Child Abuse & Neglect 103 (2020) 104446

Contents lists available at ScienceDirect

Child Abuse & Neglect

journal homepage: www.elsevier.com/locate/chiabuneg

Invited Review

Effects of maltreatment on coping and emotion regulation in childhood and adolescence: A meta-analytic review

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ARTICLE INFO

Keywords:
Maltreatment
Abuse
Neglect
Trauma
Adversity
Stress
Coping
Emotion regulation
Regulation
Stress response

ABSTRACT

Background: Child maltreatment is consistently linked to adverse mental and physical health problems, making the identification of risk and resilience processes crucial for prevention efforts. The ways that individuals cope and regulate emotions in response to stress may buffer against pre-existing risk, while deficits in these processes have the potential to amplify risk. Thus, a candidate mechanism to explain the association between early-life abuse and neglect and later maladjustment is the way in which previously-maltreated youth respond to stress throughout development.

Objective: The current review provides a quantitative analysis of the impact of early-life maltreatment on coping and emotion regulation processes during childhood and adolescence (5–18 years).

Methods: Thirty-five studies (N = 11,344) met criteria for inclusion in the meta-analysis. Effect sizes were calculated between maltreatment and broad domains (e.g., "emotion dysregulation"), intermediate factors (e.g., "problem-focused coping"), and specific strategies (e.g., "emotional suppression") of coping and emotion regulation.

Results: Maltreatment was significantly related to decreased emotion regulation ($r = -.24$, $p < .001$) and increased emotion dysregulation ($r = .28$, $p < .001$) at the domain level. No significant findings emerged at the factor level. At the strategy level, maltreatment was significantly related to increased avoidance ($r = .25$, $p < .001$), emotional suppression ($r = .24$, $p < .001$), and emotional expression ($r = .25$, $p < .001$).

Conclusions: Results indicate that maltreatment is broadly associated with poor emotion regulation as well as increased avoidance, emotional suppression, and expression of negative emotions in response to stress. Implications of these findings are discussed and an agenda for future research is proposed.

1. Introduction

Experiences of childhood abuse and neglect are linked to morbidity, mortality, and virtually all forms of psychopathology across the lifespan (Norman et al., 2012). Further, mental health disorders tend to emerge earlier with greater severity, higher rates of comorbidity, and less favorable responses to treatment for individuals with maltreatment histories compared to their non-maltreated counterparts (Álvarez et al., 2011; Nanni, Uher, & Danese, 2012). Identifying mechanisms of risk and resilience within individuals who have experienced abuse and/or neglect is vital in order to bolster prevention and early-intervention efforts for this high-risk

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https://doi.org/10.1016/j.chiabu.2020.104446
Received 11 August 2019; Received in revised form 24 February 2020; Accepted 1 March 2020
Available online 19 March 2020

population.

Stress exposure is the most potent risk factor for psychopathology during childhood, adolescence, and adulthood, and a substantial body of research suggests that effects are amassed across the lifespan (Chapman et al., 2004; Repetti, Taylor, & Seeman, 2002; Starr, Hammen, Conway, Raposa, & Brennan, 2014). Cumulative risk models highlight that exposure to stress in adolescence may be particularly predictive of mental health problems for individuals who have experienced childhood maltreatment, including sexual abuse, physical abuse, emotional abuse, physical neglect and/or emotional neglect (Appleyard, Egeland, van Dulmen, & Sroufe, 2005). Given that stressful experiences cannot be realistically avoided as a means of preventing maladjustment, the ways in which individuals *respond* to stress have important implications, as they have the potential to either buffer against or to amplify risk (Compas et al., 2017). For example, an adolescent who is able to engage in cognitive reappraisal when he hears his parents fighting (e.g., "it is normal for people to argue," "it isn't my job to fix their problems") is less likely to retain and internalize negative feelings than an adolescent who engages in denial (e.g., "this isn't happening") or emotional suppression (e.g., "I won't show anyone that I am upset"). Although one such instance is unlikely to have long term consequences, the accumulation of stressful experiences and associated responses may alter the course of adjustment over time. Investigating how early experiences of abuse and/or neglect impact the types of coping and emotion regulation strategies that individuals employ in the face of stress, therefore, is integral to understanding risk pathways in individuals who have experienced maltreatment.

Previous studies have examined stress responses as a risk factor for psychopathology, yet relatively little is known about how maltreatment relates to the specific coping and regulation strategies that individuals acquire and use. The current review addresses this gap by providing the first quantitative meta-analysis of the impact of childhood maltreatment on coping and emotion regulation processes at the *strategy*, *factor*, and *domain* levels in childhood and adolescence. First, the constructs of coping and emotion regulation are defined, followed by a discussion of the theoretical and empirical framework of the relation between maltreatment and controlled stress responses. Next, in the primary section of this review, meta-analytic results of associations between early-life abuse and neglect and subsequent coping and emotion regulation efforts are presented. Finally, a critique of the current state of the field is offered and an agenda for future research is proposed.

2. Coping and emotion regulation

2.1. Conceptualization of coping and emotion regulation

Coping and emotion regulation, at the broadest level, both refer to cognitive and behavioral strategies that individuals employ in response to an internal or external experience. Coping has been defined as conscious, volitional efforts to regulate emotion, cognition, behavior, physiology, and the environment in response to stress (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). Emotion regulation has been defined as the process by which individuals influence the occurrence, timing, nature, experience, and expression of their emotions (Gross, 2013). Although closely related, these constructs differ in that coping exclusively refers to responses to stress, whereas emotion regulation includes efforts to manage emotions under a wider range of stressful and non-stressful situations. Additionally, emotion regulation includes both controlled and automatic processes whereas coping encompasses only controlled, effortful processes. Finally, coping may include a wider array of goal-directed regulatory efforts (e.g., coping with academic stress via problem-solving with the end goal of receiving a good grade) whereas emotion regulation efforts generally focus on the goal of changing one's own emotional experience.

While each construct provides unique information, the current review examines the controlled, purposeful strategies of both coping and emotion regulation simultaneously to provide a more complete picture of stress response patterns in youth. We exclude automatic emotion regulation processes in the current study for several reasons. First, controlled processes reflect cognitive and behavioral strategies that are purposefully employed; thus, they may be more accessible to conscious awareness, improving the validity of self-report (Compas et al., 2017). Second, controlled processes can be more readily changed through psychosocial interventions, increasing the clinical relevance of the present findings (e.g., Lenz, 2015; Tein, Sandler, Ayers, & Wolchik, 2006). Third, automatic emotion regulation processes overlap with processes of physiologic stress reactivity, which represent a conceptually different phenomenon that is biologically rather than cognitively driven (Cicchetti, 2016). Finally, coping and emotion regulation have largely been examined within separate bodies of work (Compas et al., 2014). By isolating controlled processes, previous findings can fit into an integrated theoretical and empirical framework focused on how maltreatment impacts intentional responses to stress.

Although the effectiveness of each coping and regulation strategy depends on many factors (e.g., the nature of the stressor, cognitive capacity of the individual), Compas et al. (2017) conducted a quantitative meta-analysis that provides a foundation for understanding how controlled stress responses may heighten or mitigate risk for psychosocial problems in children and adolescents. Analyses of 212 studies (N = 80,850 participants) indicated that *primary control coping* (i.e., efforts to directly act on the source of stress or one's emotions, including problem solving and emotional expression) and *secondary control coping* (i.e., efforts to adapt to the source of stress, including acceptance and cognitive reappraisal) were significantly related to lower levels of symptoms of psychopathology, while *disengagement coping* (i.e., efforts to orient away from the source of stress or one's emotions, including avoidance or denial) and *emotional suppression* (i.e., efforts to dampen internal or external experiences and/or expressions of emotion) were predictive of higher levels of psychopathology symptoms. These findings suggest that certain indices of coping and emotion regulation utilized by children and adolescents may serve as protective factors against stressful experiences while others increase risk.

2.2. Coping, emotion regulation, and maltreatment

Families provide one of the most powerful and salient contexts of stress, coping, and emotion regulation during development, placing maltreated youth at an extreme disadvantage for acquiring adaptive self-regulation strategies. Conceptual models (e.g., Kliewer et al., 1994; Morris, Silk, Steinberg, Myers, & Robinson, 2007) and an emerging body of empirical work (e.g., Monti, Rudolph, & Abaied, 2014; Watson et al., 2014) suggest that the acquisition of coping and regulation strategies is learned through interpersonal interactions between caregivers and children,including direct communication, modeling, and expressions of support and warmth. Victims of early-life abuse and/or neglect may therefore fail to acquire coping and emotion regulation strategies that protect against the development of psychosocial problems (e.g., primary and secondary control coping) due to (a) decreased exposure to healthy examples of coping and emotion regulation, and/or (b) increased exposure to maladaptive stress response processes, such as violence (Kim & Cicchetti, 2010). Further, evidence suggests that children may be most sensitive to coping socialization efforts during times of significant challenge (Abaied & Rudolph, 2011). Experiences of early-life maltreatment may therefore create a 'double-hit,' such that children lack input on how to respond appropriately to stressful experiences while simultaneously being faced with stressors far out of their developmental capacity to handle (e.g., physical abuse, sexual abuse). Because of this discrepancy, youth who have been maltreated may not only fail to acquire optimal regulation strategies, but also learn strategies such as avoidance, denial, wishful thinking, or emotional suppression. Although adaptive in the short-term, these strategies may increase psychosocial risk when carried forward throughout development and used in normative situations of lower threat (Abaied & Rudolph, 2011; Compas et al., 2017). A recent study by Milojevich, Levine, Cathcart, and Quas (2018) aligned with this conceptualization, finding that maltreated youth endorsed significantly higher use of disengagement and antisocial strategies compared to their non-maltreated peers. Milojevich et al. posit that this finding may result from learned helplessness due to experiences of abuse and neglect and youth's resulting attempts to distance themselves from stressors rather than to confront them.

Previous work has established coping and emotion regulation as important mediators in the maltreatment-psychopathology relationship (e.g., Jennissen, Holl, Mai, Wolff, & Barnow, 2016). However, most studies have examined these processes broadly (e.g., "emotion dysregulation") and have not isolated and examined the direct path from early-life abuse and neglect to later coping or emotion regulation strategies. Thus, consensus in the field is that maltreatment is linked to maladaptive coping and poor emotion regulation which, in turn, leads to negative mental health outcomes. Without an understanding of the specific stress response subtypes and strategies employed by previously maltreated youth, we are unable to inform efforts to target and correct coping and emotion regulation deficits in this population.

3. The present study: meta-analysis

This meta-analytic review represents a comprehensive, empirical assessment of maltreatment and coping and emotion regulation during childhood and adolescence. The goal of this study is to synthesize findings from past research in order to elucidate patterns between experiences of abuse and neglect in childhood and subsequent controlled/volitional efforts to respond to stress. Results will reveal whether there is evidence linking early-life maltreatment to specific subtypes of coping and emotion regulation in school-age youth and highlight important directions for future research. Given previous findings that deficits in stress response strategies can be remediated via teaching coping and emotion regulation skills (e.g., Compas et al., 2010, Lenz, 2015), investigating the effects of abuse and neglect on specific categories of coping and emotion regulation is a crucial to inform prevention efforts.

4. Method

4.1. Study selection

This meta-analysis includes original, peer-reviewed papers meeting the following criteria: (i) data were collected on a sample of school-age children and adolescents (i.e., mean age between 5 and 18 years old); (ii) some or all of the sample experienced maltreatment, including physical abuse, sexual abuse, emotional abuse, physical neglect, and/or emotional neglect; (iii) coping or emotion regulation was assessed using a reliable measure; and (iv) an effect (i.e., correlation coefficient, beta weight, or means and standard deviations) was presented for the relationship between maltreatment and coping or emotion regulation.

4.2. Data sources

Articles published prior to January 1, 2020 were obtained from a PsycINFO search of Scholarly Journals (source type) using search criteria: if(maltreatment* OR abuse* OR neglect*) AND if(coping* OR regulation*). This search yielded 892 studies and was supplemented by reviewing the reference sections of published meta-analyses on related processes (Bernard, Frost, Bennett, & Lindhiem, 2017; Lavi, Katz, Ozer, & Gross, 2019), which yielded an additional 7 articles that met inclusion criteria. Articles were excluded for the following reasons: sample was out of the age range, article did not report on an empirical study, maltreatment and coping or emotion regulation were not measured, no reliability data were provided for the measure of coping/emotion regulation, or data on the association between maltreatment and coping/emotion regulation was not presented or was incompatible with the meta-analytic format (e.g., descriptive statistics; frequency analyses). In total, 35 articles met inclusion criteria (see Fig. 1 for Prisma Flow Diagram).

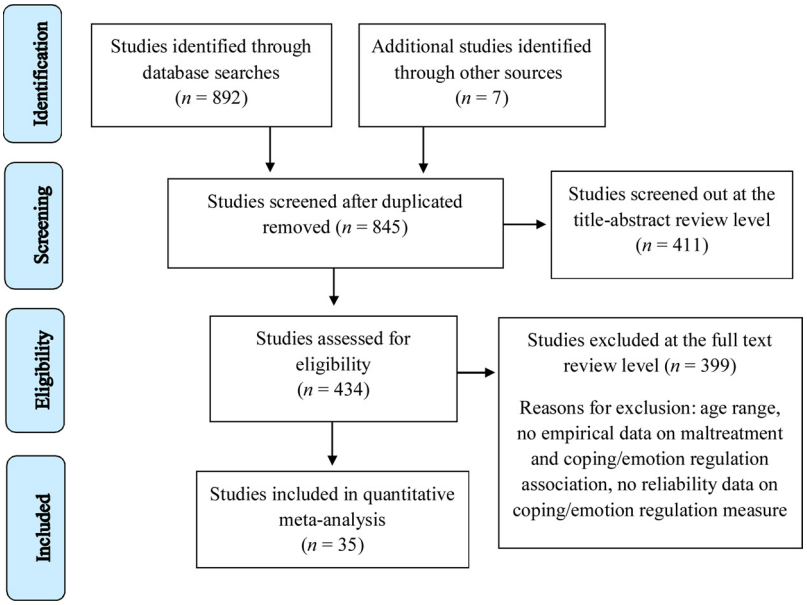

Fig. 1. PRISMA flow diagram.

4.3. Data coding procedure

Each study was coded for coping/emotion regulation category, statistics on the relationship between maltreatment and coping/emotion regulation, and descriptive data (e.g., sample size, mean age, year of publication, percent of female subjects, description of sample). Given the variability in labels and measurement tools used to assess coping and emotion regulation across studies, the organizational framework used by Compas et al. (2017) was employed to categorize stress responses. *Domains* of coping and emotion regulation represent the broadest level of measurement, where heterogeneous strategies cluster under categories of total coping, emotion regulation, adaptive coping, emotion dysregulation, emotion regulation, maladaptive coping, and total coping. This level has been only distinguished as "adaptive" versus "maladaptive," or "regulation" versus "dysregulation," on an a priori basis. Second, *factors* of coping/emotion regulation include measures of approach/ engagement, disengagement coping, emotion-focused, primary control coping, problem-focused, secondary control coping, and social support. While this intermediate level of categorization continues to include a range of strategies, these factors are more homogeneous than those composing the broad domains. Several of these factors have been supported using confirmatory factor analysis (e.g., primary control, secondary control, disengagement coping; Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000). The third level consists of specific *strategies*, which include acceptance, avoidance, cognitive reappraisal, denial, distraction, emotional expression, emotional modulation, emotional suppression, humor, problem solving, unregulated release of emotions, and wishful thinking. Categories relevant to the present meta-analysis (i.e., at least 1 study met inclusion criteria assessed the domain, factor, or strategy category) are presented in Table 1.

4.4. Data analytic procedure

All analyses were conducted with the Comprehensive Meta- Analysis program, Version 3 (Borenstein, Hedges, Higgins, & Rothstein, 2014), using study as the unit of analysis and the mean of the selected outcomes. Because studies varied in design and methodology, random effects models were employed. The mean effect size for each study (r) was the level of analysis; thus, if a single study tested associations between multiple abuse types and/or multiple stress responses within the same category, a mean effect size was calculated. Cohen (1988) guidelines were used to interpret the magnitude of the effect size for significant correlations (i.e., r = .10 represents a small effect, r = .30 as medium, and .50 or above as large).

Correlations or mean differences were entered into the meta-analysis where reported. If only standardized regression coefficients (betas) were reported, the recommendation by Peterson and Brown (2005) was followed such that β was converted to r using the formula $r = \beta + .05\lambda$, where $\lambda = 0$ when β is negative and $\lambda = 1$ when β is nonnegative, as successfully employed in other recent meta-analyses (e.g., Compas et al., 2017; Robles, Slatcher, Trombello, & McGinn, 2014). A threshold of three minimum studies (k = 3) was set to estimate effect sizes.

For each domain, factor, and strategy, weighted mean effect sizes (r), 95 % confidence intervals, and heterogeneity statistics (Q) were calculated using the procedures outlined by Hedges and Olkin (1985). Because the statistical power of the Q statistic depends on the number of studies, with power being very low or very high for a small or a large number of studies, respectively, the I^2 index is also calculated (Higgins & Thompson, 2002). The I^2 index quantifies the extent of heterogeneity from a collection of effect sizes by comparing the Q value to its expected value assuming homogeneity (i.e., to its degrees of freedom [$df = k - 1$]). The 95 % confidence

Table 1
Coping and Emotion Regulation Categories.

Domains	
Emotion Dysregulation	Affect Dysregulation, Dysfunctional Emotion Regulation, Emotion Dysregulation, Emotion Regulation Difficulty, Internalized
Emotion Regulation	Adaptive Emotion Regulation, Anger Regulation, *Constructive Coping**, Emotion Regulation, Emotion Regulated, Functional Emotion Regulation, Total Regulation
Total Coping	Constructive Coping*
Factors	
Approach/Engagement	Active Coping, Approach Coping, Engagement, *Support Seeking**
Disengagement Coping	Disengagement
Emotion-Focused	Emotion-Focused Coping
Primary Control Coping	Primary Control
Problem-Focused	Problem-Focused Coping, *Problem Solving**
Secondary Control Coping	*Distraction**, Secondary Control
Social Support	Support Seeking*
Strategies	
Avoidance	Avoidance, Avoidant Coping
Denial	Denial
Distraction	Distraction*
Emotional Suppression	Inhibition, Repression
Emotional Expression	Angry, Dysregulated Expression
Problem Solving	Problem Solving*

Note. Domains, factors, and strategies marked with asterisk (*) were re-classified into strategy/factor-inclusive categories due to an insufficient number of studies to calculate an effect size ($k < 3$); effect sizes for inclusive categories are reported in the meta-analysis.

intervals on the effect sizes represent the range in which the mean effect size falls in 95 % of cases. The calculation for the lower limit of the confidence interval is: $LL_{CI} = M^* - Z\sqrt{V_{M^*}}$ and the calculation for the upper limit of the confidence interval is: $UL_{CI} = M^* - Z\sqrt{V_{M^*}}$ where M^* is the mean effect size in the sample, Z is the critical z value representing the confidence level, and V_{M^*} is the variance of M^* (Borenstein et al., 2014). A mean effect is considered significant when the confidence interval does not include zero.

Last, several steps were taken to investigate the possibility of publication bias, which occurs as a result of selective publication of research findings based on the magnitude and direction of study results. First, funnel plots were visually examined for each significant effect size. The funnel plot includes the standard error of each study contributing to the overall effect size (a reflection of sample size) on the y axis with the study's effect estimate on the x axis. The effect estimate should be more precise with increasing sample size. In the absence of publication bias, effect estimates from studies with smaller sample sizes should be scattered symmetrically at the bottom of the plot and center more closely around the mean effect estimate at the top of the plot as the sample size increases. Funnel plots will appear asymmetrical in the presence of publication bias, suggesting that small samples reporting small to nonsignificant effect sizes were less likely to be published. Second, Egger's tests were conducted to assist in funnel plot interpretation, which is a statistical test used to detect funnel plot asymmetry (Egger, Smith, Schneider, & Minder, 1997). Third, we conducted trim and fill analyses (Duval & Tweedie, 2000) to determine how many studies would need to be included above or below the meta-analytic mean to make the plot symmetrical. Trim and fill analyses also impute the missing studies and calculate adjusted meta-analytic effect sizes that account for publication bias.

5. Results

Based on the inclusion criteria, 35 studies with 11,344 participants were included in analyses (see Table 2 for details on included studies). The number of effect sizes ranged from 1 to 8 per article, providing a total of 81 effects coded for the meta-analysis. Of the coping and emotion regulation domains, factors, and strategies assessed, there were an insufficient number of studies ($k < 3$) examining total coping, disengagement coping, primary control coping, secondary control coping, social support, problem solving, denial, and distraction to calculate effect sizes. However, several categories were subsumed under another "inclusive" category, per the coping/emotion regulation structure put forth by Compas et al. (2017) (see Table 1). Results of the associations between each inclusive category and maltreatment, including the number of studies (k), total sample size (N), mean effect size (r) and 95 % confidence interval (95 % CI), and heterogeneity statistics (Q, I^2) are reported in Table 3.

5.1. Domains

Emotion dysregulation ($r = .28$, $p < .001$) and emotion regulation ($r = -.24$, $p < .001$) were both significantly associated with maltreatment history, such that higher levels (or presence compared to absence) of childhood abuse and/or neglect was related to increased endorsement of emotion dysregulation and decreased endorsement of emotion regulation. Both models contained a significant amount of heterogeneity ($Q = 54.56$, $p < .001$, $I^2 = 81.67$ % [emotion dysregulation]; $Q = 46.75$, $p < .001$, $I^2 = 72.19$ % [emotion regulation]), with approximately three quarters of the total variability for each effect size due to between-study variability. The effect size for total coping was unable to be calculated ($k = 1$).

Table 2
Studies Included.

Study	*N*	Mean Age	Sex (% Female)	Sample Characteristics	Maltreatment Type (Measure)	Coping/ Emotion Regulation Type (Measure)
Alink, Cicchetti, Kim, and Rogosch (2009)	221	15.5	40%	Group 1: Maltreated children (N = 111); Group 2: Non-maltreated children (N = 110)	Multiple maltreatment experiences (MCS)	Emotion Regulation (CCQ)
Amédée et al. (2019)	343	8.79	65.03%	Children with and without sexual abuse histories	Sexual abuse (HVF)	Emotion Regulation (ERC)
Arslan (2017)	783	14.2	53%	9-12th grade adolescents	Psychological maltreatment (PMQ)	Avoidant Coping; Active Coping (Brief COPE)
Bal, Crombez, Oost, and Debourdeaudhuij (2003)	515	15.3	48%	Non-clinical adolescents	Sexual abuse (CAPS-C)	Active Coping; Distraction; Avoidance; Support-Seeking (HICUPS)
Chaplo, Kerig, Bennett, and Modrowski (2015)	525	16.1	25%	Juvenile justice involved youth	Sexual abuse (UCLA PTSD Index)	Emotion Regulation Difficulty (DERS)
Choi and Oh (2014)	171	9.0	89%	Sexually abused children in Korea	Multiple (3-point scale similar to MCS)	Emotion Dysregulation (ERC)
Cook, Chaplin, Sinha, Tebes, and Mayes (2012)	175	15.4	52%	Low-income urban adolescents	Multiple (CTQ-Short Form)	Anger Regulation (BASC-SRP)
Dileo, Brewer, Northam, Yucel, and Anderson (2017)	50	8.48	40%	Children with maltreatment histories and community controls	Maltreatment (CPS record review)	Emotion Regulation (ERC)
Elzy, Clark, Dollard, and Hummer (2013)	44	14.2	100%	Adolescent females residing in out-of-home placement facilities	Total trauma exposure (TSR-A)	Approach Coping; Avoidant Coping (CRI-Y)
Finzi, Har-Even, and Weizman (2003)	115	9.77	38.60%	Physically abused children; neglected children; non-maltreated children	Physical abuse; neglect (CPS record review)	Denial; Repression (CSPS)
Gagné and Melançon (2013)	278	16.1	45%	Seventh, eighth, and ninth grade adolescents	Parental psychological violence (PPVI)	Approach Coping; Avoidant Coping (WCQ)
Hébert, Langevin, and Oussaïd (2018)	309	9.07	66%	Sexually abused children	Cumulative childhood trauma (NVF; K-SADS)	Emotion Regulation (ERC)
John, Cisler, and Sigel (2017)	81	15.6	100%	Adolescent females	Multiple (NSA)	Emotion Regulation Difficulty (DERS)
Kim-Spoon et al. (2013)	322	8.1	39%	Group 1: Low income maltreated (N = 171); Group 2: Low income nonmaltreated (N = 151)	Multiple (MCS)	Emotion Regulation (ERC)
Kim, Kim, and Samuels-Dennis (2012)	2146	10.7	34%	Korean adolescents	Sexual abuse (yes/no) Physical abuse (MHQKA)	Problem Solving; Avoidance (MHQKA)
Kim & Cicchetti (2010)	421	9.1	36%	Group 1: Maltreated children at a research day camp (N = 215); Group 2: Nonmaltreated children at a research day camp (N = 206)	Multiple (MCS)	Emotion Regulation (ERC)
Ma and Li (2014)	366	12.2	55%	Chinese children with repeated familial physical and sexual abuse in Hong Kong	Physical abuse; sexual abuse (therapist report)	Dysregulated Expression; Inhibition; Emotion Regulation (CEMS)
Mills, Newman, Cossar, and Murray (2015)	222	15.4	44.60%	Secondary school pupils from a state high school in the UK.	Emotional abuse; emotional neglect (CTQ)	Functional Emotion Regulation; Dysfunctional Emotion Regulation (REQ)
Milojevich, Norwalk, & Sheridan (2019)	866	18	50.01%	High-risk children	Threat and deprivation (CPS record review; Modified MCS; Things I Have Seen and Heard; CTS)	Avoidance; Total Regulation (A-COPE)
Min, Minnes, Kim, Yoon, and Singer (2017)	363	16.7	15%	Adolescents exposed to cocaine prenatally	Multiple (JVQ)	Primary Control; Secondary Control; Disengagement (RSQ)
Moretti and Craig (2013)	179	15.0	46%	High-risk youth from juvenile justice and clinical settings	Physical and emotional abuse (CTS)	Affect Dysregulation (ARC)
Shenk, Noll, and Cassarly (2010)	211	15.75	100%	Female adolescents ages 14-18	Maltreatment (CPS agency investigation)	Dysregulation (DI)
Shenk, Putnam, and Noll (2013)	106	10.4	100%	Adolescent females	Multiple (CTI[b])	Emotion Regulation Difficulty (DERS)

(*continued on next page*)

Table 2 (*continued*)

Study	*N*	Mean Age	Sex (% Female)	Sample Characteristics	Maltreatment Type (Measure)	Coping/ Emotion Regulation Type (Measure)
Shenk, Griffin, and O'Donnell (2015)	110	17	100%	Female adolescents ages 14-19	Maltreatment (CPS agency investigation)	Emotion Regulation Difficulty (DERS)
Shields and Cicchetti (1998)	228	8.67	35.96%	Impoverished, inner-city children	Maltreatment (CPS record review)	Emotion Regulation (ERC)
Shipman and Zeman (2001)	50	9.1	36%	Maltreating and non-maltreating mother-child dyads	Physical maltreatment (CPS record review and caseworker consultation)	Dysregulated Expression; Inhibition; Emotion Regulation (CEMS)
Shipman et al. (2007)	80	9.1	45%	Maltreating and non-maltreating mother-child dyads	Maternal physical abuse and neglect (CTS-parent child)	Adaptive Emotion Regulation (ERC)
Shipman, Edwards, Brown, Swisher, and Jennings (2005)	48	9.3	40%	Maltreating and non-maltreating mother-child dyads	Neglect (CPS record review and caseworker consultation)	Constructive Coping; Inhibition (CEMS); Emotion Regulation (ERC)
Sun, Liu, & Yu (2019)	1041	12.41	44.48%	School attending adolescents in Cape Town, South Africa	Child neglect and psychological abuse (CPANS)	Emotion-Focused; Problem-Focused (CSS)
Sundermann and Deprince (2015)	115	17.0	100%	Community-recruited sample of female adolescents	Multiple (TESI-C)	Emotion Dysregulation (DERS)
Teisl and Cicchetti (2008)	267	9.1	100%	Group 1: Physically abused female youth (N = 76); Group 2: Female youth with histories of other maltreatment (N = 91); Group 3: Never maltreated female youth (N = 100)	Physical abuse; other maltreatment (Giovannoni & Beccerra 1979 Checklist-modified)	Emotion Regulation (CCQ)
Thomassin, Shaffer, Madden, and Londino (2016)	95	14.2	58%	Inpatient sample of youth	Emotional abuse; sexual abuse; physical abuse (CTQ)	Emotion Regulation (CEMS)
Tremblay, Hébert, and Piché (1999)	50	9.2	78%	Sexually abused children	Sexual abuse (HVF)	Approach Coping; Avoidant Coping (SRCS)
Wamser-Nanney and Campbell (2019)	141	9.72	69.2%	Sexually abused children ages 7-12	Sexual abuse (C-SARS)	Active/Social; Internalized; Avoidant; Angry (Kidcope)
Yoon, Cederbaum, and Schwartz (2018)	307	17.0	56%	Youth at-risk or reported for maltreatment	Physical abuse; psychological abuse; neglect; sexual abuse (Modified MCS; self-report)	Emotion-Focused; Problem-Focused (A-COPE)

Note. A-COPE = Adolescent Coping Orientation for Problem Experiences; ACS = Adolescent Coping Scale; ARC = Affect Regulation Checklist; BASC-SPR = Behavior Assessment Scale for Children Self-Report of Personality; BISC = Behavioral Inventory of Strategic Control; CAPS-CA = Clinician-Administered PTSD Scale for Children and Adolescents; CCQ = The California Child Q-Set; CCSC = Children's Coping Strategies Checklist; CECA = Childhood Experiences of Care and Abuse Interview; CECA-Q = Child Experience of Care and Abuse Questionnaire; CEMS = Children's Emotion Management Scale; CEVQ = Childhood Experiences of Violence Questionnaire; COPE = Coping with Problems Experienced; CPANS = Child Psychological Abuse and Neglect Scale; CPS = Child Protective Services; CRI-Y = Coping Response Inventory-Youth Form; CRSQ = Children's Response Styles Questionnaire; CRSS = Children's Response Styles Scale; C-SARS = Checklist of Sexual Abuse and Related Stressors; CSPS = Child Suicidal Potential Scales; CSS = Coping Style Scale; CTI[a] = the Childhood Trauma Interview; CTI[b] = the Comprehensive Trauma Interview; CTQ = the Childhood Trauma Questionnaire; CTQ = Childhood Trauma Questionnaire; CTS = Conflicts Tactics Scale; DERS = Difficulties in Emotion Regulation Scale; DI = Dysregulation Inventory; DMRS = Defense Mechanism Rating Scale; ERC = Emotion Regulation Checklist; ETI = Early Trauma Inventory; HICUPS = How I Cope Under Pressure Scale; HVF = History of Victimization Form; JVQ = Juvenile Victimization Questionnaire; K-SADS-PL = Kiddie Schedule for Affective Disorders and Schizophrenia for School-Aged Children, Present Version; MHQKA = Mental Health Questionnaire for Korean Adolescents; NSA = National Survey of Adolescents; PMQ = Psychological Maltreatment Questionnaire; PPVI = Psychologically Violent Parental Practices Inventory; REQ = Regulation of Emotions Questionnaire; RSQ = Responses to Stress Questionnaire; SRCS = Self-Report Coping Scale; TESI-C = Traumatic Events Screening Inventory for Children; TSR-A = Trauma Symptom Report-Adolescents; UCLA PTSD Index = the University of California at Los Angeles Posttraumatic Stress Disorder Reaction Index–Adolescent Version; VMPI = Vanderbilt Multidimensional Pain Coping Inventory; WCQ = Way of Coping Questionnaire.

Table 3
Effect Sizes for Maltreatment and Coping/Emotion Regulation.

	Maltreatment					
Level I: Domains	***k***	***N***	***r***	95 % ***CI***	***Q***	I^2
Emotion Dysregulation	11	2028	.28***	[.18, .38]	54.56***	81.67
Emotion Regulation	14	3675	−.24***	[−.30, −.17]	46.75***	72.19
Level II: Factors	***k***	***N***	***r***	95 % ***CI***	***Q***	I^2
Approach/Engagement	6	3517	.00	[−.10, .25]	56.17***	91.10
Emotion-Focused	3	1443	.01	[−.23, .25]	26.56***	92.47
Problem-Focused	3	3494	−.09	[−.36, .20]	120.00***	98.33
Level III: Strategies	***k***	***N***	***r***	95 % ***CI***	***Q***	I^2
Avoidance	8	4823	.25***	[.15, .35]	75.36***	90.71
Emotional Suppression	4	456	.24***	[.16, .33]	2.15	0.00
Emotional Expression	3	474	.25***	[.16, .33]	0.80	0.00

Note. ***$p < .001$.

5.2. Factors

Relations between maltreatment and approach/engagement ($r = .00$), emotion-focused ($r = .01$), and problem-focused ($r = -.09$) coping were non-significant ($ps > .10$) and results indicate significant heterogeneity for all models; thus, no associations between maltreatment and controlled stress responses emerged at the factor level. Categories of disengagement, primary control coping, secondary control coping, and social support did not contain enough studies to calculate an effect size.

5.3. Strategies

Avoidance ($r = .25$), emotional suppression ($r = .24$), and emotional expression ($r = .25$) were each significantly positively related to maltreatment ($p < .001$), such that individuals who have experienced abuse and/or neglect endorsed greater use of strategies geared toward avoiding stressors, suppressing emotions, and/or expressing emotions. Analyses indicated significant heterogeneity for avoidance ($Q = 75.36$, $p < .001$, $I^2 = 90.71$ %) and nonsignificant heterogeneity for emotional suppression and emotional expression, indicating minimal between-study variability in studies examining suppression ($k = 4$) and expression ($k = 3$). Effects for denial, distraction, and problem solving could not be calculated ($k < 3$).

5.4. Publication bias

Of the five significant effect sizes, only the effect for emotion regulation produced a significant Egger's test indicating possible publication bias ($k = 14$, regression intercept $= -4.14$, 95 % *CI* [-−6.23, −2.06], $p < .05$). A visual inspection of the funnel plot shows possible data asymmetry indicative of bias (see Fig. 2). However, follow-up trim and fill analyses suggested no publication bias (i.e., values did not need to be added in order to create a symmetrical funnel plot). It is noteworthy that asymmetry was not evident

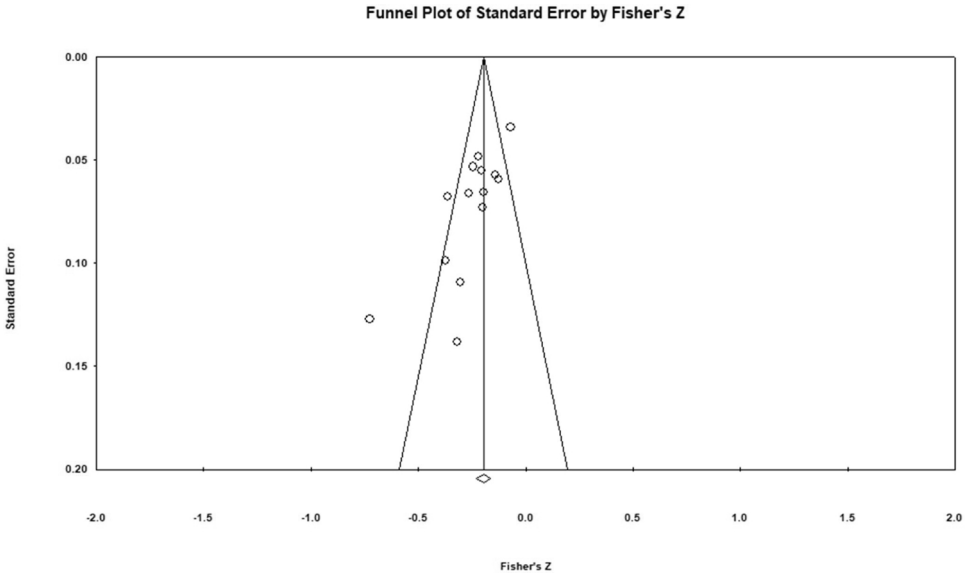

Fig. 2. Funnel plot for the relationship between the standard error and Fisher's *z* in studies of maltreatment and emotion regulation.

when visually inspecting the other four significant effect size estimates.

6. Discussion

Prior work has established child maltreatment and disruptions in coping and emotion regulation as predictors of psychopathology, yet the association between maltreatment and coping/emotion regulation is not well understood. The current study synthesizes past findings in order to investigate relation between childhood maltreatment and specific subtypes of coping and emotion regulation in school-age youth. These findings provide preliminary evidence that early-life maltreatment may disrupt general emotion regulation processes and promote greater use of avoidance, suppression, and emotional expression strategies even in non-maltreating situations, which could compound pre-existing risk for maladjustment. Although Egger's tests indicated possible publication bias for the emotion regulation category, trim and fill analyses suggested that bias was not significant. Thus, results reported in this meta-analysis appear to be an accurate representation of the state of the field.

Significant medium effects emerged for 5 of the 8 categories of coping and emotion regulation. At the *domain* level, a significant medium positive association was found for maltreatment and emotion dysregulation, and a significant medium negative association was found between maltreatment and emotion regulation. These findings are important in providing quantitative evidence that broad indices of emotion regulation are associated with maltreatment in children and adolescents. However, a closer examination of items used in domain-level measures suggest that they provide relatively little information on the specific techniques and strategies that children and adolescents use to regulate emotions or cope with stress. For example, the Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997) was used in nine of the fourteen studies reporting on emotion regulation, and includes items such as, "Displays appropriate negative emotions in response to hostile, aggressive, or intrusive acts by peers," and "Transitions well from one activity to another; does not become anxious, angry, distressed, or overly excited when moving from one activity to another." While these items depict behaviors indicative of well-regulated emotions, they do not provide information on the specific ways in which children achieve emotion regulation. Similarly, the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) was used in five of the eleven studies assessing emotion dysregulation, and includes items such as, "When I'm upset, I have difficulty controlling my behaviors," and "When I'm upset, it takes me a long time to feel better" that fail to account for the strategy behind the dysregulated response and interfere with attempts to delineate controlled and automatic responses. Thus, although the vast majority of research on coping and regulation has been conducted at the *domain* level, these results hold relatively little clinical utility.

There were insufficient studies to calculate effect sizes for several coping/emotion regulation *factors* (e.g., primary control coping, secondary control coping). This is noteworthy, as intermediate level coping/emotion regulation factors displayed the strongest associations with internalizing and externalizing problems in youth in the recent meta-analysis conducted by Compas et al. (2017). Of the categories that were analyzed, no significant results emerged and analyses indicated significant heterogeneity, such that over 90 % of total variability in each effect size was due to between-study variability. Measuring stress responding at the factor level will be an important component for future research involving maltreatment, as coping and emotion regulation factors may elucidate important etiological links to psychopathology.

Three significant medium effects emerged at the *strategy* level, such that maltreatment was linked to increased avoidance, emotional suppression, and emotional expression. These findings provide vital information regarding the specific ways in which children who have experienced maltreatment cope with stress. One explanation for findings arises from the uncontrollability of maltreatment experiences, which may instill a belief that *all* stress is uncontrollable, thereby teaching children to avoid stressors or their own responses to stress via emotional suppression/inhibition. Regarding emotional expression, it is important to note that studies included in this category assessed dysregulated expression or expression of angry emotions rather than positive expression. Thus, this response may represent an attempt to engage with a stressor but a lack of ability to do so in a regulated and productive manner.

Importantly, these findings highlight stress responses that are likely highly adaptive in maltreating situations. For example, engaging with the stressor or displaying emotions may be dangerous in high-threat situations (e.g., result in increased abuse), thereby necessitating the use of avoidance and suppression. Similarly, situations characterized by deprivation may prompt emotional expression as an attempt to receive attention from a neglecting caregiver. However, the continued use of these strategies after the maltreatment experience has ended (i.e., in situations of lower threat/deprivation) likely becomes harmful to normative development (Compas et al., 2017), highlighting the need to develop and implement preventive interventions.

6.1. Limitations and future directions

In spite of the significance of these findings, several limitations of the present study and the current state of research should be addressed. First, the possibility of publication bias should be acknowledged. All publication bias methods have limitations and no one approach is fully accurate; therefore, multiple approaches were included to help better approximate accurate estimations of effect sizes in the current review. Although trim and fill analyses suggested that publication bias was not present, additional effects of publication bias on the findings in the current study cannot be ruled out, as only published studies were included. It is important for meta-analytic studies to assess the presence and impact of bias given that systematic bias can lead to inflated effect size estimates and inaccurate conclusions.

Second, it is important to note the substantial heterogeneity that emerged in six of the eight calculated effect sizes. High heterogeneity is unsurprising, given the wide array of different measures used to assess coping and regulation as well as variability in sample characteristics. For example, each of the eight studies assessing avoidance used a different measure. Further, youth included

in this category (N = 4823) varied in the type of maltreatment they experienced (e.g., sexual abuse, psychological maltreatment, total trauma exposure), and each type of maltreatment was again assessed using a different measurement tool. Given the relative paucity of research in this area and resulting lack of power, moderator effects within heterogeneous models were not examined. Heterogeneity should instead be used as a guide for future research. Differences between studies are a necessary and important aspect of research (e.g., varying sample sizes and demographic characteristics), but improvements can be made in research design and measurement tools. As a field, identifying well-validated, reliable measures of coping and emotion regulation to employ across studies, particularly at the strategy and factor levels, would enhance our ability to examine specificity in maltreatment-stress response relationship and assess the generalizability of findings. Additionally, data on a wider range of factors and strategies is needed in order to understand whether engaging in avoidance, emotional suppression, and emotional expression are used independently or in conjunction with other coping/emotion regulation techniques. Regarding the assessment of childhood abuse and neglect, effort should be made to gather detailed histories of maltreatment (e.g., type, timing, duration, other trauma exposure) using reliable and valid measures. Emerging evidence suggests that characteristics of maltreatment may have unique implications for specific coping and emotion regulation strategies (e.g., Milojevich, Norwalk, & Sheridan, 2019). Detailed information on maltreatment will provide clarity on sample characteristics to better understand between-study differences and aide in efforts to trace specific experiences to atypical developmental processes and outcomes.

Third, further research is needed to understand how coping and emotion regulation strategies are acquired following experiences of abuse and/or neglect. Maltreatment may impact intentional efforts to respond to stress through many pathways, including (a) insecure attachment (e.g., absence of normative transition from parent working to modulate infant emotions to increased independence of child self-regulating; Bowlby, 1969; Cicchetti, 2016) and exposure to dysregulated interpersonal interactions within the family, (b) alternations in neural development (e.g., smaller prefrontal cortex; Tupler & De Bellis, 2006), (c) impairments in biological stress responding (e.g., dysregulation of the hypothalamic–pituitary–adrenal axis; Tarullo & Gunnar, 2006), and numerous others. Longitudinal, multi-method research designs will serve to help identify the specific ways in which maltreatment interferes with the acquisition of healthy stress responses. Neuroimaging methods, for instance, may aide in delineating automatic processes compared to controlled processes of coping by examining responses of both emotion (e.g., the amygdala) and executive function (e.g., areas of the prefrontal cortex) of the brain (e.g., Belden, Pagliaccio, Murphy, Luby, & Barch, 2015) and provide valuable information to supplement self-reported use of effortful strategies. Further understanding of this developmental process and use of multiple methods to better understand the complex stress response system will provide insight on *how* and *when* the typical process to acquire self-regulation skills is disrupted and, in turn, shed light on the optimal timing for intervention and type of support most needed for maltreated youth.

6.2. Conclusion

Improving the quality of interventions requires a clear theory of change, well-specified targets, and rigorous methods to measure these targets. Interventions for maltreated youth can be guided by findings on individual differences in coping and emotion regulation, as exposure to stressful events and subsequent stress responses later in development exacerbate the effects of maltreatment for some individuals. The present study provides an important foundation for understanding the impact of early-life abuse and neglect on intentional, controlled efforts to respond to stress, highlighting possible links between maltreatment and decreased emotion regulation, increased emotion dysregulation, and a greater tendency to suppress emotions, become avoidant, or express dysregulated or angry emotions. Efforts to reduce heterogeneity between studies, examine the pathway between maltreatment and specific coping and emotion strategies, and incorporate longitudinal, multi-method designs are targets for future research. Results will serve to enhance prevention and early intervention efforts by providing prescriptive targets to improve stress-response processes in individuals who have experienced maltreatment.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declaration of Competing Interest

None.

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