The Interplay of Childhood Adversity, Resilience, Gender, and Anxiety: Investigating

Protective and Risk Factors for the Development of Psychopathology

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Abstract

Background. Anxiety symptoms are increasingly prevalent in the general population, with adverse childhood experiences (ACEs) emerging as significant risk factors. However, specific influences of ACE subtypes and gender on anxiety, necessary to accurately assess related risk and protective factors remain underexplored. Additionally, the impact of ACEs on resilience and anxiety, suggests a potential mediation towards this association.

Aim. This study aims to investigate the independent effects of gender and resilience on the association between ACEs and anxiety, as well as to examine differences in effect among ACE subtypes.

Methods. 57 participants (M = 24 years) completed self-report questionnaires, including the Childhood Trauma Questionnaire (CTQ), the Brief Resilience Scale (BRS) and the State-Trait Anxiety Inventory (STAI-T) in this cross-sectional study. Multiple linear regression analyses examined the association between the variables and the moderating effects of participants' gender. A mediation analysis was performed to examine the mediating effect of resilience.

Results. The study showed that overall ACE (β = 0.348, p = .002), emotional neglect (β = 0.746, p = .013) and emotional abuse (β = 1.022, p = <.001) were significantly associated with higher scores in anxiety. Other ACE subtypes did not show significant associations. Gender did not significantly moderate these relationships. Furthermore, resilience did not significantly mediate the relationship between overall ACEs and anxiety.

Discussion. The findings highlight the essential role between ACEs and anxiety, specifically for emotional neglect and emotional abuse. Future studies should incorporate longitudinal data and diverse trauma exposures to enhance generalisability and understanding of this interplay.

Keywords:

Childhood Adversity, Abuse, Neglect, Resilience, Anxiety, Gender, Psychopathology

The Interplay of Childhood Adversity, Resilience, Gender, and Anxiety: Investigating Protective and Risk Factors for the Development of Psychopathology

1. Introduction

In recent years, the prevalence of *anxiety* has increased to unprecedented levels. In 2019 around 301 million people experienced anxiety disorders, making it the most prominent mental disorder worldwide (World Health Organization [WHO], 2022). Further, an increase in subthreshold anxiety, which does not meet full diagnostic criteria but still significantly impacts quality of life, leading to distress and impairment (Karsten et al., 2011), was observed, with a prevalence rate of 11.4% in 2018 (Bosman et al., 2019). This rise in anxiety, both clinical and subthreshold levels, has underscored the critical need for a more nuanced understanding of mental health development and the underlying factors in the general population (WHO, 2019). These factors range from protective ones, that support mental health, to risk factors that increase susceptibility, that may shape life circumstances (Dailey et al., 2022). Further understanding the dynamics is crucial to identify at-risk individuals among the general population, and to tailor future interventions to mitigate the negative effects of anxiety.

1.1 Childhood adversity

One risk factor for anxiety is *adverse childhood experiences* (ACE), as childhood experiences are found to influence later development and people´s mental health (Cicchetti & Toth, 2009). Childhood adversity encompasses a broad spectrum of situations that might seriously compromise a child´s physical or mental health before age 18 (Bartlett & Sacks, 2019). This includes any form or exposure to physical or emotional maltreatment, sexual abuse, neglect, or exploration that causes actual or potential harm to a child´s health, survival, development, or dignity, within the social or familial context (WHO, 2020). The most common types are parental death and physical abuse. Around two-thirds of all children encounter some kind of adversity (Kessler et al., 2010). Furthermore, most people who experienced one form of childhood trauma usually experienced another form (Kessler et al., 2010).

Previous studies identified five common subtypes of retrospective ACEs: *emotional abuse, physical abuse, sexual abuse, physical neglect,* and *emotional negle*ct (Centers for Disease Control and Presentation [CDCP], n.d.). *Neglect* is associated with the lack to provide emotional and physical care for a child. *Abuse* encompasses intentional harmful actions experienced by the child. Differences are made between violence due to physical force (physical abuse), forms of violation or exploration of the child (sexual abuse), as well

as causing distress or harming children´s self-worth (emotional abuse) (American Psychological Association [APA], n.d.; CDCP, n.d.). These experiences can have long-term mental health consequences, emphasising the importance of understanding their impacts.

1.2 Consequences of Childhood Adversities: Influence towards Mental Health

Research shows that exposure to ACEs during childhood negatively impacts adult well-being, increasing the likelihood of mental and physical health problems, and empathizing the lasting effects of early-life traumas (Anda et al., 2006; Herzog & Schmahl, 2018). While the association between ACEs and major depressive disorder is widely accepted, fewer studies focus solely on anxiety symptoms (e.g., Chapman et al., 2004; Poole et al., 2017a; Poole et al., 2017b). Nonetheless, anxiety disorder is the most common mental disorder (WHO, 2022) making the investigation of underlying risk factors a topic of interest. Poole et al. (2017a), for example, found a positive association between ACEs and adult anxiety symptoms.

Current research further examined different associations with various types of ACEs. Significant associations between subtypes of both anxiety and depression were found. All types of ACEs are linked with depressive disorders: sexual abuse, physical abuse, and physical neglect were more strongly associated with anxiety disorder, while emotional abuse and neglect were less so (Gardner et al., 2019). Moreover, are the latter two also lesser studies within research (Gardner et al., 2019). Contrastingly, however, other research highlights that emotional abuse can be particularly damaging, as victims often expect affection and love from the person, making the abuse more emotionally damaging, leading to increased anxiety (Fernandes & Osorio, 2015; Gibb & Alloy, 2006), as well as being associated more to internalising behaviours, compared to other subtypes (Cui & Liu, 2020). Further, the specific mechanisms through which different types of ACE contribute to anxiety are not fully investigated. Physical abuse may cause increased alertness and fear reactions (Shackman et al., 2007), while emotional abuse might cause anxiety due to disturbed attachment, low self-esteem and negative self-perception (Kascakova et al., 2020). Examining the distinct associations various ACE types have with anxiety can reveal new insights into specific risk factors.

1.3 Gender Influences on the Relationship between ACEs and Anxiety

Given that not all individuals exposed to ACEs develop anxiety, prior studies have explored different risk factors, such as *gender*. A systematic review identified being female as a common biological risk factor for the development of psychopathology, including anxiety (Lynch et al., 2021). Furthermore, lifetime prevalence rates of anxiety disorder are

higher for women than men (Kessler et al., 1994), indicating gender differences in anxiety susceptibility. Women are also twice as likely to report past childhood sexual abuse (Stoltenborgh et al., 2015). Further, general patterns of psychopathology differ: women tend to internalise behaviours and exhibit higher anxiety and phobia symptoms, while men tend to externalise problems and are more prone to psychosis spectrum disorders (Liu et al., 2011; Maschi et al., 2008; McConaughy & Skiba, 2019), therefore often experiencing fewer anxiety symptoms. Supporting these findings, Barzilay et al. (2019) reported higher anxiety and phobia symptoms in women exposed to ACEs compared to men exposed to ACE. These insights underscore the general susceptibility women have to develop mental disorders after experiencing ACEs.

Gender differences in specific ACE subtypes reveal stronger associations between certain adversities and psychopathology, more specifically depression, in women (Gardner et al., 2019). Gardner et al. (2019) found that emotional and sexual abuse were significantly linked with psychopathology in women, but not men, while emotional and physical neglect were significantly associated with psychopathology in men, but not women (Gardner et al., 2019; Lindert et al., 2014; Prachason et al., 2023). This highlights the specific sensibility men have for negative consequences following any neglect experiences during childhood. Specifically, physical neglect was associated with higher anxiety (Gardner et al., 2019). Despite these findings, many studies focus broadly on psychopathology or specifically on depression, underscoring the gap for anxiety-focused research, particularly concerning emotional abuse and neglect (Gardner et al., 2019). These forms of abuse may be especially damaging as women who experience emotional or sexual abuse appear more likely to develop anxiety symptoms, potentially due to a tendency to engage in more internalising coping behaviours than men (e.g., Liu et al., 2011).

1.4 Resilience as a Protective Factor

Not only risk factors but also protective factors like *resilience* play a crucial role in the differences in susceptibility after ACEs. Resilience, the ability to adapt to challenging life experiences through mental, emotional, and behavioural flexibility (APA, n.d.), is a key protective factor against mental disorders (Bonanno & Mancini, 2008; Luthar & Cicchetti, 2000). Importantly, resilience can develop post-trauma (Bonanno, 2004), indicating that ACEs might be associated with higher resilience in some individuals. However, a recent study by Park et al. (2023) found contrasting findings, suggesting that childhood trauma leads to lower levels of resilience. Particularly emotional abuse and emotional neglect can hinder this development, while no significant association with sexual abuse was found. This might

be due to ACEs preventing the development of secure attachment and trust, hindering the development of functional coping mechanisms (Citak & Erten, 2021). Hence, the development may be influenced by multiple variables, such as individuals coping strategies or prior mental health status.

Further, studies found that resilience is negatively associated with anxiety symptoms (Hjemdal et al., 2010), suggesting that higher resilience can be linked to reduced anxiety symptoms. Lower resilience has been shown to strengthen the relationship between ACEs and anxiety, indicating that individuals with lower resilience are more prone to emotional dysregulation and anxiety symptoms (Poole et al. 2017b). However, these studies often focus on clinical populations (i.e. individuals with mood disorders such as depression, and bipolar disorder 1 and 2), highlighting the need for research on the general population. Hence, ACEs are associated with varying levels of resilience, which in turn influence anxiety symptoms. By exploring these dynamics, a better understanding of this complex interplay between ACEs, resilience and anxiety can be drawn.

1.5 The Current Study

Within this study, two factors associated with this relationship will be independently investigated: gender and resilience. This aims towards exploring the characteristics of individuals of the general population who might be more at risk towards developing anxiety symptoms. The main aim of the current study is to investigate the relationship between types of ACE, resilience, gender and non-clinical anxiety symptoms. Within the sample adults below the age of 35 are investigated, as this is found to be the usual onset age of mental disorders related to anxiety (Solmi et al., 2022). Therefore, in line with previous research, the research question is: "*To what extent are adverse childhood experiences and specific subtypes of childhood trauma associated with anxiety in the general population, and how do resilience and gender influence this association?*". Based on the reviewed literature, it is expected that:

H1a: Higher levels of overall ACEs are significantly associated with higher anxiety scores.

H1b: Each subtype of childhood adversity (i.e., emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect) is positively associated with higher anxiety scores.

H2:   Emotional abuse will exhibit a stronger positive association with anxiety symptoms compared to the other subtypes.

H3a: The gender of participants moderates the relationship between ACEs and anxiety symptoms, with a stronger association in women.

H3b: Men will show a stronger association between emotional and physical neglect and anxiety symptoms, than women.

H4: Resilience mediates the relationship between ACEs and anxiety, with higher ACE levels associated with lower resilience and higher anxiety scores.

2. Methods

Data from a study by De Calheiros Velozo et al. (2021) was utilised for secondary analysis to investigate the aforementioned research question. The study was part of a larger research project, during which the experience sampling methodology (ESM) was used. For this paper, the focus will lie on relevant measures assessed within the baseline questionnaire.

2.1 Participants

The initial sample consisted of 58 participants, recruited through convenience sampling, via flyers distributed within Leuven (Belgium), as well as online via social media. To be eligible for participation, participants were required to speak Dutch and English fluently and be between 18 and 35 years old, as most mental disorders are developed before this age. Participants with hormonal and/or cardiovascular disorders, ongoing medication, or relevant allergies were excluded. Furthermore, participants who used illicit drugs in the past three months were excluded. The final sample consisted of 57 participants (one excluded due to being an outlier). The study was approved by the Sociaal-Maatshappenlijke Ethische Commissie (SMEC) of KU Leuven (De Calheiros Velozo et al., 2021).

2.2 Procedure

Before taking part in the study, all participants were informed of the purpose of the study and signed an informed consent form. 25 minutes after arrival at the study´s location, participants answered the baseline questionnaire. The baseline questionnaire included multiple demographic data questions (i.e. age, gender, nationality, occupation), followed by multiple scales assessing characteristics of the sample. Relevant to this study were measures assessing childhood adversity, anxiety, as well as resilience of participants. Participants received a 30 Euros reward, after taking part in the study.

2.3 Measures

All scales in the study are self-report questionnaires, that were included in English. Other non-relevant questionnaires were removed from the dataset of this study.

2.3.1 Childhood Adversity

Using the short version of the Childhood Trauma Questionnaire (CTQ) the sample´s experience across a broad range of traumatic childhood experiences was assessed. The questionnaire differentiated between the subscales of physical, emotional, and sexual abuse, as well as physical and emotional neglect, occurring before the age of 18 (Bernstein et al., 2003). In total, 28 items are included, five items for each subscale. The three remaining items accounted for minimization/denial validity. Participants answered along a five-point Likert scale, with 1 representing "Never true" and 5 representing "Very often true", measuring the frequency of occurrences. An example statement included was "People in my family said hurtful or insulting things to me.", assessing emotional abuse experiences. To assess the final score, a sum-total score was calculated, with all items belonging to the subscale of emotional neglect (items five, seven, 13, 19, 28) as well as two physical neglect items (items two and 26) being reversed in the score. Scores are assessed among four categories, namely none, low, moderate and severe levels of abuse, for which the cut-off scores varied, with higher scores indicating more severe levels of childhood adversity (see Appendix B). Final scores range from a minimum of 28 to a maximum of 140. The CTQ showed high internal consistency, with Cronbach's alpha of .90 for the overall scale (Bernstein et al., 2003). In the study at hand, a Cronbach´s alpha of .80 can be reported, indicating good internal consistency.

2.3.2 Anxiety

Participant´s anxiety levels were assessed using the State-Trait Anxiety Inventory – trait version (STAI-T), including 20 items (Spielberger, 1983). Example statements included in the STAI-T are "I feel nervous and restless.". Participants indicated on a four-point Likert scale, ranging from 1 "Almost never" to 4 "Almost always" how they are feeling (Spielberger, 1983). As a total score, a final sum score is calculated, ranging from 20 to 80. STAI scores fall into three categories: "no or low anxiety" (20–37), "moderate anxiety" (38–44), and "high anxiety" (45–80). Prior studies indicated high internal consistency of the scale with Cronbach alpha values of .896 (e.g., Nigussie et al., 2014). Within the current study, a Cronbach´s alpha of .93 can be reported, indicating high internal consistency.

2.3.3 Resilience

The brief resilience scale (BRS) was used to measure participants' ability to recover from stress and adversities. The scale includes six items, answered along a five-point Likert scale, ranging from 1, representing "Strongly disagree", to 5 representing "Strongly agree". An example statement included was "I tend to bounce back quickly after hard times" (Smith et al., 2008). When scoring items two, four, and six are recorded, as they are negatively

worded items. The total score is assessed as a mean score, ranging from a minimum score of one and a maximum score of five, a higher score indicates higher resilience (Smith et al., 2008). Scores between 1.00 to 2.99 suggest low resilience, normal resilience is indicated by scores between 3.00 to 4.30, and high resilience is indicated by scores between 4.31 to 5.00. Across four samples conducted by Smith et al. (2008), Cronbach´s alpha ranged from .80 to .91, indicating good internal consistency. In the current study, a Cronbach´s alpha of .88 indicates good internal consistency as well.

2.4 Data analysis

For the secondary analysis R Studio Version 2023.12.1 was used. Firstly, the dataset was prepared for further analyses, by removing participants who did not complete the questionnaire or did not meet the inclusion and exclusion criteria. Items belonging to other non-relevant scales in the questionnaire were removed from the dataset. Items belonging to the relevant questionnaires for this study were further scored based on relevant guides of the scales as indicated prior. Descriptive statistics, including the mean and standard deviation of relevant variables, were assessed, and frequency tables of participants' scores were created to get an overview of the sample range. Then, the main variables, namely anxiety, resilience and ACE, were checked for any significant outliers, that were out of the range of three standard deviations of the mean.

To investigate the research question and hypotheses multiple linear regression analyses were performed to examine the association between overall ACE (independent variable) and anxiety (dependent variable; hypothesis 1a) and its subtypes (hypothesis 1b & hypothesis 2). To assess the moderation effect of gender and ACEs and anxiety, a linear regression analysis was conducted, with ACE as the independent variable, anxiety as the dependent variable and gender as the predictor variable (hypothesis 3a). For subtype-specific moderation effects, interaction terms between subtypes of ACEs were added to the model (hypothesis 3b). All models were checked for the relevant parametric assumptions, namely linearity, residual independence, homoscedasticity, and residual normality before performing linear regression analysis. If applicable, multicollinearity was investigated by calculating the Variance Inflation Factor (VIF). Linearity was evaluated with scatterplots, homoscedasticity with scatterplots using the fitted and the standardized residuals and the Breusch-Pagan Test. Normality of residuals was assessed using a QQ plot and histograms. Independence of residuals was also assessed using scatterplots. If assumptions were not met, relevant non-parametric alternatives like Spearman's rank correlation test and the Huber-White estimator were used.

For the fourth hypothesis, a mediation analysis was performed, following the outline of Baron and Kenny (1986). Thereby, it was investigated whether the mediating variable resilience affects the relationship between the dependent variable anxiety and the independent variable ACE. The relationship between ACE and anxiety was first investigated using a linear mixed model. Then the association between ACE and resilience was examined with a second model. In a combined model, the effect of resilience on anxiety was evaluated. The Sobel test was used to examine the indirect effects of ACE on anxiety, controlling for resilience. All analyses considered p-values of alpha $< .05$ as significant.

3. Results

3.1 Descriptive information

Before assessing the hypotheses, descriptive statistics of the sample were assessed. The initial sample consisted of 58 participants. One participant was removed from the sample, due to being too much of an outlier, by being outside of the range of three standard deviations of the mean for the CTQ questionnaire, resulting in a final number of 57 participants. The mean age was 24 ($SD = 3.29$), with a reported minimum age of 19 and a maximum of 35 years old. In Table 1, an overview of descriptive statistics of the sample is presented.

Table 1

Characteristics of the Sample (N=57)

	Amount	Percentage
Gender		
Male	9	15.79 %
Female	48	84.21 %
Nationality		
Belgian	49	85.96%
Dutch	4	7.02%
Others	4	7.02%
Marital Status		
Single	15	26.32%
In a relationship	31	54.39%
Married	10	17.54%
Others/ NA	1	1.75%
Education		
NA	1	1.75%
Working	17	29.82%
University students	39	68.42%

Note. The column "Amount" refers to the number of participants reporting among the relevant items.; NA = No Answer

Further, the main characteristics of relevant scales were assessed, which are presented in Tables 2 and 3. Notably, the mean of participants falls into low to moderate anxiety and resilience levels (Smith et al., 2008).

Table 2

Overview and Frequency of Relevant Scales as answered by the Sample (N=57)

Scale	Mean	SD	Var	Min.	Max.
Anxiety (STAI)	38.6	9.65	93.1	21	65
Resilience (BRS)	3.20	0.88	0.78	1.67	5
Childhood Adversity (CTQ)	36.6	11.2	126	26	73
Emotional Abuse	8.77	4.57	20.9	5	24
Sexual Abuse	5.65	2.78	7.73	5	25
Physical Abuse	5.47	1.31	1.72	5	13
Emotional Neglect	9.68	4.22	17.8	5	22
Physical Neglect	6.42	2.05	4.21	5	13

Note. The table displayed descriptive statistics of the relevant scales assessed in the study. SD = Standard Deviation, Var = Variance, Min = Minimum Score, Max. = Maximum Score assessed. The abbreviation in the first column refers to the used scale to assess the variable, STAI = State-Trait Anxiety Inventory, BRS = Brief Resilience Scale, CTQ = Childhood Trauma Questionnaire; The last five columns all indicate subscales of the CTQ.

Table 3

Overview of the indicated level of Anxiety and Resilience of the Sample (N=57)

Level	Anxiety	Resilience
None or Low	26	26
	(45.61%)	(45.61%)
Moderate	17	23
	(29.82%)	(40.35%)
High	14	8
	(24.56%)	(14.04%)

The findings further indicate that the lowest form of ACEs reported was physical abuse ($n = 3$; 5.26%), and the highest reported ACE types were emotional abuse ($n = 20$; 35.09%) and emotional neglect ($n = 24$; 42.11 %), mostly ranging from low to moderate levels of abuse. For those, the mean score also falls into the category of low abuse (see Table 3). Nonetheless, most participants reported no abuse (see Table 4). An overview of the varying cut-off points for the CTQ-Subscales can be found in Appendix A.

Table 4

Overview of the Level of Childhood Adversity indicated by the Sample (N=57)

| Level of abuse	Emotional Abuse	Physical Abuse	Sexual Abuse	Emotional Neglect	Physical Neglect
None	37	54	49	33	41
	(64.91 %)	(94.74 %)	(85.96 %)	(57.89 %)	(71.93 %)
Low	10	2	4	17	10
	(17.54 %)	(3.51 %)	(7.02 %)	(29.82 %)	(17.54 %)
Moderate	5	/	3	1	5
	(8.77 %)		(5.26 %)	(1.75 %)	(8.77 %)
Severe	5	1	1	6	1
	(8.77 %)	(1.75 %)	(1.75 %)	(10.53 %)	(1.75)

3.2 ACEs and Anxiety (H1a & H1b)

For all linear models related to hypothesis 1a and hypothesis 1b, only the assumption of equal variance of residuals was slightly violated, which can be accounted for by the large enough sample size.

The findings indicate a significant positive relationship between overall ACE and anxiety score ($\beta = 0.348$, $SE = 0.106$, $t(55) = 3.282$, $p = .002$). The adjusted R-squared value was 0.1486, suggesting that approximately 14.86% of the variability in anxiety scores was accounted for by overall ACEs. Hence, hypothesis 1a can be accepted (Figure 1).

Figure 1

Scatterplot of the Total Scores of Overall Childhood Adversity and Anxiety
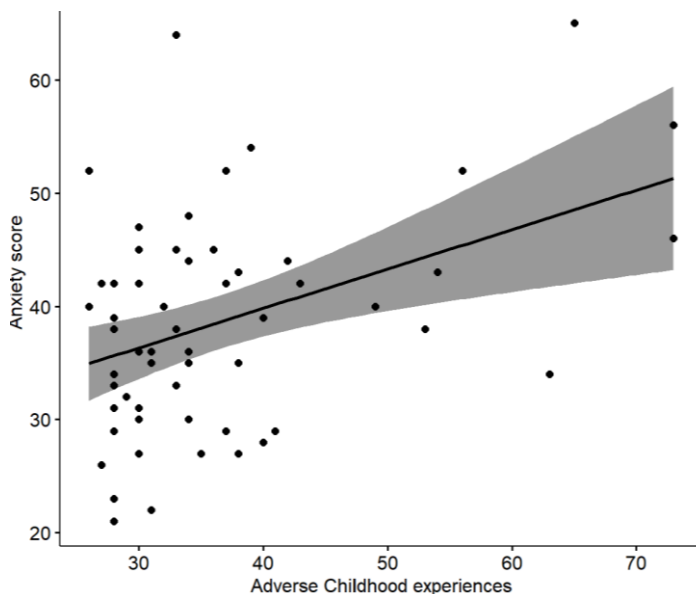
To test hypothesis 1b, separate linear models for each subtype of ACE were created to avoid issues of multicollinearity. The outcome of the analyses is summarised in Table 5. For emotional abuse, as well as emotional neglect, a significant positive association was found (emotional abuse: $\beta = 1.022$, $SE = 00.259$, $t(55) = 4.101$, $p = <.001$; emotional neglect: $\beta = 0.746$, $SE = 0.292$, $t(55) = 2.558$, $p = .013$). For physical abuse, sexual abuse, and physical neglect, no significant associations were found (see Table 5). Therefore, hypothesis 1b should be rejected, as not all types are significantly associated with anxiety.

Table 5

Results of the Analysis for the Subscales of CTQ

	Estimate	Std. Error	t-value	p-value
Emotional Abuse	1.022	0.249	4.101	<.001*
Physical Abuse	1.688	0.966	1.748	.086
Sexual Abuse	0.786	0.456	1.725	.090
Emotional Neglect	0.746	0.292	2.558	.013*
Physical Neglect	0.798	0.625	1.278	.207

Note. * = p <.05, Std. Error = Standard Error.

3.2 Emotional abuse and anxiety (H2)

To investigate hypothesis 2, a linear model was created combining all subtypes into one model. However, issues of multicollinearity were present which can increase the risk of Type 1 error, hence results should be interpreted with caution. Despite this, the model met all other assumptions. Hereby, only emotional abuse showed a significant association with anxiety symptoms ($\beta = 1.4952$, $SE = 0.5051$, $t(51) = 2.960$, $p = .004$), while other subtypes did not significantly predict anxiety (see Table 6).

To further explore hypothesis 2, a second linear regression analysis was done to investigate the interaction effects between emotional abuse and other subtypes on anxiety symptoms, to see whether the subtypes themselves influence the associations. However, none of the interaction terms were significant (see Appendix B). This suggests that the significance of emotional abuse is not significantly dependent on the interaction with other subtypes. Therefore, hypothesis 2 can be accepted.

Table 6

Results of Regression Analysis for the Subtypes of ACEs and Anxiety

	Estimate	Std. Error	t-value	p-value
Intercept	35.5	6.84	5.19	<.001*
Emotional abuse	1.50	.505	2.96	.004*
Physical abuse	- .941	1.18	-.800	.427
Sexual abuse	.138	.466	.295	.769
Emotional neglect	- .367	.463	-.792	.043
Physical neglect	- .322	.654	-.492	.625

Note. Std. Error = Standard Error; * = p <.05

3.3 Influence of Gender on ACE and Anxiety - Moderation Analysis (H3a & H3b)

The model investigating hypothesis 3a violated the assumptions of linearity and homoscedasticity. Hence, the Huber-White estimator was used to assess robust standard errors and address these issues. While the findings again indicated a significant overall effect of ACE towards anxiety (β = 0.7774, *SE* = 0.396, $t(54)$ = 1.961, *p* = .05), the findings suggest that gender does not significantly moderate this relationship (β = 19.35, *SE* = 15.15, $t(54)$ = 1.277, *p* = .207). The interaction effect between childhood trauma and gender was also not significant (β = -0.4588, *SE* = 0.405, $t(54)$ = -1.134, *p* = .262). Therefore, hypothesis 3a can be rejected.

As the regression model assessing hypothesis 3b, combining all childhood adversity types violated the assumption of multicollinearity and equal variance, the Huber-White estimator was again used as a non-parametric alternative. The findings indicate a significant relationship between physical neglect and anxiety (β =6.0132, *SE* = 2.5331, $t(45)$= 2.374, *p* < .05), which are significantly negatively moderated by the gender of participants (β = -6.603, *SE* = 2.62, $t(45)$= -2.520, *p* =.015; see Figure 2), suggesting that the genders influences differ. Emotional neglect is not significantly associated and moderated. Notably, the findings suggest a negative association between sexual abuse and anxiety. Other subtypes are not significantly associated (see Table 7). Therefore, as gender only significantly moderates physical neglect, hypothesis 3b should be rejected.

Table 7

Results of Regression Analysis for Moderating Effects of Gender on the Association between Childhood Adversity Subtypes and Anxiety

	Estimate	Std. Error	t-value	p-value
Intercept	158.555	65.946	2.404	.020*
Emotional abuse	3.111	3.391	.917	.364
Gender	-118.584	66.286	-1.789	.080
Physical abuse	5.654	4.387	1.289	.204
Sexual abuse	-41.412	15.717	-2.635	.012*
Emotional neglect	-.741	2.808	-.264	.793
Physical neglect	6.013	2.533	2.374	.022*
Gender x Emotional abuse	-1.556	3.426	-.454	.652
Gender x Physical Abuse	-7.121	4.538	-1.569	.124
Gender x Sexual Abuse	41.564	15.723	2.644	.011*
Gender x Emotional Neglect	.354	2.844	.125	.901
Gender x Physical Neglect	-6.603	2.620	-2.520	.015*

Note. Std. Error = Standard Error; * = p <.05; values are rounded to three decimal points

Figure 2

Scatterplot of Relationship between Physical Neglect and Anxiety Differentiated by Gender
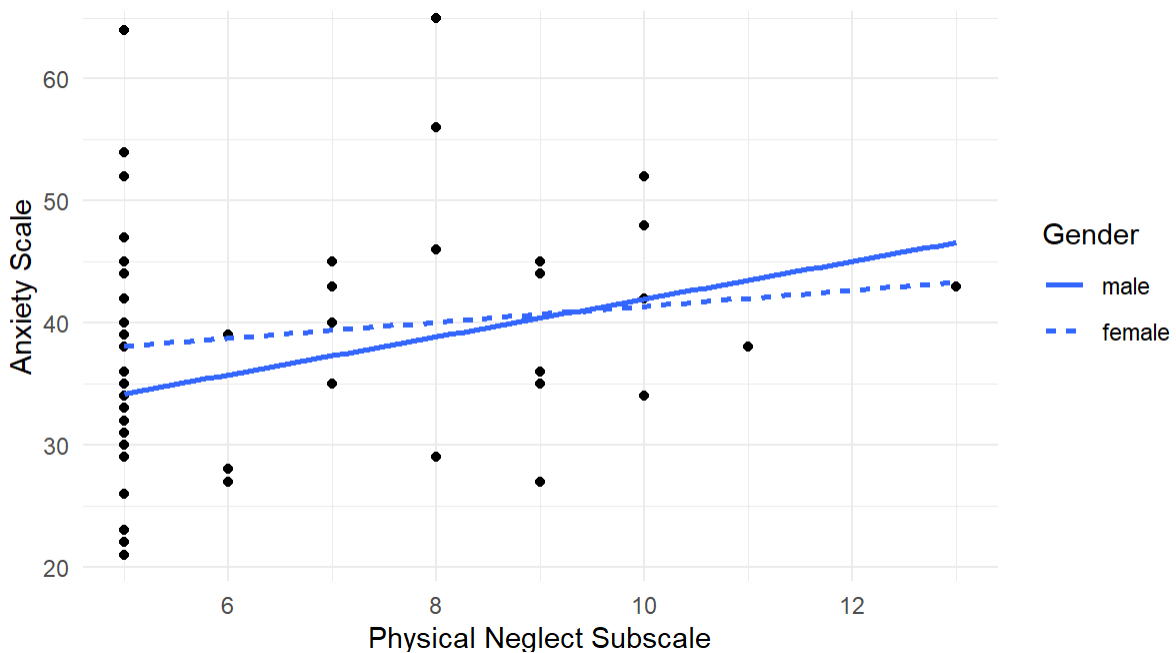

Note. The solid line represents the fitted linear regression line for males, and the dashed line represents females.

3.4 Influence of Resilience on Association of ACE and Anxiety -Mediation Analysis (H4)

When examining hypothesis 4, a significant positive association between ACE and anxiety was identified *(β = 0.348, p = .002)*. The model assessing the association between ACE and resilience was marginally significantly negatively associated *(β = -0.020, p = .054)*. Further, no significant association between resilience and anxiety was found *(β = 0.267, p = 0.900)*. However, when controlling for resilience and investigating the direct effects, a marginally significant weak direct relationship between childhood trauma and anxiety was found *(b = -0.020, 95% CI [-0.040, 0.000], p = .052)*. The Sobel test strengthened these findings (Sobel test statistic = -0.126, *one-tailed p = .450, two-tailed p = .899*) with p-values above .05, suggesting that resilience does not mediate the relationship. Hence, hypothesis 4 can be rejected (see Figure 3).

Figure 3

Mediation Model for the Association Between Resilience towards Childhood Adversity and Anxiety
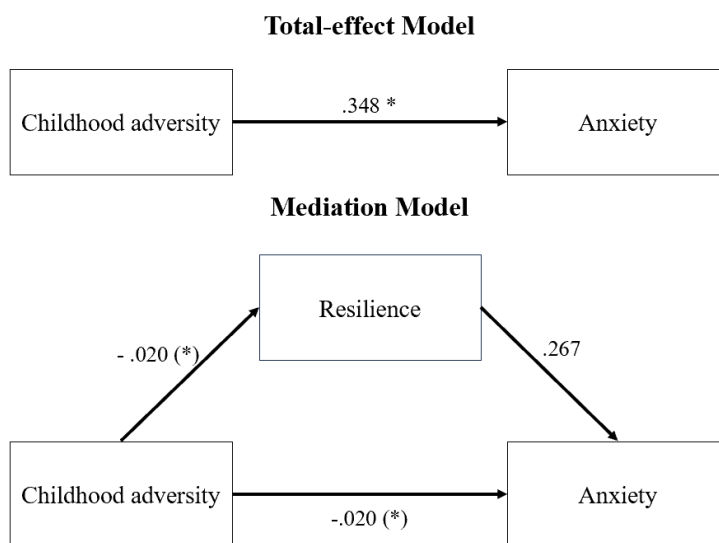
Note. Standardised regression coefficients for each path are displayed. * = p < .05; (*) = marginally significant associations.

4. Discussion

This study's aims were first, to replicate the association between ACE and subtypes of ACE towards anxiety, second, to explore two individual people's characteristics, gender and resilience, and their associations to ACEs and anxiety, in the general population. The study's findings show that overall ACE, emotional neglect and emotional abuse, but not the other subtypes of ACEs were significantly associated with higher anxiety. Gender did not

significantly moderate this relationship, except for the associations with physical neglect and sexual abuse. Lastly, resilience did not mediate the relationship between ACEs and anxiety.

4.1. Association between ACE and Subtypes and Anxiety

A significant positive association between ACE and anxiety was observed. These findings align with numerous studies highlighting the impact of ACE on various mental health outcomes, more specifically anxiety in the general population (e.g., see Anda et al., 2006; Poole et al., 2017a). This further underlines the association between early-life traumas and mental health outcomes in later life.

Emotional abuse and emotional neglect were significantly associated with anxiety. Both emotional abuse and neglect can disrupt cognitive and behavioural patterns, contributing to anxiety development (Beck, 1985). Emotional abuse, for instance, often occurs in contexts where the victim expects affection and love from the abuser, intensifying the emotional damage (Gibb & Alloy, 2006). This type of abuse can foster the internalisation of harmful cognitions and maladaptive coping strategies, impacting self-identity and cognitive appraisals (Cui & Liu, 2020). Similarly, emotional neglect, where emotional needs are unmet, can lead to alterations in the oxytocin system and brain reward pathways, further influencing anxiety (Strathearn, 2011). These findings suggest that both emotional abuse and emotional neglect play critical roles in shaping cognitive appraisals and emotional responses, leading to heightened anxiety. Individuals exposed to these ACEs may develop harmful thinking patterns, stress dysregulation (Weissman et al., 2019), and increased emotional reactivity (Kong et al., 2019). For instance, anxious individuals tend to perceive ambiguous stimuli as dangerous, a cognitive appraisal pattern that can be rooted in childhood experiences of emotional abuse or neglect (Zainal et al., 2024). Such experiences can also impair fear processing and safety learning, leading to threat biases that contribute to anxiety in adulthood (McLaughlin et al., 2017; Britton et al., 2011).

For other subtypes, namely sexual abuse, physical abuse and physical neglect, no significant association was found, contrasting with prior research. These types may lead to different cognitive distortions, resulting in other disorders. Effects may be limited to specific situations or triggers, not measurable with the STAI-T. Beck´s model (1985) would support this idea, suggesting that specific cognitive vulnerabilities manifest in distinct disorders. In a study by Cougle et al. (2010), experiences of physical abuse were associated with the development of PTSD or specific phobias in adulthood. However, within the same study, associations between sexual abuse and multiple anxiety disorders were observed (Cougle et

al., 2010), leading to the need for further investigations. Additionally, the low prevalence of these types in the sample limits the ability to detect significant effects.

4.2 Moderating Role of Gender

In contrast to the current findings, previous research has highlighted gender disparities related to both overall ACE (Cui & Liu, 2018) and anxiety (Stoltenborgh et al., 2015). This lack of observed gender differences might be due to the sample's characteristics of predominantly female participants, limiting generalisability.

Of particular interest were the subtype-specific moderation effects. Previous literature indicates that particularly neglect types are associated with the development of psychopathology in men (Gardner et al., 2019). This was only partially found, as only physical neglect was significantly moderated by gender. Traditional gender role expectations may influence how men and women respond to traumatic events. Men may potentially downplay or underreport their experiences due to societal expectations of emotional endurance, as society expects women to be more emotionally expressive and loving (Ullman & Filipas, 2005). This may prevent gender differences in the relationship between anxiety symptoms and neglect from becoming discernible (e.g., Ullman & Filipas, 2005). Physical neglect involves a lack of meeting basic needs, which may be more immediate and visible, making it harder for individuals to downplay or ignore these (Briere et al., 1996), potentially explaining the differences. Emotional neglect, however, may be internalised differently, being more susceptible to underreporting (Briere et al., 1996). This downplaying might extend to anxiety, complicating the detection of differences further.

Contrary to previous findings, a negative association was found between sexual abuse and anxiety, when examining gender disparities. This means that contrary to expectations, individuals who experience sexual abuse tend to report lower levels of anxiety. One possible explanation for this counterintuitive finding could be the low reporting of sexual abuse within the sample, as 85% of participants reported no sexual abuse. This low prevalence may limit the ability to detect significant associations and could result in statistical anomalies. Further, a study by Phanichrat and Townshend (2010) showed that victims may deal with sexual abuse by seeking support or using cognitive engagement, hence being able to more effectively work against the negative consequences of such experiences. This warrants further exploration as it deviates greatly from previous findings. Notable, the uneven distribution of gender within the sample, with predominantly female participants, may have influenced the moderation findings further.

4.3 The Role of Resilience in the Relationship Between ACE and Anxiety

Lastly, in contrast to prior studies, the findings suggest that participants' resilience does not mediate the relationship between ACE and anxiety, despite a significant negative association between ACE and resilience. This partially supports prior research suggesting resilience can buffer against ACE effects, thereby reducing anxiety (e.g., Hjemdal et al., 2010).

The direct relationship between ACE and anxiety remained weak when controlling for resilience, suggesting that other factors beyond resilience, such as biological changes, influence this relationship. Nusslock and Miller (2016) proposed the possibility of ACEs sensitising brain areas responsible for stress responses, reward responses and inhibitory control. As a result, cognitive appraisal of stressful events may be altered, meaning that victims of ACE may be more likely to experience something as fearful or stressful, as well as utilise and develop less effective coping styles (Nusslock & Miller, 2016). Coping mechanisms may play a role in the complex interplay of factors, as research found influences of ACEs towards coping mechanisms, and hence individuals' ability to cope with stressors (Chi et al., 2022). Adaptive coping mechanisms (e.g., seeking social support) are associated with lower anxiety and reduced stress. In contrast, maladaptive coping strategies (e.g., avoidance) may exacerbate anxiety and hinder resilience development (Zadahmad & Torkan, 2019). Hence, if individuals exposed to ACEs develop maladaptive coping strategies as a response (e.g., Citak & Erten, 2021), anxiety and stress might increase as a consequence. Adaptive coping strategies, such as self-compassion or social support on the other hand may mediate this association of ACEs and anxiety (e.g., Chi et al., 2022). However, to make clear statements, more research is needed.

The relatively low levels of ACE and resilience may also explain the findings. Most participants reported no to low levels of abuse, and more than half reported low resilience. Prior studies found, that after experiencing stressors people may develop resilience (Bonanno, 2004), raising questions on whether lower levels of ACE foster resilience similarly to higher levels. Individuals with low levels of abuse may not receive the necessary support they need, may be less prone to engage in adaptive coping strategies or develop resilience to the same extent as people experiencing higher levels of abuse. The mediation analysis showed a marginally significant association between resilience and anxiety, but further research is needed to gain deeper insights.

4.4 Strengths, Limitations and Future Research

This study demonstrates several strengths contributing to its significance. While the effects of ACEs towards anxiety have been established in previous studies, this study added

new insights by involving the ACE subtypes. By focusing specifically on anxiety, distinct from depression, it provides more in-depth insight into associations with anxiety. This was done using robust measures, such as the brief resilience scale, to ensure the generalisability of the findings.

However, several limitations can also be noted. Firstly, the cross-sectional study design and its implications for mediation analysis present a limitation. As all variables are measured at the same time point, no conclusions regarding causality and effect directions can be drawn (Wang & Cheng, 2020). According to Baron and Kenny (1986), temporal precedence is a key construct for establishing mediation. It entails that the independent variable must come before the mediator, which in turn must come before the dependent variable in time (Chmura Kraemer et al., 2008). This should be considered when interpreting the outcomes, as this criterion cannot be met in a cross-sectional design. Hence, longitudinal study designs are recommended to investigate the causality while also mitigating issues associated with retrospective data.

Moreover, the sample exhibits relatively low ACEs and resilience scores, cautioning against generalising the findings to broader populations. For example, sexual, physical abuse and physical neglect were the lowest reported numbers within the sample and were also the three types with non-significant association. Future studies with diverse ACE exposures are needed to confirm the robustness of the results. Additionally, exploring specific resilience factors, such as coping strategies and social support, could refine tailored interventions. Moreover, future studies should investigate biopsychosocial changes related to trauma responses, as it is assumed that ACEs sensitize brain areas, influencing threat appraisal, influencing anxiety development. By integrating biopsychosocial perspectives, like stress response, and psychological coping, more comprehensive models can be created.

Furthermore, the study relied on solely self-report measures, such as the CTQ. In this case, this measure deals with retrospective experiences, relying on accurate recall of childhood experiences. This might lead to social desirability biases or recall errors, as emotional topics may be altered or suppressed over time (Krayem et al., 2021), which should be considered when interpreting the results. In this study, this was counterbalanced by using reliable measures to assess these scores, showing high levels of internal consistency (e.g., Bernstein et al., 1994; Smith et al., 2008).

Another limitation is the sample homogeneity, as the majority of participants were female (84.21 %), limiting the generalizability, especially regarding the gender-moderation analysis. Future studies should include more diverse demographics, including gender,

ethnicity, and socioeconomic status. Incorporating both clinical and non-clinical anxiety samples would offer a way to further gain an understanding of the differences between these populations. Hence, utilising non-probability sampling methods and conducting multi-country studies could enhance the external validity.

While this study aimed to include a broad scope of ACE types, other multifaceted types, such as parental death or parental substance abuse are overlooked. However, especially the former is the most common type of ACE (Kessler et al., 2010), associated with anxiety in later life. Even though events directly associated with the individual are assumed to have more direct risks (Zimmerman & Posick, 2016), the explicit differences in anxiety should be explored. Also, individuals who experience one type of trauma experience others (Kessler et al., 2010), which is not assessed in this study but can be seen in high collinearity between the subtypes of ACE. Future studies should incorporate measures capturing a wider spectrum of ACE types and explore the co-occurrence of multiple traumas in greater detail, potentially through qualitative approaches (e.g., open questions, and interviews).

4.5 Practical Implications and Conclusion

This cross-sectional study explored the interplay between ACE, anxiety, gender and resilience, using a non-probability sample of 57 young adults. Hereby, overall ACE was found to be positively associated with anxiety development. While subtype differences exist, emotional abuse and emotional neglect emerged as being significantly associated with anxiety development. While the study did not provide evidence for moderation of gender, or mediation of resilience, these findings contribute valuable insights into risk and protective factors for mental health problems, by offering deeper insights into the differences between ACE subtypes. It underlines the importance of early recognition of ACEs to decrease their long-lasting effects. To further understand the underlying risk and protective factors for the most prominent mental disorder, with increasing numbers of subthreshold anxiety, further research into the topic is needed, including investigations into aspects like biopsychological mechanisms, and coping strategies. Most importantly, this study highlights the need to consider individuals' trauma profiles and childhood experiences when assessing the risk for mental health outcomes. Especially when designing assessments and interventions related to anxiety disorders, trauma-informed approaches are important, that also look into the differences between the specific subtypes of ACEs.

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Appendix A

Table 1

Cut-off scores for the Childhood Trauma Questionnaire according to Bernstein & Fink (1998)

Level of abuse	Emotional Abuse	Physical Abuse	Sexual Abuse	Emotional Neglect	Physical Neglect
None	8	7	5	9	7
Low	12	9	7	14	9
Moderate	15	12	12	17	12
Sever	16+	13+	13+	18+	13+

Note. The different columns refer to the five subscales of the Childhood Trauma Questionnaire. The numbers refer to the total scores for the different subscales.

Appendix B

Table 1

Results of Regression Analysis for the subtypes of ACEs and Anxiety with and without accounting for Interaction of Subtypes

	Estimate	Std. Error	t-value	p-value
	Model without Interaction			
Intercept	35.5	6.84	5.19	<.001*
Emotional abuse	1.50	.505	2.96	.004*
Physical abuse	- .941	1.18	- .800	.427
Sexual abuse	.138	.466	.295	.769
Emotional neglect	- .367	.463	-.792	.0432
Physical neglect	- .322	.654	-.492	.625
	Model with Interaction			
Intercept	194.00	132.00	1.46	.151
Emotional abuse	7.26	8.28	0.88	.385
Physical abuse	-15.00	15.40	-.97	.336
Sexual abuse	-43.50	31.00	-1.40	.168
Emotional neglect	-6.69	9.03	-.74	.463
Physical neglect	3.37	5.12	.66	.513
Emotional Abuse x Physical Abuse	1.2167	.7810	1.558	.127
Emotional Abuse x Sexual Abuse	-2.29	1.78	-1.29	.205
Emotional Abuse x Emotional Neglect	-.07	.14	-.46	.645
Emotional Abuse x Physical Neglect	0.00	.37	0.00	.998
Physical Abuse x Sexual Abuse	4.79	3.74	1.28	.207
Physical Abuse x Emotional Neglect	-1.34	.85	-1.58	.123
Physical Abuse x Physical Neglect	-1.55	1.57	-.99	.328
Sexual Abuse x Emotional Neglect	2.83	1.89	1.49	.143
Sexual Abuse x Physical Neglect	1.01	1.24	.81	.420
Emotional Neglect x Physical Neglect	-.05	.38	-.13	.899

Note. Std. Error = Standard Error; * = p <.05; values are rounded to three decimal points