estimators in the random-effects model. *Journal of Educational and Behavioral Statistics*, 30(3), 261–293.

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, 36(3), 1–48.

Wang, L. P., & Zhang, Y. X. (2022). The influence of college students' emotional neglect on aggression: Mediation of empathy. Health Vocational Education*, 40(10), 152–154.

*Wang, Q. X. (2022). Empathy and its clinical correlates in adolescents with depression (Unpublished master's thesis). Anhui Medical University, Hefei, China.

Wang, Y. L., Guo, J. N., Yin, X. B., Zhang, Q., Dong, L. Y., Wang, K., & Wang, Y, Y. (2021). The role of empathy in the relationship between childhood trauma and borderline personality tendencies in male offenders. The Journal of Forensic Psychiatry & Psychology*, 32(5), 679–696.

Weinstein, S. R., Meehan, K. B., Cain, N. M., Ripoll, L. H., Boussi, A. R., Papouchis, N., … New, A. S. (2016). Mental state identification, borderline pathology, and the neglected role of childhood trauma. *Personality Disorders: Theory, Research, and Treatment*, 7(1), 61–71.

World Health Organization. (2022, September 19). Child maltreatment. Retrieved from: https://www.who.int/news-room/fact-sheets/detail/child-maltreatment

Xu, K. W., Wang, Y. Y., Li, S. W., Cao, G. J., Guan, R. Y., Liu, Z. Z., … Qian, M. Y. (2010). The psychological trauma, empathy deficits and antisocial personality disorders. Neural Injury and Functional Reconstruction*, 5(4), 253–258.

Xu, X., Liu, Z., Gong, S., & Wu, Y. (2022). The relationship between empathy and attachment in children and adolescents: Three-level meta-analyses. *International Journal of Environmental Research and Public Health*, 19(3), 1391.

Yan, Z. Q., Su. J. L., & Su, Y. J. (2018). Empathy and Sympathy or Compassion: Source, Conception and Measurement. *Studies of Psychology and Behavior*, 16(4), 433–440.

Yang, J., Zhang, X. H, Zhao, X. L., & He, Y. (2020). Childhood emotional neglect predicts college students' empathy ability. Community Psychology Research*, 9(1), 143–160.

Yin, T. Z., & Yao, Q. (2021). The effect of psychological maltreatment on externalizing problem behavior of high school students: The chain mediating effect of empathy and moral disengagement. Chinese Journal of Special Education*, 10, 70–76.

Yu, G., Li, S., & Zhao, F. (2020). Childhood maltreatment and prosocial behavior among Chinese adolescents: Roles of empathy and gratitude. Child Abuse & Neglect*, 101, 104344.

*Zhang, J. (2022). The relationship between childhood trauma and adolescent cyberbullying: The mediation of hostile attribution bias and the moderation of emapthy (Unpublished master's thesis). Hubei University, Wuhan, China.

*Zhang, M. N. (2022). The influence of childhood emotional neglect on pain empathy in in-group/out-group (Unpublished master's thesis). Xinan University, Chongqin, China.

Zhang, Q., Zhou, Y., Chen, Z., & Xiang, Y. (2022). Does childhood maltreatment predict moral disgust? The underlying mediating mechanisms. International Journal of Environmental Research and Public Health*, 19(16), 10411.

Zhang, X., Zhang, M., Zeng, M., Lan, M., Liu, Y., Li, J., … Yang, J. (2022). Childhood emotional neglect predicts empathic accuracy in social inclusion and exclusion contexts. PsyCh Journal*, 11(4), 481–491.

Zheng, Y., Hu, D., Li, X., & Yin, M. (2022). Research on the relationship between empathy, belief in a just world, and childhood trauma in pre-clinical medical students. Healthcare*, 10(10), 1989.

Zhou, Q., Eisenberg, N., & Valiente, C. (2019). Empathy. In M. W. Gallagher & S. J. Lopez (Eds.), *Positive psychological assessment: A handbook of models and measures* (2nd ed., pp. 249–266). American Psychological Association.

Appendix

Supplementary Table 1. Quality Assessment of Included Studies

Study	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Criterion 6	Criterion 7	Criterion 8	Criterion 9	Criterion 10	Criterion 11	Criterion 12	Criterion 13	Criterion 14	Quality Score
Simons (2002)	Yes	Y	N	Y	N	Y	NA	Y	N	NA	Y	N	NA	NA	5
Lucas (2009)	Yes	Y	N	Y	N	Y	NA	Y	N	NA	Y	N	NA	NA	5
徐凯文 (2010)	Y	Y	N	Y	N	Y	NA	Y	N	NA	Y	N	NA	NA	5

Study	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5	Criterion 6	Criterion 7	Criterion 8	Criterion 9	Criterion 10	Criterion 11	Criterion 12	Criterion 13	Criterion 14	Quality Score
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Note: Study quality was assessed using the NIH Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies. Each criterion was scored as met (Y = 1 point), not met (N = 0 points), or not applicable (NA). Theoretical means: 4 for cross-sectional, 7 for longitudinal studies.

Supplementary Figure 1. Funnel Plot of Effect Size Distribution [Figure 1: see original paper]

Formulas Used in Data Analysis

Converting t-test t-values to correlation coefficient r:

$$r = \sqrt{\frac{t^2}{t^2 + df}}$$

where t is the reported t-value and df is the degrees of freedom (df = N − 2 = n_1 + n_2 − 2).

Converting pairwise comparison effect size Cohen's d to correlation coefficient r:

$$r = \frac{d}{\sqrt{d^2 + \frac{(n_1+n_2)^2-2(n_1+n_2)}{n_1 n_2}}}$$

where d is Cohen's d for difference tests.

Converting one-way ANOVA F-value to correlation coefficient r:

$$r = \sqrt{\frac{F}{F + df}}$$

where F is the reported F-value and df is the residual degrees of freedom (df = N − 2).

Converting correlation coefficient r to Fisher's z:

$$z_r = \frac{1}{2}[\log_e(1 + r) - \log_e(1 - r)] = \frac{1}{2}\log_e\left(\frac{1 + r}{1 - r}\right)$$

where r is the Pearson correlation coefficient and z_r is its Fisher transformation.

Standard error of main effect:

$$SE(\hat{\theta}) = \sqrt{v}$$

where SE(^) is the standard error of the meta-analytic main effect and v is its variance.

Converting Fisher's z back to r:

$$r = \frac{e^{2z_r} - 1}{e^{2z_r} + 1}$$

where e is the exponential function.

Three-Level Meta-Analysis Model

Level 1 model:

$$y_{ij} = \lambda_{ij} + e_{ij}$$

Level 2 model:

$$\lambda_{ij} = \kappa_j + u_{(2)ij}$$

Level 3 model:

$$\kappa_j = \beta_0 + u_{(3)j}$$

where y_{ij} represents a unique effect size i in study j; *λ{ij} is the "true" effect size; e*{ij} is the known sampling error. _j is the average effect size for study j; *β0 is the overall population effect; Var(u*(2)ij) = τ^2 *(2) and Var(u*(3)j) = τ^2_(3) represent study-specific Level 2 and Level 3 heterogeneity.

Combined model:

$$y_{ij} = \beta_0 + u_{(2)ij} + u_{(3)j} + e_{ij}$$

Mixed-Effects Model for Moderation

Mixed-effects model with one covariate:

$$y_{ij} = \beta_0 + \beta_{1X_{ij}} + u_{(2)ij} + u_{(3)j} + e_{ij}$$

where X is the covariate; τ^2 *(2) and* τ^2(3) now represent residual heterogeneity at Level 2 and Level 3 after controlling for the covariate.

Note: Figure translations are in progress. See original paper for figures.

Source: ChinaXiv — Machine translation. Verify with original.