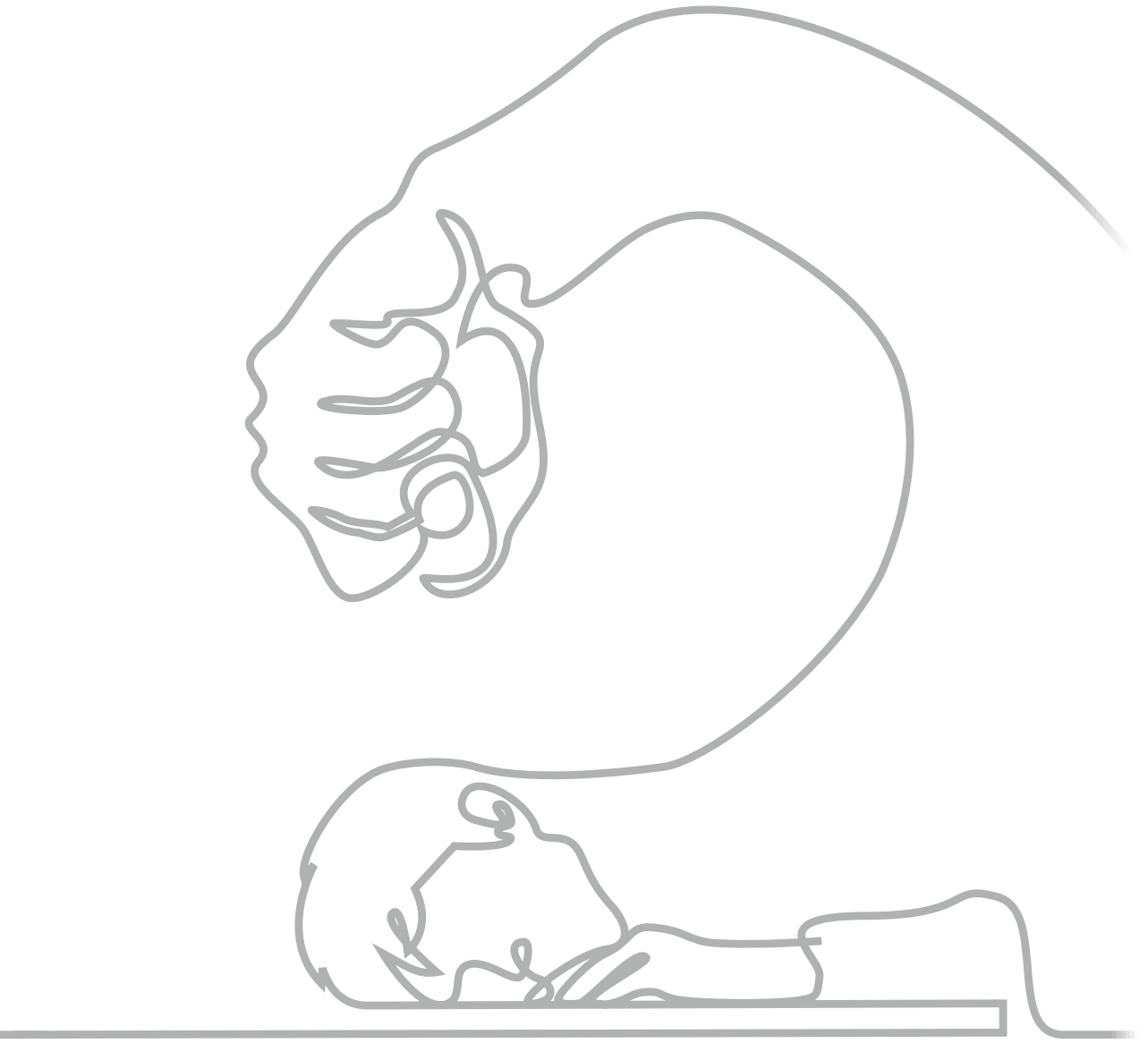
Consumed by a forbidden emotion: anger and aggression in patients with psychiatric disorders

Bles, N.J. de

Submitted as: de Bles, N. J.*, Pütz, L. E. H.*, Rius Ottenheim, N., van Hemert, A. M., Elzinga, B. M., Penninx, B. W. J. H., & Giltay, E. J. (2023). Childhood trauma and anger in adults with and without depressive and anxiety disorders

*Joint first author

4 Childhood trauma and anger in adults with and without depressive and anxiety disorders



Abstract

Background: Childhood trauma is associated with severe sequelae, including stress-related mental health disorders that can perpetuate long into adulthood. A key mechanism in this relationship seems to be emotion regulation. We aimed to investigate (1) whether childhood trauma is associated with anger in adulthood, and, if so, (2) to explore which types of childhood trauma predominate in the prediction of anger in a cohort that included participants with and without lifetime affective disorders.

Methods: In the Netherlands Study of Depression and Anxiety (NESDA), childhood trauma was assessed with a semi-structured Childhood Trauma Interview (CTI) at baseline, and analysed in relation to anger as measured at 4-year follow-up with the Spielberger Trait Anger Subscale (STAS), the Anger Attacks Questionnaire, and cluster B personality traits (i.e., borderline, antisocial) of the Personality Disorder Questionnaire 4 (PDQ-4), using analysis of covariance (ANCOVA) and multivariable logistic regression analyses. Post-hoc analyses comprised cross-sectional regression analyses, using the Childhood Trauma Questionnaire – Short Form (CTQ-SF) also obtained at 4-year follow-up.

Results: Participants (n = 2271) were on average 42.1 years (SD = 13.1), and 66.2% were female. Childhood trauma showed a dose-response association with all anger constructs. All types of childhood trauma were significantly associated with borderline personality traits, independently of depression and anxiety. Additionally, all types of childhood trauma except for sexual abuse were associated with higher levels of trait anger, and a higher prevalence of anger attacks and antisocial personality traits in adulthood. Cross-sectionally, the effect sizes were larger compared to the analyses with the childhood trauma measured four years prior to the anger measures.

Conclusions: Childhood trauma is linked with anger in adulthood, which could be of particular interest in the context of psychopathology. Focus on childhood traumatic experiences and adulthood anger may help to enhance the effectiveness of treatment for patients with depressive and anxiety disorders. Trauma-focused interventions should be implemented when appropriate.

Introduction

Childhood trauma (CT) is associated with severe mental health consequences that can perpetuate long into adulthood [1]. CT, as stated by the World Health Organization (WHO), is defined as "all forms of physical and/or emotional ill-treatment, sexual abuse, neglect or negligent treatment or commercial or other exploitation, resulting in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust or power" [2]. In the Netherlands, up to 1 out of 4 children reported ever having endured some form of maltreatment [3], although the prevalence of CT is likely to be an underestimation as a result of underreporting due to fear, secrecy, and stigma [4].

The substantial impact of CT is reflected by its association with the high prevalence of depressive and anxiety disorders in adulthood, including increased comorbidity and chronicity [5]. Although there are multiple potential mechanisms for psychopathology in the context of CT, emotion regulation arises as a key mechanism [6]. Poor emotion regulation can be a consequence of parents lacking sensitiveness and responsiveness to their children's emotional states or a poor parental self-regulation, learning children to be very attentive and ready to brace themselves for a possible emotional outburst of a parent [7]. This heightened sense of awareness of the emotional state of a parent can lead to a faster perception of threat in later life and to a defense system more 'ready' to respond lowering the threshold to experience anger [8]. Furthermore, by being exposed to the uncontrolled anger of primary caregivers, maltreated children are at higher risk of becoming perpetrators themselves by modelling [9, 10].

Cross-sectional studies that took into account a broad spectrum of childhood adversities found significant associations between CT, on the one hand, and anger in adulthood, on the other hand, including a dose-response relationship [11-14]. Male delinquents with a history of emotional or sexual abuse were nearly twice more likely to have high trait anger than those without emotional or sexual abuse [11], and a history of physical abuse was found to be associated with a 27% increase in trait anger in the general population [15]. Only a few cross-sectional studies focused on other anger constructs than trait anger, such as anger expression–outwards, anger expression–inwards, and anger control, although these studies found low correlations [16] or no correlations with CT at all [17]. Longitudinal studies, in contrast, showed that childhood maltreatment was predictive of anger in adulthood [18, 19]. Thus, the evidence suggests that CT is related to anger in adulthood, although the relationship has not been studied extensively among patients with affective disorders.

The link between CT and anger among adult patients with an affective disorder could be of importance, as anger is very prevalent among such disorders [20] and may even serve as a mediator of the relationship between CT and subsequent adulthood psychopathology [21]. Additionally, previous studies have shown that high levels of anger may lead to treatment dropout and poorer treatment outcomes in adults [22, 23]. Continuing on this, anger remains elevated in remitted patients compared to healthy controls [20], and both residual symptoms and the experience of childhood trauma are risk factors for relapse [24]. Thus, the link between CT and anger may yield anchor points for better and enduring effects of treatment for affective disorders.

The aims of the present study were (1) to investigate the association between CT and anger in adulthood, including trait anger, anger attacks, and borderline- and antisocial personality traits as constructs of anger and (2) to explore which types of CT predominate in the prediction of anger in a cohort that included participants without lifetime psychiatric disorders, with current or remitted depressive and anxiety disorders, or comorbid depressive and anxiety disorders.

Methods

Participants

Data stemmed from the Netherlands Study of Depression and Anxiety (NESDA), an ongoing, multisite, prospective cohort study. The study included participants with current or remitted depressive and anxiety disorders, comorbid depressive and anxiety disorders, and individuals without lifetime psychiatric disorders ("healthy controls"). In total, NESDA recruited 2981 participants at baseline ranging from 18-65 years old, as described in detail elsewhere [25]. The exclusion criteria were (1) suffering from another primary diagnosis (e.g., psychotic disorder, severe substance abuse disorder, bipolar or obsessive-compulsive disorder) and (2) insufficient mastery of the Dutch language. Baseline data collection took place between 2004 and 2007 and the 4-year follow-up between 2008 and 2011 in which wave anger was assessed. NESDA recruited participants from community care, primary care, and specialized outpatient mental health care from areas around Amsterdam, Groningen, and Leiden. The study was approved by the ethical committees of participating universities (VU University Medical Center, University Medical Center Groningen, and Leiden University Medical Center). All participants provided written informed consent.

Eleven participants with missing data on CT at baseline, 573 participants who dropped out between baseline and 4-year follow-up, and 126 participants with missing

data on CT or anger questionnaires at 4-year follow-up were excluded, resulting in a remaining sample of 2271 (76.2%) included in the main analyses (Fig. 1). The excluded 710 participants had a lower level of education ($p < 0.001$), a higher Body Mass Index (BMI) ($p = 0.040$), were more often current smokers ($p < 0.001$), alcohol dependent or alcohol abusers ($p = 0.004$), had less severe worry symptoms (p's < 0.001), and had more severe depressive and anxiety symptoms (p's < 0.001) at baseline compared to the 2271 included participants.

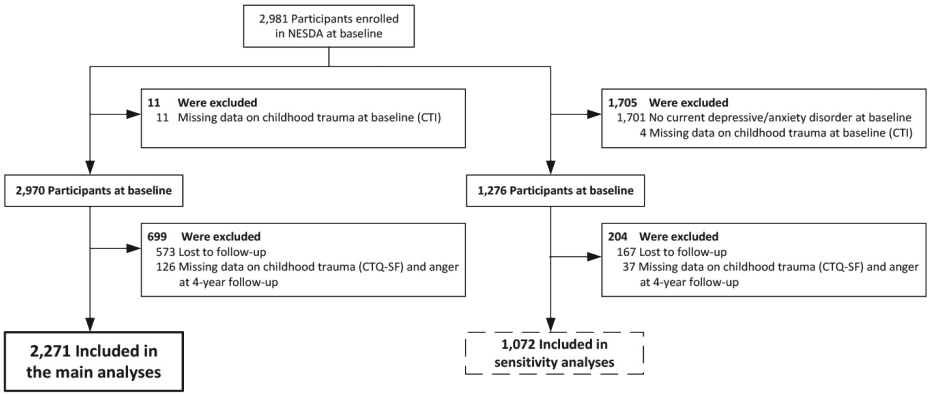


Fig. 1. Flowchart of included participants in the main and sensitivity analyses
Note. NESDA = Netherlands Study of Depression and Anxiety; CTI = Childhood Trauma Interview; CTQ-SF = Childhood Trauma Questionnaire – Short Form.

Measurements

CT and life events

Exposure to CT in NESDA was assessed twice: at the baseline using the structured Childhood Trauma Interview (CTI) [26], and at a 4-year follow-up using the self-reported Childhood Trauma Questionnaire-Short Form (CTQ-SF) [27].

The CTI comprised two sections. The first section of the interview consists of several questions on childhood life events before the age of 16: parental loss, divorce of parents, or being placed in care (i.e., child home, juvenile prison, foster family). Each event was scored as 0 (*did not happen*) or 1 (*did happen*). The childhood life event index ranged from 0–2 (0, no childhood life events; 1, one childhood life event; 2, two or more childhood life events [28]).

The second section contains four yes or no questions on experienced emotional neglect, psychological, physical, or sexual abuse before the age of sixteen. Participants

were asked the following questions: (1) Were you emotionally neglected, meaning nobody ever listened to you at home, your problems and experiences were ignored, and you felt that there was no attention or support from your parents? (2) Were you psychologically abused, meaning being yelled at, falsely punished, subordinated to your siblings, or being blackmailed? (3) Were you being abused physically, meaning being hit, kicked, beaten up or other types of physical abuse? (4) Were you sexually abused, meaning being touched or having to touch someone in a sexual way against your will? [26]. Subsequently, if answered yes, participants were asked to score the frequency on a 5-point Likert-scale ranging from 1 (*once*) to 5 (*very often*) and were asked for the perpetrator. Scores for each question were categorized to calculate a frequency score ranging from 0–2 (0, never happened; 1, once or sometimes; 2, regularly/very often). These scores combined into the childhood trauma index. This is the sum score of the four questions ranging from 0–8, where a higher number corresponds with a higher frequency and more types of CT [28, 29].

At 4-year follow-up, the CTQ-SF was assessed, which is a 28-item self-report instrument. It retrospectively assesses the same four CT categories of the CTI, with the addition of physical neglect [27]. Convergent validity was found to be fair as indicated by moderate correlations between analogous subscales of the CTQ-SF and the CTI (i.e., childhood trauma index): emotional neglect ($\rho = .60$), emotional abuse ($\rho = .57$), physical abuse ($\rho = .61$), and sexual abuse ($\rho = .57$) [30]. These associations were not attenuated by disorder status.

Trait Anger

Trait anger is described as a person's proneness to experience feelings of anger and was measured using a Dutch adaptation of the trait anger subscale of the Spielberger State-Trait-Anger Scale (STAS) [31, 32]. The STAS is a self-report measure that also includes a measure of state anger, not used in this study. The trait anger subscale contains 10 items to which participants answer on a 4-point Likert scale ranging from 1 (*almost never*) to 4 (*almost always*), leading to a sum score ranging from 10 to 40. The scale is subdivided in two scores, namely 'temperament' (i.e., the disposition to experience anger; Items 1, 2, 3, 5, and 6) and 'reaction', (i.e., the disposition to express anger especially upon provocation; Items 7, 8, and 10). Psychometric properties have shown high test-retest reliability (rtt = 0.78) and good item-total correlations (> 0.40) [31]. The Cronbach's alpha in our sample was 0.89, showing good internal consistency.

Anger Attacks

The anger attacks questionnaire [33] is a self-rated instrument used to measure the presence or absence of anger attacks during the previous 6 months. Anger attacks are described as sudden spells of anger accompanied by autonomic activation and are experienced as uncharacteristic and inappropriate for the situation [34]. In order to establish the presence of anger attacks in a dichotomous matter, all the criteria of the questionnaire need to be met over a period of the past 6 months: (1) irritability, (2) overreaction to minor annoyances, (3) inappropriate anger and rage directed at others, (4) incidence of one or more anger attacks within in the past month, (5) occurrence of at least four out of the thirteen following autonomic and/or behavioral features in at least one of the attacks: tachycardia, hot flashes, tightness of the chest, paresthesia, dizziness, shortness of breath, sweating, trembling, panic, feeling out of control, feeling like attacking others, attacking physically or verbally, and throwing or destroying objects [35].

Cluster B personality traits

A shortened 37-item version of the Dutch adaptation of the Personality Disorder Questionnaire (PDQ-4) was used to screen for the presence or absence of characteristics of antisocial and borderline personality traits, based upon the criteria of the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) for these personality disorders [36, 37]. The questionnaire consists of dichotomous ('true'/'false') items, of which 8 items correspond with borderline personality disorders traits (e.g., "I have difficulty controlling my anger or temper"), and one additional item (the 9th item) measuring the impulsivity (e.g. "I have done things on impulse that could have gotten me into trouble") comprising 6 sub-items (e.g. "Reckless driving"). Seven items correspond with antisocial personality disorder traits (e.g. "I don't care if others get hurt as long as I get what I want") and the remaining 15 items correspond with antisocial behavior before the age of 15 (e.g. "I was considered a bully"). Borderline personality disorder traits ($\alpha = 0.75$) and antisocial personality disorders traits ($\alpha = 0.57$) were used in the current analyses, with a cut-off for the presence of these traits being ≥ 5 and ≥ 3 respectively. Test-retest reliability over three different time periods were on average 0.67 [38].

Symptom severity

The severity of depressive symptoms in the last seven days was measured using the self-report 30-item Inventory of Depressive Symptomatology (IDS-SR) [39]. Answers are

given on a 4-point Likert scale (0–3), with a sum score ranging from 0 to 84, due to a calculation of only 28 out of 30 items. The Beck Anxiety Inventory (BAI) is a self-report measure consisting of 21 items answered on a 4-point Likert scale (0–3). The answers result in a sum score ranging from 0 to 63 [40]. The BAI gives an impression of the somatic manifestation of anxiety over the last week. The Fear Questionnaire (FQ), a 15-item self-report measure, uses a 9-point Likert scale (0–8), with a sum score ranging from 0 to 120 [41]. This measure assesses distress and avoidance instead of fear of particular situations. The abbreviated 11-item version of the Penn State Worry Questionnaire (PSWQ) was used to assess pathological worry and general anxiety [42]. Answers to this questionnaire were given on a 5-point Likert scale (1–5), with a sum score ranging from 11 to 55 points.

Covariates

Sociodemographic and clinical covariates used for the analyses were self-reported sex, age, level of education (in years), BMI, smoking status (current/not current), and lifetime DSM IV-based alcohol dependency or abuse as measured using the Composite International Diagnostic Interview (CIDI; WHO version 2.1). The CIDI, which is a diagnostic interview based on the criteria of the DSM-IV, was also used to diagnose depressive (i.e., major depressive disorder and dysthymia) and anxiety disorders (i.e., panic disorder, social phobia, generalized anxiety disorder and agoraphobia). The CIDI was used to assess remitted or current disorders in the preceding 6 months at both baseline and 4-year follow-up. The CIDI shows high interrater reliability [43] and high test-retest reliability [44].

Statistical analyses

The main analyses used the CTI indices to reduce the chance of reverse causation. Baseline sociodemographic and clinical characteristics were summarized across the childhood trauma index (i.e., score 0, 1–3 and 4–8), using analysis of variance (ANOVA) for continuous variables and chi-squared tests for categorical variables.

ANOVA was used to compare the mean levels of the continuous variable trait anger, and chi-squared tests were used to compare the prevalence of the dichotomous variables anger attacks, borderline personality traits, and antisocial personality traits across the childhood trauma index. These analyses were repeated and adjusted for sex, age, level of education, BMI, smoking, alcohol dependency or abuse, and disorder status using analysis of covariance (ANCOVA) and multivariable logistic regression analyses.

We used a table and forest plot to show the results from the effects of the CTI (i.e., presence of childhood life events and the four CT types [i.e., emotional neglect, psychological, physical, or sexual abuse]) on the different anger measures, through logistic regression analysis (with 95% CI). The total trait anger score was dichotomized using the 75th percentile as a cut-off, representing a high trait anger score (cutoff ≥ 18). Logistic regression analyses were performed to examine the associations between the presence of childhood life events with a childhood life events index > 1 and different types of CT (i.e., emotional neglect, psychological abuse, physical abuse, and sexual abuse) measured at baseline, and the outcome anger measures obtained at 4-year follow-up. The analyses were repeated adjusting for sex, age, level of education, BMI, smoking, alcohol dependency or abuse, and disorder status (i.e., current depressive disorder and current anxiety disorder) using multivariable logistic regression.

A correlation analysis was performed establishing the correlation coefficients between the childhood life event index, childhood trauma index, CTQ-SF, anger measures (i.e., trait anger, anger attacks, borderline personality traits, and antisocial personality traits), and symptom severity measures (i.e., IDS-SR, BAI, PSWQ, FQ). To present the correlations in an intuitive manner, the data was visualized as a heat plot.

Regression analyses were repeated cross-sectionally, using the CTQ-SF. The CTQ-SF total score was categorized into three severity groups. The associations between the CTQ-SF and outcome anger measures were first tested in an unadjusted model using ANOVA and chi-squared tests. Subsequently, ANCOVA and multivariable logistic regression analyses were performed adjusting for the previously mentioned covariates.

As negative affect may enhance the recollection of negative experiences [45], we also performed sensitivity analyses. We repeated the main analyses using the childhood trauma index at baseline and the anger measures at 4-year follow-up excluding participants with a current depressive and/or anxiety disorder at baseline (Fig. 1). A two-tailed $p < 0.05$ was considered statistically significant. Analyses were performed using IBM SPSS statistical software (version 25, IBM Corp) and the R statistical software, version 4.0.3 (R Foundation for Statistical Computing, Vienna, Austria 2016. URL: https://www.R-project.org/).

Results

Sample characteristics

The mean age of the participants (*N* = 2271) was 42.1 years, and 66.2% were female. Table 1 shows the sample characteristics categorized according to the childhood trauma index. As shown here, participants with a higher childhood trauma score were significantly more often female, older, had less years of education, a higher BMI, were more often smokers, and more often suffered from alcohol dependency or abuse compared to participants with low childhood trauma scores. A higher childhood trauma score was associated with a current diagnosis of depression, both with and without a comorbid anxiety disorder, but the childhood trauma score was not associated with pure anxiety disorder. Furthermore, a higher childhood trauma score was associated with higher scores on depression and anxiety severity scales, and the use of benzodiazepines and antidepressants.

Table 1. Characteristics of the study sample (*N* = 2271) at baseline according to childhood trauma index

	Childhood trauma score			
	0 (*n* = 1216)	1–3 (*n* = 600)	4–8 (*n* = 455)	*P*-value for trend
Sociodemographics				
Female sex, no. (%)	743 (61.1)	433 (72.2)	328 (72.1)	< 0.001
Age in years, mean (*SD*)	40.6 (13.7)	42.5 (12.5)	45.6 (11.4)	< 0.001
Education in years, mean (*SD*)	12.5 (3.2)	12.7 (3.3)	11.7 (3.3)	< 0.001
BMI, kg/m^2, mean (*SD*)	25.2 (4.7)	25.3 (5.0)	26.6 (5.6)	< 0.001
Smoking, no. (%)	406 (33.4)	206 (34.3)	182 (40.0)	0.019
Lifetime alcohol dependency/abuse, no. (%)	286 (23.5)	166 (27.7)	137 (30.1)	0.003
Clinical characteristics				
Disorder status				
Current depressive disorder, no. (%)	129 (10.6)	81 (13.5)	79 (17.4)	< 0.001
Current anxiety disorder, no. (%)	203 (16.7)	117 (19.5)	89 (19.6)	0.11
Current comorbid disorder, no. (%)	188 (15.5)	153 (25.5)	160 (35.2)	< 0.001
Severity measures				
IDS-SR total score, mean (*SD*)	15.7 (12.5)	21.7 (13.3)	28.2 (13.3)	< 0.001
BAI total score, mean (*SD*)	8.68 (9.2)	11.7 (9.3)	15.6 (10.6)	< 0.001
FQ total score, mean (*SD*)	18.9 (16.4)	25.1 (19.0)	31.4 (21.4)	< 0.001
PSWQ total score, mean (*SD*)	25.7 (13.1)	29.5 (13.9)	31.9 (14.7)	< 0.001
Medication use				
Benzodiazepines, no. (%)	121 (10.0)	103 (17.2)	91 (20.0)	< 0.001
Antidepressants, no. (%)	219 (18.0)	156 (26.0)	160 (35.2)	< 0.001

Note. BMI = Body Mass Index; IDS-SR = Inventory of Depressive Symptomatology, self-report; BAI = Beck Anxiety Inventory; FQ = Fear Questionnaire; PSWQ = Penn State Worry Questionnaire. Data are number (percentage) or mean (SD), when appropriate. *P*-values by ANOVA linear term or Chi square tests (for linear association). Significant at $p < 0.05$.

Anger according to trauma groups

Between-group differences according to childhood trauma index are shown in table 2. A higher childhood trauma score was associated with a higher trait anger score ($p < 0.001$). Additionally, the prevalence of anger attacks ($p < 0.001$), borderline personality traits ($p < 0.001$), and antisocial personality traits ($p = 0.002$) was significantly higher in participants having suffered from childhood trauma compared to those reporting no history of childhood trauma. All associations remained statistically significant in the adjusted models.

Type of childhood trauma associated with anger

Figure 2 shows the (adjusted) odds ratios of different anger measures according to childhood life events and different types of childhood trauma. Childhood life events and all types of CT except sexual abuse were independently associated with trait anger, showing the strongest association with emotional neglect ($OR = 1.42$, $p < 0.001$). Furthermore, emotional neglect ($OR = 1.35$, $p = 0.004$), psychological abuse ($OR = 1.31$, $p = 0.024$) and physical abuse ($OR = 1.48$, $p = 0.004$) were independently associated with anger attacks. All types of CT, but not the childhood life event index, were significantly associated with borderline personality traits, with high ORs regarding emotional neglect ($OR = 1.76$, $p < 0.001$) and psychological abuse ($OR = 1.77$, $p < 0.001$). Last, all trauma measures except for sexual abuse were significantly associated with antisocial personality traits, with the highest OR for physical abuse ($OR = 1.98$, $p = 0.002$). However, it must be noted that only a few ($n = 40$; 1.8%) participants were categorized as having antisocial personality traits.

Correlations between outcomes

Figure 3 shows a heat plot of the correlations between trauma, anger and different severity measures of depression and anxiety. The childhood trauma index and CTQ-SF were strongly correlated ($\rho = 0.686$, $p < 0.001$), but both measures showed only a weak correlation with the childhood life event index. All three trauma measures showed significant but only rather weak correlations with anger outcomes, with a moderately strong correlation between the CTQ-SF and borderline personality traits ($\rho = 0.329$, $p < 0.001$). Childhood life events showed a weak correlation with the BAI (ρ's 0.046, $p = 0.028$), but non-significant correlations with other severity measures (i.e., IDS-SR, FQ, PSWQ). In contrast, the childhood trauma index and the CTQ-SF correlated with all symptom severity measures, with low to moderate correlations.

	n	Unadjusted OR (95% CI)	*P*-value	Adjusted OR (95% CI)	*P*-value
Childhood Life Event Index					
Trait anger	472	1.58 (1.40–1.78)	<0.001	1.41 (1.16–1.72)	0.001
Anger attacks	149	1.25 (0.92–1.70)	0.15	1.20 (0.88–1.64)	0.26
PDQ–4 Borderline	241	1.36 (1.07–1.74)	0.012	1.29 (0.99–1.67)	0.06
PDQ–4 Antisocial	40	2.06 (1.29–3.29)	0.002	1.91 (1.18–3.08)	0.008
Emotional neglect					
Trait anger	472	1.61 (1.44–1.80)	<0.001	1.42 (1.25–1.62)	<0.001
Anger attacks	149	1.54 (1.27–1.87)	<0.001	1.35 (1.10–1.66)	0.004
PDQ–4 Borderline	241	2.05 (1.76–2.39)	<0.001	1.76 (1.49–2.09)	<0.001
PDQ–4 Antisocial	40	2.03 (1.42–2.89)	<0.001	1.88 (1.29–2.74)	0.001
Psychological abuse					
Trait anger	472	1.45 (1.25–1.67)	<0.001	1.28 (1.10–1.49)	.002
Anger attacks	149	1.52 (1.22–1.89)	<0.001	1.31 (1.04–1.65)	0.024
PDQ–4 Borderline	241	2.11 (1.78–2.49)	<0.001	1.77 (1.47–2.13)	<0.001
PDQ–4 Antisocial	40	1.88 (1.29–2.74)	0.001	1.69 (1.13–2.52)	0.011
Physical abuse					
Trait anger	472	1.65 (1.40–1.95)	<0.001	1.37 (1.16–1.62)	<0.001
Anger attacks	149	1.72 (1.36–2.18)	<0.001	1.48 (1.15–1.89)	0.004
PDQ–4 Borderline	241	2.10 (1.74–2.53)	<0.001	1.71 (1.39–2.09)	<0.001
PDQ–4 Antisocial	40	2.20 (1.50–3.23)	<0.001	1.98 (1.32–2.95)	0.002
Sexual abuse					
Trait anger	472	1.16 (1.00–1.35)	0.052	1.20 (1.04–1.38)	0.15
Anger attacks	149	1.20 (0.95–1.52)	0.13	1.15 (0.89–1.48)	0.36
PDQ–4 Borderline	241	1.45 (1.21–1.73)	<0.001	1.33 (1.09–1.62)	0.011
PDQ–4 Antisocial	40	1.13 (0.71–1.79)	0.61	1.21 (0.74–1.99)	0.54

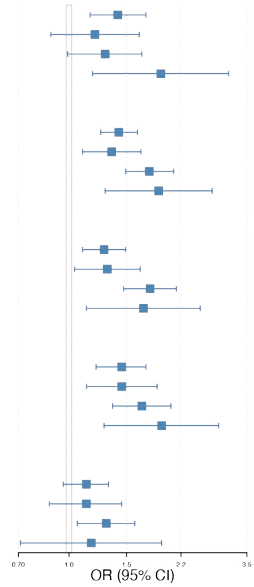


Fig. 2. The (adjusted) odds ratios of different anger measures according to childhood life events and different types of childhood trauma. Model 1 shows the crude (unadjusted) model. Model 2 adjusted for sex, age, level of education, BMI, smoking, alcohol dependency/abuse, disorder status at baseline.

Post-hoc analyses

Supplementary Table 1 shows the cross-sectional between-group differences according to the CTQ-SF. The associations between CT and anger measures remained in the cross-sectional analyses, with a higher score on the CTQ-SF corresponding to a higher trait anger score ($p < 0.001$). A higher prevalence of anger attacks ($p < 0.001$), borderline personality traits ($p < 0.001$), and antisocial personality traits ($p < 0.001$) was found in participants having suffered from CT compared to those reporting no history of CT. Cross-sectionally, the effect sizes were larger compared to the analyses with the CT measured four years prior to the anger measures.

In sensitivity analyses, we excluded participants with a current depressive and/or anxiety disorder at baseline to check for reporting bias (Table 3). A higher score on the childhood trauma index was associated with a higher trait anger score ($p < 0.001$) and a higher prevalence of borderline personality traits ($p < 0.001$). Childhood trauma score was not associated with anger attacks ($X^2 = 2.47$, $p = 0.12$) and antisocial personality

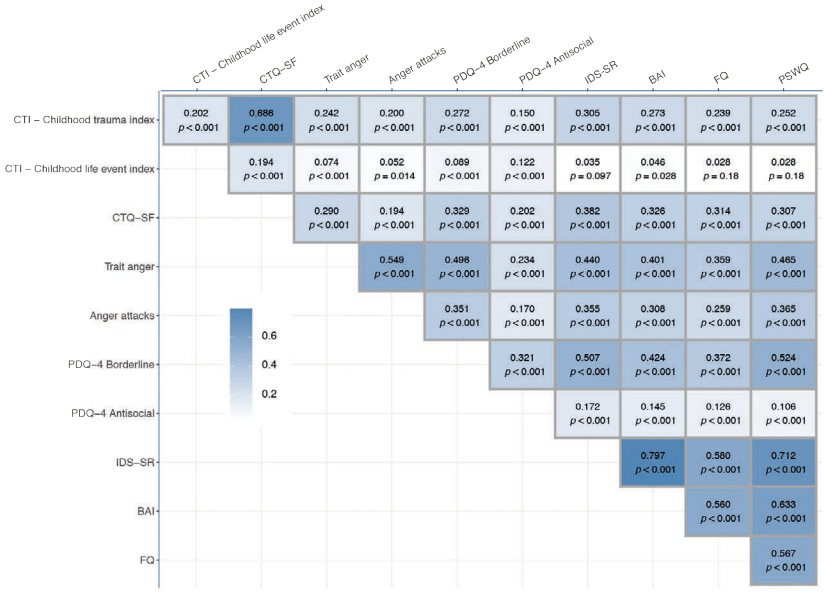


Fig. 3. Heat plot of correlations between childhood trauma (i.e., CTI - Childhood trauma index; CTQ-SF), childhood life events, anger measures (i.e., Trait anger, Anger attacks, PDQ-4 Borderline, PDQ-4 Antisocial), and symptom severity measures (i.e., IDS-SR, BAI, FQ, PSWQ). We used a sum score for the dichotomous variables anger attacks, PDQ-4 Borderline, and PDQ-4 Antisocial using the 5, 9, and 7 items respectively. The darker the color, the stronger the correlation. Non-significant correlations are shown in white. Correlations are presented in Spearman's *ρ*. CTI = Childhood Trauma Interview; CTQ-SF = Childhood Trauma Questionnaire – Short Form; PDQ-4. = Personality Disorder Questionnaire 4; IDS-SR = Inventory of Depressive Symptomatology, self-report; BAI = Beck Anxiety Inventory; FQ = Fear Questionnaire; PSWQ = Penn State Worry Questionnaire.

traits ($X^2 = 1.64$, $p = 0.20$). Due to the exclusion of participants with a current depressive and/or anxiety disorder, only 30 and 6 participants remained with anger attacks and antisocial personality traits respectively and therefore limited the statistical power of the current analysis.

Table 2. Anger outcomes at 4 years according to childhood trauma index at baseline

	Childhood trauma score				
	0 (*n* = 1216)	**1-3 (*n* = 600)**	**4-8 (*n* = 455)**	**Test statistic for trend**	***P*-value for trend**
Trait anger					
Unadjusted means (*SE*)	14.37 (0.12)[a]	15.92 (0.19)[b]	16.85 (0.24)[c]	F(1,2270) = 107.73	< 0.001
Adjusted means (*SE*)	14.56 (0.13)[a]	15.85 (0.18)[b]	16.43 (0.22)[c]	F(1,2270) = 60.64	< 0.001
Anger attacks					
Prevalence of anger attacks (%)	57 (4.7)	42 (7.0)	49 (10.8)	X^2 (1) = 20.05	< 0.001
Unadjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	1.53 (1.01-2.31)[b]	2.45 (1.65-3.65)[c]	Wald(1) = 19.42	< 0.001
Adjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	1.34 (0.87-2.05)[a]	1.92 (1.24-2.95)[b]	Wald(1) = 8.64	0.003
Borderline personality traits					
Prevalence (%)	65 (5.3)	77 (12.8)	99 (21.8)	X^2 (1) = 98.00	< 0.001
Unadjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	2.61 (1.84-3.68)[b]	4.92 (3.52-6.88)[c]	Wald (1) = 89.65	< 0.001
Adjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	2.31 (1.60-3.33)[b]	3.66 (2.54-5.29)[c]	Wald (1) = 49.16	< 0.001
Antisocial personality traits					
Prevalence (%)	14 (1.2)	9 (1.5)	16 (3.5)	X^2 (1) = 9.50	0.002
Unadjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	1.31 (0.56-3.04)[a]	3.13 (1.51-6.46)[b]	Wald (1) = 8.95	0.003
Adjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	1.35 (0.56-3.22)[a]	2.92 (1.33-6.44)[b]	Wald (1) = 6.78	0.009

Note. Data are (adjusted) means (with standard errors in parentheses) or number of participants (with percentages in parentheses). Values in the same row with different superscript letters are significantly different, $p < 0.05$ (in post hoc comparisons). Adjusted for sex, age, level of education, BMI, smoking, alcohol dependency/abuse, disorder status at baseline.

Table 3. Sensitivity analyses of anger outcomes according to childhood trauma score at baseline

	Childhood trauma score				
	0 (*n* = 696)	**1-3 (*n* = 249)**	**4-8 (*n* = 127)**	**Test statistic for trend**	***P*-value for trend**
Trait anger					
Unadjusted means (*SE*)	13.39 (0.13)[a]	15.08 (0.27)[b]	15.47 (0.40)[b]	F(1,1071) = 50.68	< 0.001
Adjusted means (*SE*)	13.38 (0.15)[a]	15.09 (0.25)[b]	15.49 (0.35)[b]	F(1,1071) = 49.28	< 0.001
Anger attacks					
Prevalence of anger attacks (%)	14 (2.0)	12 (4.8)	4 (3.1)	X^2 (1) = 2.47	0.12
Unadjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	2.47 (1.12-5.41)[b]	1.58 (0.51-4.89)[b]	Wald(1) = 2.42	0.12
Adjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	2.62 (1.17-5.87)[b]	1.75 (0.54-5.66)[b]	Wald(1) = 2.87	0.09
Borderline personality traits					
Prevalence (%)	7 (1.0)	17 (6.8)	8 (6.3)	X^2 (1) = 21.42	< 0.001
Unadjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	7.21 (2.95-17.61)[b]	6.62 (2.36-18.59)[c]	Wald (1) = 18.57	< 0.001
Adjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	8.33 (3.32-20.90)[b]	8.94 (2.93-27.30)[c]	Wald (1) = 20.64	< 0.001
Antisocial personality traits					
Prevalence (%)	3 (0.4)	1 (0.4)	2 (1.6)	X^2 (1) = 1.64	0.20
Unadjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	0.93 (0.10-9.00)[a]	3.70 (0.61-22.34)[a]	Wald (1) = 1.54	0.21
Adjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	1.15 (0.11-11.46)[a]	5.02 (0.67-37.70)[a]	Wald (1) = 1.97	0.16

Note. Data are (adjusted) means (with standard errors in parentheses) or number of participants (with percentages in parentheses). Values in the same row with different superscript letters are significantly different, $p < 0.05$ (in post hoc comparisons). Adjusted for sex, age, level of education, BMI, smoking, alcohol dependency/abuse, disorder status at baseline.

Discussion

This study aimed to examine the association between CT and several anger outcomes. Our findings indicate that a history of CT is associated with higher levels of trait anger, and a higher prevalence of anger attacks, borderline-, and antisocial personality traits in adulthood. All types of CT except for sexual abuse were associated with trait anger, anger attacks and antisocial personality traits, independently of depression and anxiety. Additionally, all types of CT were significantly associated with borderline personality traits.

Our findings support prior cross-sectional and longitudinal studies that found an association between CT and different anger outcomes in adulthood [11-14, 18, 19], including a dose-response relationship between CT and anger. A higher score for CT, both due to a higher frequency or more types of CT, are associated with higher anger scores [12-14]. However, most of these studies included non-clinical volunteers or adults without a history of psychopathology who had been placed in residential care as a child [17-19]. A recent study conducted among participants with psychopathology found trait anger to be an important mediator between CT and later psychopathology [21], though it did not consider other anger outcomes than trait anger. The potential relationship with other anger outcomes like anger attacks, in particular in the context of psychopathology, has received much less attention, yet it has been suggested that different forms of CT may affect the development of anger and aggression differently [46].

In that light, our study elaborates on previous research that found distinct effects of subtypes of abuse on emotion regulation difficulties in adulthood [47, 48]. The current findings show that emotional neglect predominates in the prediction of both trait anger and borderline personality traits, whereas physical abuse predominates in the prediction of anger attacks and antisocial personality traits. Neglect occurs in case a caregiver is not sensitive to the emotions of a child, causing a lack of emotional validation and emotional interactions. Hence, neglect may lead to disorganized attachment, rejection sensitivity, and impaired emotion regulation [49], which is linked to symptoms of borderline personality disorder (BPD), amongst others [50]. The negative impact of emotional abuse and neglect on anger was also found in previous studies [11-13, 19]. While neglect may result in difficulties in the regulation of emotions, physical abuse may result in hypervigilance to threat. Hypervigilance to threat could be an adaptation to the exposure of physical abuse, learning children to be attentive to threat-related signals. This was confirmed by children with a history of physical abuse who displayed a response bias for angry facial expressions [51]. The heightened sense of awareness of

the emotional state of a parent can lead to an earlier perception of threat in later life and to a defense system more 'ready' to respond lowering the threshold to experience anger [8]. Additionally, children who are exposed to physical abuse are at higher risk of becoming perpetrators themselves by modelling [9]. It should be noted though that perpetrators of physical abuse and physical and emotional neglect are often the parents of those afflicted, whereas most studies, including the current one, cannot differentiate between the effects of environmental and hereditary factors. Interestingly, the current study found sexual abuse to be only associated with borderline personality traits, but not with other anger outcomes. These findings could be explained in the light of previous studies which demonstrated that survivors of childhood sexual abuse had a heightened sense of interpersonal rejection sensitivity [52]. This may lead to the suppression of anger, as expressing anger might drive others away from the individual. Thus, the current results highlight the importance of considering different childhood trauma subtypes and their long-term effects on emotion regulation, more specifically the regulation of anger.

Our findings may yield anchor points for appropriate treatment. In clinical practice, it is important to explain and validate the relationship between childhood trauma and anger in adulthood, as psychoeducation is an essential constituent of the approaches to reduce symptoms of anger [53]. Unfortunately, emotion regulation difficulties and impulsive behavior are often viewed upon as limiting factors in trauma-focused therapy, thinking it may worsen these symptoms. As a result, it could be that patients are prevented from receiving a beneficial additive treatment. A meta-analysis that included those that had experienced childhood trauma did not find symptom complexity to be a contraindication for trauma-focused psychological interventions [54]. Moreover, trauma-focused treatments including eye movement desensitization and reprocessing (EMDR) have been found to be effective in the reduction of anger in patients suffering from PTSD [55]. As for pharmacotherapy, antidepressants were found to be effective in the treatment of anger [56], although some studies indicate that pharmacotherapy is less efficacious in depressive patients with a history of childhood trauma compared to their counterparts having no history of childhood trauma [57, 58]. On the contrary, a recent meta-analysis in patients with major depressive disorder found symptom improvement after pharmacotherapy regardless of their exposure to childhood trauma, yet did not take into account residual symptoms including anger [59]. To sum up, we believe that optimal and long-lasting treatment effects should include the exploration of childhood traumatic experiences and anger in adulthood.

One of the strengths of the current study is the inclusion of a large number of participants that oversampled patients with (preceding) depressive and anxiety disorders. Furthermore, all domains of CT and childhood life events were assessed using a structured interview. Even though retrospective and subjective data collection of CT is sensitive for recall bias, a structured interview is considered the 'gold standard' [60]. In addition, four anger outcomes were included, which differentiate between individuals with an angry disposition (embedded in personality) and individuals responding angrily to an immediate situation. In our main analyses, trauma and anger data were assessed four years apart, to reduce the chance of reverse causation as current anger may influence the appraisal of childhood experiences. Limitations, however, include that anger outcomes were only assessed once. As we also could not differentiate between environmental and hereditary effects, it was not possible to draw firm conclusions about the causality of CT in the onset and development of anger in adulthood. Second, only a few participants showed self-report evidence of antisocial personality traits, which limited the statistical power for this outcome. Third, the current study did not take into account certain psychiatric disorders that often display anger as a part of the disorder symptoms, with PTSD being of particular importance [61]. Although the prevalence of PTSD was high in the current sample [62], we did not adjust for PTSD due to the risk of overadjustment. Fourth, participants with a current disorder could have a different recollection of CT, yet previous research did not find such a relationship [63].

In summary, our findings confirm that those who have experienced CT are at increased risk of emotions of anger. In order to stop the cycle of abuse [64, 65], it is important that clinicians are aware of this relationship, explore adverse childhood experiences and start trauma-focused therapeutic interventions when appropriate. Twin and adoption studies may help to disentangle the complex effects of genetic vulnerability and traumatic childhood experiences on the development of the complex psychological constructs and behaviors associated with anger.

Acknowledgments

The infrastructure for the NESDA study (www.nesda.nl) is funded through the Geestkracht program of the Netherlands Organization for Health Research and Development (ZonMw, grant number 10-0001002) and financial contributions by participating universities and mental health care organizations (VU University Medical Center, GGZ inGeest, Leiden University Medical Center, Leiden University, GGZ Rivierduinen, University Medical Center Groningen, University of Groningen, Lentis, GGZ Friesland, GGZ Drenthe, Dimence, Rob Giel Onderzoekscentrum).

References

1. McKay MT, Cannon M, Chambers D, Conroy RM, Coughlan H, Dodd P, et al. Childhood trauma and adult mental disorder: A systematic review and meta-analysis of longitudinal cohort studies. *Acta psychiatrica Scandinavica.* 2021;143(3):189-205.
2. World Health Organization. Report of the consultation on child abuse prevention, 29-31 March 1999, WHO, Geneva. World Health Organization; 1999.
3. Schellingerhout R, Ramakers, C. Scholierenonderzoek Kindermishandeling 2016. Nijmegen: ITS, Radboud Universiteit Nijmegen; 2017.
4. Pinheiro PS. World report on violence against children. 2006.
5. Kuzminskaite E, Penninx BWJH, van Harmelen A-L, Elzinga BM, Hovens JGFM, Vinkers CH. Childhood Trauma in Adult Depressive and Anxiety Disorders: An Integrated Review on Psychological and Biological Mechanisms in the NESDA Cohort. *Journal of affective disorders.* 2021;283:179-91.
6. Panagou C, MacBeth A. Deconstructing pathways to resilience: A systematic review of associations between psychosocial mechanisms and transdiagnostic adult mental health outcomes in the context of adverse childhood experiences. *Clinical psychology & psychotherapy.* 2022;29(5):1626-54.
7. Wang X, Zhao F, Yang J, Gao L, Li B, Lei L, et al. Childhood Maltreatment and Bullying Perpetration among Chinese Adolescents: A Moderated Mediation Model of Moral Disengagement and Trait Anger. *Child abuse & neglect.* 2020;106:104507.
8. Zhu W, Chen Y, Xia L. Childhood maltreatment and aggression: The mediating roles of hostile attribution bias and anger rumination. *Personality and Individual Differences.* 2020;162:110007.
9. Ryan G. Preventing Violence and Trauma in the Next Generation. *Journal of Interpersonal Violence.* 2005;20(1):132-41.
10. Anderson CA, Bushman BJ. Human Aggression. Annual Review of Psychology. 2002;53(1):27-51.
11. Tang LN, Ye XZ, Yan QG, Chang HJ, Ma YQ, Liu DB, et al. Factors associated with trait anger level of juvenile offenders in Hubei province: A binary logistic regression analysis. *J Huazhong Univ Sci Technolog Med Sci.* 2017;37(1):20-4.
12. Sudbrack R, Manfro PH, Kuhn IM, de Carvalho HW, Lara DR. What doesn't kill you makes you stronger and weaker: how childhood trauma relates to temperament traits. *Journal of psychiatric research.* 2015;62:123-9.
13. Teicher MH, Samson JA, Polcari A, McGreenery CE. Sticks, stones, and hurtful words: relative effects of various forms of childhood maltreatment. *The American journal of psychiatry.* 2006;163(6):993-1000.
14. Adler AB, LeardMann CA, Roenfeldt KA, Jacobson IG, Forbes D. Magnitude of problematic anger and its predictors in the Millennium Cohort. *BMC Public Health.* 2020;20(1):1168.
15. Springer KW, Sheridan J, Kuo D, Carnes M. Long-term physical and mental health consequences of childhood physical abuse: results from a large population-based sample of men and women. *Child Abuse Negl.* 2007;31(5):517-30.
16. Cowell W, Taing L, Askowitz T, Bosquet Enlow M, Hacker MR, Wright RJ. Associations of Maternal Trait Anger Expression and Lifetime Traumatic and Non-traumatic Experiences with Preterm Birth. *Matern Child Health J.* 2021;25(4):635-44.

17. Glück TM, Knefel M, Lueger-Schuster B. A network analysis of anger, shame, proposed ICD-11 post-traumatic stress disorder, and different types of childhood trauma in foster care settings in a sample of adult survivors. *Eur J Psychotraumatol.* 2017;8(sup3):1372543.
18. Herrenkohl TI, Klika JB, Herrenkohl RC, Russo MJ, Dee T. A prospective investigation of the relationship between child maltreatment and indicators of adult psychological well-being. *Violence Vict.* 2012;27(5):764-76.
19. van Vugt E, Lanctôt N, Paquette G, Collin-Vézina D, Lemieux A. Girls in residential care: from child maltreatment to trauma-related symptoms in emerging adulthood. *Child Abuse Negl.* 2014;38(1):114-22.
20. de Bles NJ, Rius Ottenheim N, van Hemert AM, Putz LEH, van der Does AJW, Penninx B, et al. Trait anger and anger attacks in relation to depressive and anxiety disorders. *J Affect Disord.* 2019;259:259-65.
21. Win E, Zainal NH, Newman MG. Trait anger expression mediates childhood trauma predicting for adulthood anxiety, depressive, and alcohol use disorders. *Journal of affective disorders.* 2021;288:114-21.
22. Newman CF. When Clients' Morbid Avoidance and Chronic Anger Impede Their Response to Cognitive-Behavioral Therapy for Depression. *Cogn Behav Pract.* 2011;18(3):350-61.
23. Erwin BA, Heimberg RG, Schneier FR, Liebowitz MR. Anger experience and expression in social anxiety disorder: Pretreatment profile and predictors of attrition and response to cognitive-behavioral treatment. *Behavior Therapy.* 2003;34(3):331-50.
24. Buckman JEJ, Underwood A, Clarke K, Saunders R, Hollon SD, Fearon P, et al. Risk factors for relapse and recurrence of depression in adults and how they operate: A four-phase systematic review and meta-synthesis. *Clinical psychology review.* 2018;64:13-38.
25. Penninx B, Eikelenboom M, Giltay EJ, van Hemert AM, Riese H, Schoevers RA, et al. Cohort profile of the longitudinal Netherlands Study of Depression and Anxiety (NESDA) on etiology, course and consequences of depressive and anxiety disorders. *Journal of affective disorders.* 2021;287:69-77.
26. de Graaf R, Bijl RV, Ten Have M, Beekman AT, Vollebergh WA. Pathways to comorbidity: the transition of pure mood, anxiety and substance use disorders into comorbid conditions in a longitudinal population-based study. *Journal of affective disorders.* 2004;82(3):461-7.
27. Bernstein DP, Stein JA, Newcomb MD, Walker E, Pogge D, Ahluvalia T, et al. Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse Negl.* 2003;27(2):169-90.
28. Hovens JG, Wiersma JE, Giltay EJ, van Oppen P, Spinhoven P, Penninx BW, et al. Childhood life events and childhood trauma in adult patients with depressive, anxiety and comorbid disorders vs. controls. *Acta Psychiatr Scand.* 2010;122(1):66-74.
29. Wiersma JE, Hovens JG, van Oppen P, Giltay EJ, van Schaik DJ, Beekman AT, et al. The importance of childhood trauma and childhood life events for chronicity of depression in adults. *J Clin Psychiatry.* 2009;70(7):983-9.
30. Spinhoven P, Penninx BW, Hickendorff M, van Hemert AM, Bernstein DP, Elzinga BM. Childhood Trauma Questionnaire: factor structure, measurement invariance, and validity across emotional disorders. *Psychol Assess.* 2014;26(3):717-29.

31. Van der Ploeg HM, Defares P.B., Spielberger C.D. Handleiding bij de Zelf-Analyse Vragenlijst ZAV. Een vragenlijst voor het meten van boosheid en woede als toestand en als dispositie. Manual for the Self-Analysis questionnaire, a Dutch adaptation of the Spielberger State-Trait Anger Scale. Lisse: Swets & Zeitlinger; 1982.
32. Spielberger CD. Preliminary Manual for the State-Trait Anger Scale (STAS). 1980.
33. Fava M, Rosenbaum JF, McCarthy M, Pava J, Steingard R, Bless E. Anger attacks in depressed outpatients and their response to fluoxetine. *Psychopharmacology bulletin.* 1991;27(3):275-9.
34. Fava M, Anderson K, Rosenbaum JF. "Anger attacks": possible variants of panic and major depressive disorders. *The American journal of psychiatry.* 1990;147(7):867-70.
35. Fava M, Rosenbaum JF. Anger attacks in patients with depression. *J Clin Psychiatry.* 1999;60 Suppl 15:21-4.
36. Hyler SE, Rieder R.O., Williams J.B.W. Spitzer, R.L. Hendler, J. & Lyons M. . The Personality Diagnostic Questionnaire: Development and Preliminary Results. *Journal of Personality Disorders.* 1988;2(3):229–37.
37. APA. Diagnostic and Statistical Manual of Mental Disorders 4th Edition (DSM-IV). Washington D.C.1994.
38. Okada M, Oltmanns TF. Comparison of Three Self-Report Measures of Personality Pathology. *J Psychopathol Behav Assess.* 2009;31(4):358-67.
39. Rush AJ, Gullion CM, Basco MR, Jarrett RB, Trivedi MH. The Inventory of Depressive Symptomatology (IDS): psychometric properties. *Psychol Med.* 1996;26(3):477-86.
40. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. *Journal of consulting and clinical psychology.* 1988;56(6):893-7.
41. Marks IM, Mathews AM. Brief standard self-rating for phobic patients. Behav Res Ther. 1979;17(3):263-7.
42. Meyer TJ, Miller ML, Metzger RL, Borkovec TD. Development and validation of the Penn State Worry Questionnaire. *Behav Res Ther.* 1990;28(6):487-95.
43. Wittchen HU, Robins LN, Cottler LB, Sartorius N, Burke JD, Regier D. Cross-cultural feasibility, reliability and sources of variance of the Composite International Diagnostic Interview (CIDI). The Multicentre WHO/ADAMHA Field Trials. *The British journal of psychiatry : the journal of mental science.* 1991;159:645-53, 58.
44. Wacker HR, Battegay, R., Mullejans, R., & Schlosser, C. . Using the CIDI-C in the general population. In: C. N. Stefanis ADR, & C. R. Soldatos, editor. Psychiatry: A world perspective. Amsterdam: Elsevier Science Publishers; 2006. p. 138-43.
45. Marsh C, Hammond MD, Crawford MT. Thinking about negative life events as a mediator between depression and fading affect bias. *PloS one.* 2019;14(1):e0211147-e.
46. Lee V, Hoaken PN. Cognition, emotion, and neurobiological development: mediating the relation between maltreatment and aggression. *Child Maltreat.* 2007;12(3):281-98.
47. Zhou X, Zhen R. How do physical and emotional abuse affect depression and problematic behaviors in adolescents? The roles of emotional regulation and anger. *Child Abuse Negl.* 2022;129:105641.
48. Cheng P, Langevin R. Unpacking the effects of child maltreatment subtypes on emotional competence in emerging adults. *Psychol Trauma.* 2022.
49. De Wolf M. Psychoanalytische theorievorming en de DSM-5. Ontwikkeling en. 2015.

50. Linehan MM. Cognitive-behavioral treatment of borderline personality disorder. New York, NY, US: Guilford Press; 1993. xvii, 558-xvii, p.
51. Pollak SD, Cicchetti D, Hornung K, Reed A. Recognizing emotion in faces: developmental effects of child abuse and neglect. *Developmental psychology.* 2000;36(5):679-88.
52. Luterek JA, Harb GC, Heimberg RG, Marx BP. Interpersonal rejection sensitivity in childhood sexual abuse survivors: mediator of depressive symptoms and anger suppression. *J Interpers Violence.* 2004;19(1):90-107.
53. Coon DW, Thompson L, Steffen A, Sorocco K, Gallagher-Thompson D. Anger and depression management: psychoeducational skill training interventions for women caregivers of a relative with dementia. *The Gerontologist.* 2003;43(5):678-89.
54. Ehring T, Welboren R, Morina N, Wicherts JM, Freitag J, Emmelkamp PM. Meta-analysis of psychological treatments for posttraumatic stress disorder in adult survivors of childhood abuse. *Clinical psychology review.* 2014;34(8):645-57.
55. Stapleton JA, Taylor S, Asmundson GJ. Effects of three PTSD treatments on anger and guilt: exposure therapy, eye movement desensitization and reprocessing, and relaxation training. *Journal of traumatic stress.* 2006;19(1):19-28.
56. Bond AJ. Antidepressant treatments and human aggression. *Eur J Pharmacol.* 2005;526(1-3):218-25.
57. Nelson J, Klumparendt A, Doebler P, Ehring T. Childhood maltreatment and characteristics of adult depression: Meta-analysis. *The British Journal of Psychiatry.* 2017;210(2):96-104.
58. Nanni V, Uher R, Danese A. Childhood Maltreatment Predicts Unfavorable Course of Illness and Treatment Outcome in Depression: A Meta-Analysis. *American Journal of Psychiatry.* 2012;169(2):141-51.
59. Kuzminskaite E, Gathier AW, Cuijpers P, Penninx BWJH, Ammerman RT, Brakemeier E-L, et al. Treatment efficacy and effectiveness in adults with major depressive disorder and childhood trauma history: a systematic review and meta-analysis. *The Lancet Psychiatry.* 2022;9(11):860-73.
60. Paivio SC. Stability of retrospective self-reports of child abuse and neglect before and after therapy for child abuse issues. *Child Abuse Negl.* 2001;25(8):1053-68.
61. APA. Diagnostic and Statistical Manual of Mental Disorders, 5th ed. Washington, DC: American Psychiatric Association; 2013.
62. van den Berg LJM, Tollenaar MS, Spinhoven P, Penninx B, Elzinga BM. A new perspective on PTSD symptoms after traumatic vs stressful life events and the role of gender. *Eur J Psychotraumatol.* 2017;8(1):1380470.
63. Hardt J, Rutter M. Validity of adult retrospective reports of adverse childhood experiences: review of the evidence. *Journal of child psychology and psychiatry, and allied disciplines.* 2004;45(2):260-73.
64. Mielke EL, Neukel C, Fuchs A, Hillmann K, Zietlow AL, Bertsch K, et al. The Cycle of Abuse: Emotional Availability in Resilient and Non-Resilient Mothers with Early Life Maltreatment. *Psychopathology.* 2020;53(5):298-305.
65. Widom CS. The Cycle of Violence. *Science.* 1989;244(4901):160-6.

Supplementary Table 1. Cross-sectional anger outcomes according to CTQ-SF at 4-year follow-up

	Childhood trauma score				
	0 (*n* = 783)	**1-3 (*n* = 762)**	**4-8 (*n* = 726)**	**Test statistic for trend**	***P*-value for trend**
Trait anger					
Unadjusted means (*SE*)	13.86 (0.14)[a]	15.17 (0.17)[b]	16.92 (0.19)[c]	F(1,2270) = 165.94	< 0.001
Adjusted means (*SE*)	14.13 (0.16)[a]	15.20 (0.16)[b]	16.59 (0.17)[c]	F(1,2270) = 104.66	< 0.001
Anger attacks					
Prevalence of anger attacks (%)	26 (3.3)	51 (6.7)	71 (9.8)	X^2 (1) = 25.83	< 0.001
Unadjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	2.09 (1.29-3.39)[b]	3.16 (1.99-5.01)[c]	Wald(1) = 24.75	< 0.001
Adjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	1.86 (1.14-3.05)[b]	2.43 (1.50-3.94)[c]	Wald(1) = 12.78	< 0.001
Borderline personality traits					
Prevalence (%)	24 (3.1)	59 (7.7)	158 (21.8)	X^2 (1) = 137.09	< 0.001
Unadjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	2.65 (1.63-4.31)[b]	8.80 (5.65-13.70)[c]	Wald (1) = 117.34	< 0.001
Adjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	2.26 (1.37-3.73)[b]	6.77 (4.26-10.77)[c]	Wald (1) = 80.62	< 0.001
Antisocial personality traits					
Prevalence (%)	7 (0.9)	4 (0.5)	28 (3.9)	X^2 (1) = 18.98	< 0.001
Unadjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	0.58 (0.17-2.01)[a]	4.45 (1.93-10.24)[b]	Wald (1) = 16.44	< 0.001
Adjusted odds ratio (*OR, 95%CI*)	1.0, Ref.[a]	0.46 (0.13-1.61)[a]	3.54 (1.46-8.60)[b]	Wald (1) = 12.08	0.001

Note. Data are (adjusted) means (with standard errors in parentheses) or number of participants (with percentages in parentheses). Values in the same row with different superscript letters are significantly different, $p < 0.05$ (in post hoc comparisons). Adjusted for sex, age, level of education, BMI, smoking, alcohol dependency/abuse, disorder status at baseline.