Friendship stress buffering in young people with childhood adversity

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Chapter 6

Friendship Buffering and Autobiographical Memory Specificity in Young People with Childhood Adversity

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Abstract

Background: Young people with childhood adversity (CA) tend to show altered autobiographical memory processing, such as reduced access to details of specific positive events, which may represent a potential mechanism through which CA increases mental health risk. Although friendship support is known to improve mental health outcomes in this population, the mechanisms underlying this protective relationship remain largely unknown.

Objective: This study aimed to investigate associations between perceived friendship support, valence-specific autobiographical memory recall, perceived stress, and depressive symptoms in young people with CA.

Participants and Setting: The study included 100 young people (aged 18-24 years) with low to moderate levels of CA, recruited from the general population across the Netherlands.

Methods: Hierarchical multiple regressions were conducted to examine relationships between friendship support, positive and negative autobiographical memory specificity, perceived stress, and depressive symptoms.

Results: Friendship support was not linked to positive or negative autobiographical memory specificity. However, it was associated with lower perceived stress (β = -0.44, p < .001) and fewer depressive symptoms (β = -0.21, p = .041). Autobiographical memory specificity showed no relationship with perceived stress or depressive symptoms. Furthermore, more severe CA (β = 0.21, p = .002) and higher perceived stress (β = 0.56, p < .001) were both associated with more depressive symptoms.

Conclusions: These findings point towards a model where friendship support exerts its protective mental health effects possibly through reducing perceived stress in young people with CA, rather than through influencing the specificity of positive or negative autobiographical memories.

Keywords: autobiographical memory specificity, friendship stress buffering, depressive symptoms, young people, childhood adversity

Highlights

- Young people with childhood adversity recalled autobiographical memories.
- Memory specificity was not associated with psychosocial functioning.
- More friendship support linked to less perceived stress and depressive symptoms.

Introduction

Approximately half of all young people growing up worldwide are exposed to at least one form of childhood adversity (CA) (Bellis et al., 2014; McLaughlin, 2016). This includes often co-occurring experiences such as abuse or neglect, parental mental illness, bullying, growing up in severe poverty, or exposure to war (Brown et al., 2019; Dong et al., 2004). Chronic and repeated exposure to these toxic stressors requires young people to adapt their psychological, social, and cognitive functioning, and the strategies they employ may increase the risk for later-life mental health problems. Indeed, a large-scale epidemiological survey with more than 51,000 adults across 21 countries estimated that around one-third of all mental disorders worldwide are attributable to CA exposure (Kessler et al., 2010). Although these associations are well-documented, the mechanisms linking CA exposure to mental health problems as well as the protective factors that can mitigate these effects remain less understood. Hence, a better mechanistic understanding could provide crucial insights for developing targeted and effective prevention and intervention efforts for young people with CA.

Altered autobiographical memory processing following CA may be one potential pathway leading to mental health problems (McCrory et al., 2017). Autobiographical memory gradually develops from early childhood through young adulthood and is defined as the system that integrates specific personal experiences as well as perspectives, interpretations, and evaluations from both oneself and others to scaffold an overarching life narrative (Fivush, 2011). Young people with CA tend to show alterations in autobiographical memory processing, such as cognitive biases favoring negative memories, diminished richness of positive memories, and reduced specificity (i.e., generalized recall of single events) (Dalgleish & Werner-Seidler, 2014; McCrory et al., 2017; Puetz et al., 2021; Valentino et al., 2009). For example, when asked to complete the widely used Autobiographical Memory Task (AMT; J. M. Williams & Broadbent (1986)), in which the goal is to generate specific memories in response to differentially valenced cue words, maltreated adolescents (aged 10-14 years) showed reduced autobiographical memory specificity and increased amygdala activation in response to recalling negative compared to positive memories (McCrory et al., 2017). This tendency to recall memories in a generalized manner rather than as specific, detailed experiences may hold functional value in an adverse environment. For instance, by avoiding detailed recollections of traumatic or distressing events, individuals can shield themselves from overwhelmingly intense negative emotions often associated with such memories (J. M. Williams, 2006). At the same time, reduced autobiographical memory specificity is related to patterns of repetitive, negative thinking (rumination) which can increase vulnerability to mental health problems, particularly as individuals transition to a less adverse environment, such as school (McCrory & Viding, 2015; Valentino et al., 2009). Indeed, adversity-related alterations in autobiographical memory have

been linked to the onset, maintenance, and recurrence of depression (Dalgleish & Werner-Seidler, 2014; Hallford et al., 2022; McCrory et al., 2017; Valentino et al., 2009).

The neurocognitive social transactional model of psychiatric vulnerability (McCrory et al., 2022) argues that adversity-related cognitive alterations, such as reduced access to memories of specific events, may inadvertently generate more stressful experiences with peers (stress generation) or lead to an attenuation in the number and quality of friendships (social thinning), thus exacerbating mental health challenges. For example, reduced autobiographical memory specificity can affect social functioning by limiting the richness of autobiographical experiences available to navigate interpersonal challenges (Goddard et al., 1996), such as resolving conflicts with friends. In turn, this could perpetuate stress generation by prolonging conflicts and contribute to social thinning by jeopardizing the stability of friendships. Indeed, maltreated adolescents (aged 10-14 years at baseline) were found to exhibit reduced autobiographical memory specificity, aggregated across both positive and negative memories, which was associated with reduced prosocial behavior rated by the parent two years later (Puetz et al., 2021). Furthermore, among trauma-exposed adults with posttraumatic stress disorder (PTSD), Sutherland & Bryant (2008) observed a higher prevalence of reduced autobiographical memory specificity compared to adults without PTSD and found that in both groups memory recall was less specific for positive compared to negative events. In the same study, reduced autobiographical memory specificity, for both positive and negative memories, was strongly associated with deficits in real-life problem-solving abilities, particularly in resolving interpersonal challenges like friendship issues (Sutherland & Bryant, 2008). The existing evidence therefore indicates that, reduced autobiographical memory specificity seems to play a key role in disrupted social functioning and concurrently the maintenance of mental health problems in individuals with CA. It is therefore imperative to establish if and how autobiographical memory processing is associated with protective factors like friendship support to ultimately improve mental health outcomes in young people with CA.

Friendship support is a well-established protective factor that significantly enhances mental health in young people with CA (König et al., 2023, 2025; van Harmelen et al., 2016, 2017, 2021). Safe, stable, and reciprocal friendships become increasingly important during adolescence, a period that begins with puberty and ends with adult independence (Burnett Heyes et al., 2015; Crone & Dahl, 2012; Güroğlu, 2022). This critical developmental stage is marked by a heightened sensitivity to and need for peer interactions (Blakemore & Mills, 2014; Orben et al., 2020) as well as an increased vulnerability to the onset of mental health problems (Orben et al., 2022; Paus et al., 2008; Solmi et al., 2022). Therefore, friendship support may be particularly important for young people

with CA, given their elevated risk for mental health challenges. Indeed, greater perceived friendship quality was found to be associated with fewer depressive symptoms (König et al., 2025; van Harmelen et al., 2016) and increased adaptive mental health functioning (König et al., 2023; van Harmelen et al., 2017, 2021) in young people with CA. However, the mechanisms linking friendship support to mental health in young people with CA are largely unknown (e.g., Raposa et al., (2015); Scheuplein & van Harmelen (2022)).

Several studies highlight the interconnectedness between friendship support, valence-specific autobiographical memory recall, stress responsivity, and mental health in young people with and without CA. One potential pathway through which friendship support may exert its protective mental health effects is by influencing the specificity of positive autobiographical memories (Barry et al., 2019; Kensinger et al., 2016). This may subsequently reduce perceptions, reactions, and physiological responses to and after stress (Gunnar, 2017; R. M. Sullivan & Perry, 2015), thereby lowering the physiological burden of stress exposure and improving mental health functioning (Gotlib et al., 2020; Hammen et al., 2000; Hennessy et al., 2009; König et al., 2023). In line with this model, social interactions with friends may aid retrieval of emotionally salient memories, such as positive experiences (Güroğlu et al., 2008). Additionally, recalling positive autobiographical memories was found to lower cortisol levels and reduce negative affect following acute stress exposure in US college students (Speer & Delgado, 2017). In young people (aged 14 years) with CA, Askelund et al. (2019) found that more specific positive autobiographical memories were associated with lower morning cortisol and fewer negative self-cognitions during low mood over the course of one year. In the same study, positive memory specificity was related to fewer depressive symptoms mediated through fewer negative self-cognitions in response to recent stressful life events. A recent longitudinal study of young people (aged 16-26 years) with CA found that high-quality friendship support reduced perceived stress and subsequent depressive symptoms in response to the COVID-19 pandemic (König et al., 2025). In young people (aged 15-17 years) without CA, Barry et al. (2019) reported moderate associations between greater levels of perceived social support from friends and romantic partners and increased autobiographical memory specificity of both positive and negative events. Additionally, greater social support was positively associated with mental health functioning. However, no direct link between autobiographical memory specificity and mental health functioning was observed (Barry et al., 2019).

Building on this body of research, the current study examined whether greater perceived friendship support is associated with greater specificity of positive autobiographical memories in young people with CA as well as with lower perceived stress and fewer depressive symptoms. Hence, we analyzed cross-sectional data from the first 100 participants of the ongoing Towards Health and

Resilience in Volatile Environments (THRIVE) study. The THRIVE study is a longitudinal investigation of risk and protective factors affecting mental health in young people (aged 18-24 years) with retrospectively self-reported CA. To assess autobiographical memory specificity, we adapted the AMT and instructed participants to recall friendship memories evoked by four positive and four negative cue words. Specifically, we examined whether greater friendship support was associated with greater specificity of positive autobiographical friendship memories (hypothesis 1.1; Barry et al. (2019)), lower levels of perceived stress (hypothesis 1.2; König et al. (2025)), and fewer depressive symptoms (hypothesis 1.3; van Harmelen et al. (2016)). Next, we examined whether greater specificity of positive memories was associated with lower levels of perceived stress (hypothesis 2.1; Speer & Delgado (2017)) and fewer depressive symptoms (hypothesis 2.2; Askelund et al. (2019)). Finally, we aimed to replicate the association between lower levels of perceived stress and fewer depressive symptoms (hypothesis 3; Gotlib et al., (2020); Hammen et al., (2000); König et al., (2025)). To account for potential valence-specific effects, we analyzed associations for both positive and negative autobiographical friendship memories.

Methods

Towards Health and Resilience in Volatile Environments (THRIVE) Study

Cross-sectional data from the first 100 participants were drawn from the THRIVE study (see Table 1 for sample characteristics). This subset was selected based on the availability of complete assessments by the project deadline in June 2024. It was deemed sufficient for conducting robust preliminary statistical analyses and was chosen to provide initial insights while data collection for the full sample is ongoing. A post-hoc power analysis using G*Power 3.1 (Faul et al., 2007) further confirmed that the sample of $N = 100$ participants has 84% power to detect small to moderate main effects ($f^2 = .09$ at $\alpha = .05$, two-sided), which is consistent with effect sizes reported in related research (Puetz et al., 2021). The THRIVE study is an ongoing longitudinal study at Leiden University, the Netherlands, with a target sample size of 250 young people aged between 18 to 24 years with a retrospectively self-reported history of CA. CA was conceptualized as exposure to any adverse life event experienced within or outside the family environment before the age of 18. Participants were recruited across the Netherlands from the general population through flyer distribution at schools and universities, general practitioners' practices, shops, libraries, hospitals, out-patient care facilities, and social media. Individuals were eligible to participate if they were aged between 18 to 24 years, able to speak, write, and understand Dutch, and self-reported CA experiences before the age of 18. Due to the potentially stressful nature of the study protocol, individuals who had experienced severe depressive symptoms or suicidal thoughts within the past two weeks prior to the eligibility screening were excluded. Specifically, participants with a score above 14 on the 9-item Patient

Health Questionnaire (PHQ; Kroenke et al. (2001)) or a score greater than zero on question nine of the PHQ ("Thoughts that you would be better off dead, or of hurting yourself") were not included in the study. Eligibility criteria were assessed via telephone by a trained member of the study team. The THRIVE study received ethical approval from the Medical Ethics Committee Leiden The Hague Delft (NL80017.058.21) in July 2022 and commenced in October 2022.

Characteristics	
Age	21.23 (1.84)
Gender identity	
Male	20%
Female	79%
Non-binary	1%
Ethnic orientation	
Asian	3%
Black, African, or Caribbean	2%
White	84%
Other	11%
Highest education	
HAVO (11 years of education)	11%
VWO (12 years of education)	54%
MBO (14 years of education)	4%
HBO (15 years of education)	7%
WO bachelor (17 years of education)	19%
WO master (17+ years of education)	4%
Other	1%
Maltreatment experiences	
Childhood Trauma Questionnaire- Short Form (CTQ-SF)	
Sexual abuse	5.12 (2.66)
Physical abuse	6.62 (3.69)
Emotional abuse	11.08 (5.62)
Physical neglect	7.43 (3.12)
Emotional neglect	11.39 (4.36)
Friendship support	
Multidimensional Scale of Perceived Social Support (MSPSS)	23.69 (3.83)
McGill Friendship Questionnaire – Friendship Functions (MFQ-FF)	
Stimulating companionship	35.94 (4.38)
Help	33.54 (4.81)
Intimacy	35.13 (5.07)
Reliable alliance	37.87 (2.75)

Self-validation	34.47 (5.28)
Emotional security	35.17 (4.33)
Perceived stress	15.95 (5.24)
Depressive symptoms	
Mood and Feelings Questionnaire (MFQ)	10.62 (8.36)
Patient Health Questionnaire (PHQ-9)	4.87 (3.61)

Table 1. Sample characteristics (*N* = 100). Age is reported in years *M* (*SD*). Gender identity, ethnic orientation, and highest education are reported as %. Key features of the Dutch education system have been summarized by the (European Commission, 2024). Self-reported severity levels of maltreatment experiences, perceived friendship support, perceived stress, and depressive symptoms are presented as raw measurement characteristics *M (SD)*. Based on established cut-off scores for the original English Childhood Trauma Questionnaire (CTQ; Bernstein et al. (1994)), this sample can be characterized reporting low to moderate severity levels of maltreatment experiences. Specifically, the following cut-off scores can be applied to each scale: sexual abuse (low to moderate: 4-7), physical abuse (low to moderate: 5-9), emotional abuse (low to moderate: 5-12), physical neglect (low to moderate: 5-9), emotional neglect (low to moderate: 5-14). Please note that this study utilized the 24-item Dutch CTQ-SF with a 4-item sexual abuse subscale for which no published cut-off scores are currently available (Thombs et al., 2009).

Procedure

This study utilized self-report data from the first 100 participants who completed the initial two assessment timepoints (on average 31 days apart) of the ongoing THRIVE longitudinal study. The measures relevant to the current study are described below. At each assessment timepoint, informed consent was obtained from participants, who were informed that they could withdraw from the study at any time without having to provide a reason and without any consequences.

During the first assessment timepoint (T1), eligible participants received a secure online link via email to remotely complete self-report questionnaires about past maltreatment experiences and currently perceived friendship support. These domains were assessed using the Dutch Childhood Trauma Questionnaire Short-Form (CTQ-SF; Thombs et al. (2009)), the Cambridge Friendship Questionnaire (CFQ; van Harmelen et al. (2017)), the McGill Friendship Questionnaire – Friendship Functions (MFQ-FF; Mendelson & Aboud (1999)), and the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al. (1990)).

For the second assessment timepoint (T2), participants visited the Leiden University Medical Center in the Netherlands, on average one month after the completion of T1. During T2, participants provided saliva samples, mood ratings, and self-reports. These self-reports covered, among other measures, currently

perceived stress and depressive symptoms, using the Perceived Stress Scale (PSS; Sheldon Cohen et al. (1983)), the Mood and Feelings Questionnaire (MFQ; Angold & Costello (1987)), and the 9-item Patient Health Questionnaire (PHQ-9; Kroenke et al. (2001)). In addition, participants underwent magnetic resonance imaging (MRI) and completed a range of cognitive tasks both inside and outside the MRI environment. An adapted version of the Autobiographical Memory Task (AMT; J. M. Williams & Broadbent (1986)) was administered before scanning to assess autobiographical friendship memory processing. All T2 self-reports analyzed as part of this study were assessed after scanning.

Participants received €15 for the completion of T1 (approximately 48 minutes) and €70 for the completion of T2 (approximately 4 hours), adding up to a total of €85. This study was conducted in accordance with the principles of the Declaration of Helsinki (World Medical Association, 2013), the Medical Research Involving Human Subjects Act (WMO; The Central Committee on Research Involving Human Subjects (2018)), and the Leiden University code of ethics for research in the social and behavioral sciences involving human participants (Leiden University, 2018).

Measures

Maltreatment Experiences

The *Dutch Childhood Trauma Questionnaire-Short Form* (CTQ-SF; Bernstein et al. (1994); Thombs et al. (2009)) was administered remotely at T1 to retrospectively assess self-reported maltreatment experiences within the family environment before the age of 18. Participants rated items such as "I believe that I was physically abused" on a 5-point Likert scale (1 = never true, 5 = very often true). The Dutch CTQ-SF consists of 24-items comprising five subscales (sexual, physical, emotional abuse and physical and emotional neglect), which were combined to calculate a standardized total severity *z*-score. Specifically, to compute this cumulative maltreatment index (higher index indicating more severe maltreatment experiences), mean imputations were performed to replace two missing responses, and positive items were reverse coded. Compared to the original English CTQ-SF (Bernstein et al., 2003), the Dutch CTQ-SF (Thombs et al., 2009) removed the item "I believe I was molested" due to translation ambiguity of the word molested. Internal consistency was excellent for the total scale (Cronbach's $\alpha = .94$) and acceptable to excellent for the five subscales (sexual abuse: $\alpha = .89$; physical abuse: $\alpha = .89$; emotional abuse: $\alpha = .91$; physical neglect: $\alpha = .69$; emotional neglect: $\alpha = .87$). To assess potential underreporting of maltreatment experiences, the CTQ-SF also includes a 3-item minimization/denial (MD)-scale. Participants who responded to MD-items such as "I had the perfect childhood" with "very often true" (a rating of 5 on the 5-point Likert scale) would be scored as 1. MD-scale ratings below 5 would be scored as 0. A total MD-score of 3 is thought to indicate strong underreporting of

maltreatment experiences. The prevalence of MD was 9% in our sample (MD total scores: 0 = 91%, 1 = 7%, 2 = 1%, 3 = 1%), which is lower compared to endorsements reported in both community and clinical samples (MacDonald et al., 2015, 2016).

Friendship Support

Currently perceived friendship support was assessed at T1 using three self-report questionnaires. The *Cambridge Friendship Questionnaire* (CFQ; van Harmelen et al. (2017)) was administered to assess the self-reported number, availability, and quality of current friendships. Participants rated items such as "Do you feel that your friends understand you?". Negative items were reverse coded so that higher scores indicate greater perceived friendship support. Internal consistency for the total scale was poor (Cronbach's α = .53), which led to its exclusion from all subsequent analyses.

The *McGill Friendship Questionnaire – Friendship Functions* (MFQ-FF; Mendelson & Aboud (1999)) was used to assess friendship support provided by a specific, self-selected friend. Participants rated items such as "[Name of friend] would make me feel better if I were worried" on a 9-point Likert scale (0 = never, 8 = always). The MFQ-FF consists of 30-items comprising six subscales (stimulating companionship, help, intimacy, reliable alliance, self-validation, emotional security), which can be combined to calculate a total friendship functioning score. Higher scores indicate greater perceived friendship support. Internal consistency was excellent for the total scale (Cronbach's α = .95) as well as acceptable to good for the six subscales (stimulating companionship: Cronbach's α = .79; help: Cronbach's α = .75; intimacy: Cronbach's α = .87; reliable alliance: Cronbach's α = .83; self-validation: Cronbach's α = .86; emotional security: Cronbach's α = .84).

The *Multidimensional Scale of Perceived Social Support* (MSPSS; Zimet et al. (1990)) was used to assess perceived social support from family, friends, and significant others. Specifically, this study only utilized the 4-items assessing perceived friendship support. Participants rated items such as "I can count on my friends when things go wrong" on a 7-point Likert scale (1 = very strongly disagree, 7 = very strongly agree) with higher scores indicating greater perceived friendship support. Internal consistency for the friendship subscale was excellent (Cronbach's α = .90).

To compute a single friendship support index (higher index indicating greater perceived friendship support), the standardized total *z*-scores of the MFQ-FF and MSPSS were averaged.

Depressive Symptoms
Current depressive symptoms (i.e., during the past two weeks) were assessed at T2 using two self-report questionnaires. The *Mood and Feelings Questionnaire* (MFQ; Angold & Costello (1987)) consists of 31-items such as "I felt miserable or unhappy", which were rated on a 3-point Likert scale (0 = not true, 3 = true). Higher scores indicate greater depressive symptoms. Internal consistency for the total scale was excellent (Cronbach's α = .90).

The *Patient Health Questionnaire* (PHQ-9; Kroenke et al. (2001)) consists of 9-items such as "Feeling down, depressed, or hopeless", which were rated on a 4-point Likert scale (0 = not at all, 3 = nearly every day). Higher scores indicate greater depressive symptoms. Internal consistency for the total scale was acceptable (Cronbach's α = .76).

To compute a single depressive symptoms index (higher index indicating greater depressive symptoms), the standardized total *z*-scores of the MFQ and PHQ-9 were averaged.

Perceived Stress
The *Perceived Stress Scale* (PSS; Sheldon Cohen et al. (1983)) was administered at T2 to assess levels of perceived stress during the past month. Participants rated 10 items such as "In the last month, how often have you felt nervous and stressed?" on a 5-point Likert scale (0 = never, 4 = very often). Positive items were reverse coded so that higher standardized total *z*-scores indicate greater levels of perceived stress during the past month. Internal consistency for the total scale was acceptable (Cronbach's α = .74).

Autobiographical Friendship Memories
The *Autobiographical Memory Task* (AMT; J. M. Williams & Broadbent (1986)) was adapted in a written, computerized format to assess specificity of autobiographical friendship memories. At T2, participants were asked to recall a memory of a situation or experience with a friend that a presented cue word reminded them of. Four positive and four negative Dutch cue words were presented in the following fixed order: gelukkig (happy), boos (angry), leuk (nice), jaloers (jealous), grappig (funny), gekwetst (hurt), gezellig (cozy), eenzaam (lonely). Additionally, participants were instructed to write about different memories in relation to each cue word and were informed that their friendship memories could be formed recently (e.g., last week) or years ago. While participants were instructed to recall real memories, there was no emphasize on a memory having to be specific. This minimal instruction approach has proven effective in enhancing the task's sensitivity to detect reduced memory specificity in non-clinical samples (Debeer et al., 2009). In response to each cue word,

participants were given two minutes to provide a friendship memory after which the task advanced automatically.

Two independent raters (RQ and EV), both native Dutch speakers, each scored a total of 800 responses based on a stringent scoring procedure, resulting in strong interrater reliability (kappa = .77). Any disagreements were resolved through discussion. A memory was scored as *specific* if it referred to a single event that has happened within a period of 24h, at a particular time and place. A memory was scored as *non-specific* if it pertained to a single event that unfolded over the course of more than 24h, at a particular time and place (extended); If it referred to a situation or experience that cannot be linked to a single event (categoric); If no response was provided or if a statement/general remark was given (omission); Or, if the response referred to an event previously reported (repeated). For each valence, the proportion of specific memories was calculated by dividing the number of specific memories by the total number of cue words. A higher proportion indicates a more specific recall of friendship memories for that valence. Results remained the same when the number of omissions was subtracted, as per Debeer et al. (2009) and Hitchcock et al. (2019). These confirmatory analyses are reported in the supplementary materials (Section 1). For ease of interpretation, all subsequent findings are reported without excluding the number of omissions. Wilcoxon signed-rank tests indicated no significant valence differences for specific autobiographical friendship memories, V = 1670.50, p = .112, or generalized memories (extended and categoric combined), V = 1126, p = .767. However, the number of omissions was significantly higher for negative cue words (M = 0.16, SD = 0.44) compared to positive cues (M = 0.04, SD = 0.20), V = 13, p = .008. Descriptive statistics of AMT responses are presented in Table 2.

	Cue Words	Specific	Extended	Categoric	Omission	Repeated
Positive	Happy	69 (69.0)	17 (17.0)	14 (14.0)	0 (0)	0 (0)
	Nice	67 (67.0)	9 (9.0)	23 (23.0)	1 (1.0)	0 (0)
	Funny	81 (81.0)	1 (1.0)	15 (15.0)	3 (3.0)	0 (0)
	Cozy	75 (75.0)	4 (4.0)	21 (21.0)	0 (0)	0 (0)
	***M* (*SD*)**	**73 (6.32)**	**7.75 (6.99)**	**18.25 (4.43)**	**1 (1.41)**	**0 (0)**
Negative	Angry	78 (78.0)	6 (6.0)	13 (13.0)	3 (3.0)	0 (0)
	Jealous	54 (54.0)	11 (11.0)	31 (31.0)	3 (3.0)	1 (1.0)
	Hurt	76 (76.0)	5 (5.0)	13 (13.0)	2 (2.0)	4 (4.0)
	Lonely	62 (62.0)	9 (9.0)	20 (20.0)	8 (8.0)	1 (1.0)
	***M* (*SD*)**	**67.5 (11.47)**	**7.75 (2.75)**	**19.25 (8.50)**	**4 (2.71)**	**1.5 (1.73)**

Table 2. Percentage of responses by memory type in the autobiographical friendship memory task ($N = 100$). Characteristics are reported as *n* (%). Cue words were presented in Dutch in the following fixed order: gelukkig (happy), boos (angry), leuk (nice), jaloers (jealous), grappig (funny), gekwetst (hurt), gezellig (cozy), eenzaam (lonely). The number of omissions was significantly higher for negative cue words compared to positive cues ($p = .008$). No other significant valence differences were observed.

Statistical Analysis

All analyses were performed in R (version 4.3.0; R Core Team (2022)). Two outliers were detected using the Rosner's test (rosnerTest function of the EnvStats R package, version 2.7.0; Millard (2013)) in combination with the 3-sigma method (mean +/- three standard deviations). One outlier reported severe

maltreatment experiences, and one outlier reported severe depressive symptoms. Both outliers were excluded from subsequent analyses, resulting in a final sample size of $N = 98$. All analyses were conducted on standardized z-scores. Due to non-normality of residuals amongst our primary regression models (supplementary Table S2), we conducted robust hierarchical multiple regressions using Huber weights. The robust hierarchical multiple regressions approach was chosen to clarify the incremental contribution of the covariates, including maltreatment experiences, age, and gender identity. In step 1, the friendship support index, the autobiographical friendship memory specificity index, or the perceived stress index were entered to assess their direct effects on the outcome variable. In step 2, the cumulative maltreatment index, age, and gender identity were added to determine their additional predictive value. Models were compared using the Akaike Information Criteria (AIC; Akaike (1974)), with lower values indicating better model fit. Main effects of the best fitting models were inspected using two-sided robust Wald tests (model_parameters function of the parameters R package, version 0.21.7; Lüdecke et al. (2020)). Significance was set at $p < .05$ throughout all analyses and partial Cohen's f-squared (f_p^2) effect size estimates are reported for all relevant tests (cohens_f_squared function of the effectsize R package, version 0.8.8; Ben-Shachar et al. (2020). Model specifications and model fit indices are provided in the supplementary materials (Section 3) alongside Spearman's rank correlations with 95% bootstrap confidence intervals (Section 4). To perform these analyses, we used the cor_mat function of the rstatix R package (version 0.7.2; Kassambara (2023)), the corci function of the bootcorci R package (version 0.0.0.9000; Rousselet et al. (2019)), and the rlm function of the MASS R package (version 7.3.58.4; Venables & Ripley (2002)). Associations for both positive and negative autobiographical friendship memories were analyzed to account for potential valence specific effects and the false discovery rate (FDR) correction method (Benjamini & Hochberg, 1995) was used to correct for multiple comparisons. Mean imputation to replace two missing CTQ-SF values were performed using the mice R package (version 3.16.0; van Buuren & Groothuis-Oudshoorn (2011)).

Results

Associations of Friendship Support with Autobiographical Friendship Memory Specificity, Perceived Stress, and Depressive Symptoms

First, we examined whether greater friendship support was associated with greater specificity of positive autobiographical friendship memories (hypothesis 1.1). Contrary to our predictions, we observed no association between perceived levels of friendship support and specificity of either positive ($\beta = 0.15$, $p = .183$) or negative ($\beta = 0.02$, $p = .869$) autobiographical friendship memories. The inclusion of covariates (i.e., maltreatment experiences, age, and gender identity) did not improve model fit (Tables S3.1.2 and S3.1.4). Next, we examined whether

greater friendship support was associated with lower levels of perceived stress (hypothesis 1.2). In line with our predictions, greater levels of perceived friendship support were moderately associated with lower levels of perceived stress (β = -0.44, SE = 0.12, 95% CI [-0.68, -0.21], t_{96} = -3.74, f_p^2 = 0.16, p < .001). The inclusion of covariates did not improve model fit (Table S3.2.2). Next, we examined whether greater friendship support was associated with fewer depressive symptoms (hypothesis 1.3). In line with our predictions, greater levels of perceived friendship support were weakly to moderately associated with fewer depressive symptoms (β = -0.21, SE = 0.10, 95% CI [-0.42, -0.01], t_{93} = -2.07, f_p^2 = 0.07, p = .041). The inclusion of covariates improved model fit, revealing a small to moderate association between more severe maltreatment experiences and greater levels of depressive symptoms (β = 0.25, SE = 0.09, 95% CI [0.07, 0.44], t_{93} = 2.72, f_p^2 = 0.08, p = .008) (Table S3.3.2).

Associations of Autobiographical Friendship Memory Specificity with Perceived Stress and Depressive Symptoms

Second, we examined whether specificity of positive autobiographical friendship memories was associated with lower levels of perceived stress (hypothesis 2.1). Contrary to our predictions, we observed no association between specificity and perceived stress, for neither positive (β = 0.18, p = .102) or negative (β = 0.20, p = .069) autobiographical friendship memories. The inclusion of covariates did not improve model fit (Tables S3.4.2 and S3.4.4). Next, we examined whether specificity of positive autobiographical friendship memories was associated with fewer depressive symptoms (hypothesis 2.2). Contrary to our predictions, specificity of positive autobiographical friendship memories was not associated with depressive symptoms (β = 0.12, p = .157). Greater specificity of negative autobiographical friendship memories was weakly associated with more depressive symptoms (β = 0.17, SE = 0.08, 95% CI [0.01, 0.34], t_{93} = 2.07, f_p^2 = 0.07, p = .041), but this effect did not survive correction for multiple comparisons (p_{FDR} = .082). For both models, the inclusion of covariates improved model fit, revealing a small to moderate association between more severe maltreatment experiences and greater levels of depressive symptoms (positive memory specificity: β = 0.34, SE = 0.09, 95% CI [0.16, 0.51], t_{93} = 3.87, f_p^2 = 0.12, p_{FDR} < .001; and negative memory specificity: β = 0.30, SE = 0.09, 95% CI [0.13, 0.48], t_{93} = 3.44, f_p^2 = 0.11, p_{FDR} < .001) (Tables 3.5.2 and 3.5.4).

Association between Perceived Stress and Depressive Symptoms

Finally, we examined whether lower levels of perceived stress were associated with fewer depressive symptoms (hypothesis 3). In line with our predictions, we observed a strong association between greater levels of perceived stress and more depressive symptoms (β = 0.56, SE = 0.06, 95% CI [0.43, 0.68], t_{93} = 8.87, f_p^2 = 0.77, p < .001). The inclusion of covariates improved model fit and confirmed the previously reported moderate association between more severe maltreatment

experiences and more depressive symptoms (β = 0.21, SE = 0.07, 95% CI [0.08, 0.35], t_{93} = 3.20, f_p^2 = 0.15, p = .002) (Table S3.6.2).

Discussion

This study examined whether greater perceived friendship support is associated with greater specificity of positive autobiographical friendship memories, lower perceived stress, and fewer depressive symptoms in 100 young people (aged 18-24 years) with low to moderate CA. In line with previous research, we found that more severe CA is associated with higher levels of depressive symptoms (K. Hughes et al., 2017) and that greater perceived friendship support is associated with both lower levels of perceived stress (König et al., 2025) and fewer depressive symptoms (van Harmelen et al., 2016). However, friendship support was not associated with the specificity of either positive or negative autobiographical friendship memories. Furthermore, we found no evidence that memory specificity for positive or negative events was related to perceived stress. We found only weak support that greater specificity of negative, but not positive, autobiographical friendship memories were associated with more depressive symptoms, but the effect did not survive correction for multiple comparisons. Lastly, in keeping with prior research, we found that greater levels of perceived stress are associated with more depressive symptoms (Gotlib et al., 2020; König et al., 2025). As such, our findings point towards a model where friendship support exerts its protective mental health effects possibly through reducing perceived stress in young people with CA, rather than through influencing the specificity of positive or negative autobiographical friendship memories. However, the cross-sectional nature of our data limits our ability to further investigate this potential stress-buffering pathway.

Contrary to previous findings, positive autobiographical memory specificity was not associated with lower perceived stress (Speer & Delgado, 2017), fewer depressive symptoms (Askelund et al., 2019), or greater friendship support (Barry et al., 2019). Sample and methodological differences may explain this discrepancy, as both Speer & Delgado (2017) and Barry et al. (2019) studied young people without CA and used different approaches to investigate key variables such as stress and social support. Speer & Delgado (2017) demonstrated that the active retrieval of specific positive autobiographical memories was an effective strategy to reduce psychological and physiological responses to acute stress, while Barry et al. (2019) showed that less specific autobiographical memory recall at baseline predicted reduced social support from friends and romantic partners both at baseline and after one year. In contrast, the current study assessed self-reported perceived stress over the past four weeks, rather than inducing acute stress using the socially evaluative cold pressor task (Schwabe et al., 2008; Speer & Delgado, 2017), and focused specifically on friendship support, rather than a combination of support from friends and romantic partners (Barry et al., 2019). Furthermore,

our study recruited a comparatively high-functioning, community sample of young people who, on average, retrospectively self-reported low to moderate CA, mild levels of depressive symptoms, and strong friendship support. Even low to moderate CA exposure may add additional layers of complexity to the association between autobiographical memory specificity and psychosocial functioning due to causing functional alterations across a range of neurocognitive systems (McCrory et al., 2022). For example, longitudinal data from Askelund et al. (2019) showed that positive autobiographical memory specificity was only indirectly associated with fewer depressive symptoms via reducing negative self-cognitions in response to recent stressful life events. Additionally, Puetz et al. (2021) reported that in a small sample of maltreated young people (aged 11-14 years), reduced autobiographical memory specificity predicted reduced prosocial behavior but not depressive symptoms, despite numerous studies establishing reduced autobiographical memory specificity as a cognitive marker of depression (Hallford et al., 2022; Liu et al., 2013). Thus, the relationship between adversity-related alterations in autobiographical memory specificity and psychosocial functioning appears to be complex, likely unfolds over time, and may involve intermediary factors, such as self-cognitions.

Having said that, we did not observe associations between the severity of CA and autobiographical memory specificity, despite previous research reporting reduced autobiographical memory specificity in maltreated young people (Barry, Lenaert, et al., 2018; McCrory et al., 2017; Valentino et al., 2009). However, several studies were unable to demonstrate consistent associations between trauma exposure and lower autobiographical memory specificity and instead suggest that lower specificity may be a function of comorbid affective disorders, such as depression, over and above any CA effects (Kuyken et al., 2006; Moore & Zoellner, 2007; J. M. G. Williams et al., 2007). For example, Kuyken et al. (2006) showed that young people with major depressive disorder (MDD) and no reported history of trauma produced less specific autobiographical memories during the Autobiographical Memory Task (J. M. Williams & Broadbent, 1986) compared to both never-depressed young people with no history of trauma and young people with MDD and a history of trauma. This suggests that reduced autobiographical memory specificity may develop through factors other than CA, for example through deficits in executive functioning (Dalgleish et al., 2007).

Next, we found that young people with CA who were more specific in recalling negative autobiographical friendship memories also self-reported greater depressive symptoms. While this valence-specific effect did not survive correction for multiple comparisons, it is worth noting that this uncorrected finding aligns with previous research. Negatively biased autobiographical memory processing, with faster access and a greater tendency to generate negative memories, is a defining feature of affective disorders such as depression (Dalgleish & Werner-

Seidler, 2014; Gotlib & Joormann, 2010). For instance, in a community sample of adult women (aged 31-41 years) with sexual abuse experiences, Burnside et al. (2004) found that those with major depression disorder were more specific in recalling negative autobiographical memories compared to those without the disorder. Additionally, neuroimaging studies involving clinically depressed adults (aged 18-55 years; K. D. Young et al. (2017)) and maltreated adolescents (aged 10-14 years; McCrory et al. (2017)) have both shown that recalling specific negative, compared to positive, autobiographical memories elicits stronger activation in areas of the brain implicated in salience processing. This suggests that negative autobiographical memories may hold greater salience for these individuals, thereby influencing their increased accessibility and specificity (Barry, Chiu, et al., 2018).

In line with recent longitudinal findings (König et al., 2025), we observed that young people with CA who self-reported greater friendship support also self-reported lower levels of perceived stress and fewer depressive symptoms. These findings add to a growing body of research emphasizing the importance of friendship support for mental health and well-being, especially in young people with CA (Fritz, de Graaff, et al., 2018; König et al., 2023, 2025; Scheuplein & van Harmelen, 2022; van Harmelen et al., 2016, 2017, 2021). According to social stress buffering models (Gunnar, 2017), the availability of a social partner is thought to mitigate psychological and physiological stress responses, thereby lowering the risk of mental health problems. A recent longitudinal study of young people (aged 16-26 years) with CA found that high-quality friendship support assessed prior to the COVID-19 pandemic buffered depressive symptoms during the pandemic through reducing perceived stress (König et al., 2025). Hence, strong friendship support may have protected our participants from experiencing severe depressive symptoms through reducing perceived stress. But again, due to the cross-sectional nature of this analysis, a comprehensive investigation of such a mechanistic, stress-buffering pathway is not possible.

In addition to our main study objectives, we observed that retrospectively self-reported CA is a potent risk factor for current psychosocial functioning. First, we found that young people with more severe maltreatment experiences self-reported greater depressive symptoms. This finding aligns with numerous studies highlighting the pervasive long-term negative mental health consequences of child maltreatment (Norman et al., 2012; Vachon et al., 2015). For example, meta-analytic evidence suggests that regardless of type, individuals with maltreatment experiences are 2.81 times more likely to develop depression in adulthood compared to those without such experiences (J. Nelson et al., 2017). Interestingly, emotional maltreatment has consistently shown the strongest associations with depressive symptoms and diagnosis (Humphreys et al., 2020), which aligns with our sample predominantly reporting emotional maltreatment experiences.

However, the study's small sample precluded our ability to further investigate specific associations between maltreatment type and depression vulnerability. Second, analyses reported in the supplementary materials revealed that more severe maltreatment experiences were moderately correlated with lower friendship quality. This association could be a sign of social thinning in vulnerable young people and has been reported in previous studies (König et al., 2025; McCrory et al., 2022; McLafferty et al., 2018; Nevard et al., 2021; Salzinger et al., 1993), outlining pragmatic targets for prevention and intervention efforts in the aftermath of CA.

The findings of the current study should be interpreted considering certain limitations. First, the observational study design prevents causal inferences. The neurocognitive social transactional model of psychiatric vulnerability (McCrory et al., 2022) proposes a dynamic interplay between stress adaptation, friendship support, and mental health vulnerability following CA, which ideally requires investigation through prospective longitudinal studies. Additionally, further research is needed to understand if and how adversity-related alterations in autobiographical memory processing are linked to these processes. Second, we did not use formal diagnostic procedures to assess mental health. Due to the potentially stressful nature of the study protocol, young people who recently experienced severe depressive symptoms or suicidal thoughts were not eligible to participate, likely resulting in a sample that may not fully represent the broader population of young people with more severe emotional distress. This could also explain the underrepresentation of young people with more severe CA. Third, compared to previous studies, it is possible that our adapted version of the AMT did not contain sufficient cue words for each valence to identify strong valence-specific effects, as most studies used twice the number of cue words we included (Hitchcock et al., 2019; van Vreeswijk & De Wilde, 2004). Additionally, most prior studies instructed participants to recall any memory associated with a given cue word, rather than memories specifically related to a friend. This shorter version was chosen due to time constraints on the day of testing. Finally, we used retrospective measures of CA to identify eligible participants. However, this approach may have introduced individuals with different risk trajectories for mental health problems compared to those identified using prospective measures (Baldwin et al., 2019).

This study adds to a growing literature highlighting the protective, stress-buffering role of friendships (König et al., 2023, 2025). However, a more nuanced mechanistic understanding is needed to inform preventative intervention efforts. For example, future studies could inspect friendship characteristics, such as stability, closeness, intimacy, or emotional security (Güroğlu, 2022). Furthermore, incorporating observational data and peer reports alongside self-reports can help mitigate potential limitations such as social desirability and recall

biases (Jordan & Troth, 2020). Once the longitudinal THRIVE study is concluded, it would be valuable to replicate the current findings and move beyond only using memory specificity as an index of altered autobiographical memory processing. For example, analyzing sensory-perceptual and contextual details could provide additional fine-grained insights into the associations between adversity-related alterations in autobiographical memory processing and psychosocial functioning (Hitchcock et al., 2022). To achieve this, natural language models offer a promising avenue to accurately and precisely code large amounts of text-based autobiographical memories (Mistica et al., 2024).

In conclusion, we observed that young people with CA who self-reported greater friendship support also reported lower levels of perceived stress and fewer depressive symptoms. Greater specificity when recalling negative autobiographical friendship memories was only weakly associated with more depressive symptoms, but did not survive correction for multiple comparisons and therefore requires exploration in larger longitudinal samples. Finally, lower levels of perceived stress were strongly associated with fewer depressive symptoms. Our findings suggest that friendship support may exert its protective mental health effects through reducing perceived stress in young people with CA, rather than through influencing the specificity of positive or negative autobiographical friendship memories.

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Data Availability Statement
Upon publication, all R scripts and pre-processed, anonymized data will be made available on DataverseNL. To facilitate a double anonymized peer review process, R scripts and anonymized data are temporarily available on OSF: https://osf.io/7tnhz/?view_only=6b2837343b1e42e1b30cac8a12e8d97e. Raw AMT data is not provided to safeguard the anonymity of our study participants.

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Conflicts of Interest
The authors declare no conflict of interest.

Institutional Review Board Statement
The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Medical Ethics Committee Leiden The Hague Delft (NL80017.058.21) in July 2022.

Informed Consent Statement
Informed consent was obtained from all subjects involved in the study.

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Supplementary Information

Confirmatory Analyses: Subtracting the Number of Omissions from the Autobiographical Memory Specificity Score

For each valence, the proportion of specific memories was calculated by dividing the number of specific memories by the total number of cue words and subtracting the number of omissions, as per Debeer et al. (2009) and Hitchcock et al. (2019). A higher proportion indicates a more specific recall of friendship memoires for that valence. Four additional outliers were detected demonstrating strongly lower specificity of both positive and negative autobiographical friendship memories, resulting in a confirmatory sample size of $N = 94$.

Associations between Friendship Support and Autobiographical Friendship Memory Specificity

Model	AIC	BIC
1: Friendship support	222.43	230.06
2: Friendship support + maltreatment experiences + age + gender identity	227.93	243.19

Table S1.1.1. Model fit statistic for all robust hierarchical multiple regression models predicting positive autobiographical friendship memory specificity. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	*β*	SE	95% CI	*t*	*p*
Model 1					
Intercept	0.18	0.08	[0.03, 0.34]	2.40	**.018**
Friendship support	0.09	0.09	[-0.09, 0.27]	0.99	.325
Model 2					
Intercept	0.49	0.99	[-1.47, 2.45]	0.50	.621
Friendship support	0.08	0.10	[-0.12, 0.27]	0.76	.451
Maltreatment experiences	-0.03	0.09	[-0.20, 0.15]	-0.30	.762
Age	-0.02	0.04	[-0.10, 0.07]	-0.42	.679
Gender identity	0.04	0.20	[-0.36, 0.44]	0.21	.838

Table S1.1.2. Model estimates for all robust hierarchical multiple regression models predicting positive autobiographical friendship memory specificity. The best fitting model was #1. β = standardized coefficients; 95% CI = 95% confidence interval. Bold denotes significant effects.

Model	AIC	BIC
1: Friendship support	223.65	231.28
2: Friendship support + maltreatment experiences + age + gender identity	229.58	244.84

Table S1.1.3. Model fit statistic for all robust hierarchical multiple regression models predicting negative autobiographical friendship memory specificity. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	*β*	SE	95% CI	*t*	*p*
Model 1					
Intercept	0.29	0.05	[0.19, 0.39]	6.02	**< .001**
Friendship support	0.01	0.06	[-0.11, 0.12]	0.15	.880
Model 2					
Intercept	0.50	0.63	[-0.75, 1.74]	0.79	.431
Friendship support	0.02	0.06	[-0.11, 0.14]	0.29	.774
Maltreatment experiences	0.03	0.06	[-0.08, 0.14]	0.49	.625
Age	-0.01	0.03	[-0.06, 0.05]	-0.31	.759
Gender identity	-0.02	0.13	[-0.27, 0.24]	-0.12	.901

Table S1.1.4. Model estimates for all robust hierarchical multiple regression models predicting negative autobiographical friendship memory specificity. The best fitting model was #1. β = standardized coefficients; 95% CI = 95% confidence interval. Bold denotes significant effects.

Associations between Autobiographical Friendship Memory Specificity and Perceived Stress

Model	AIC	BIC
1: Positive memory specificity	264.96	272.59
2: Positive memory specificity + maltreatment experiences + age + gender identity	270.04	285.30

Table S1.2.1. Model fit statistic for all robust hierarchical multiple regression models predicting perceived stress. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	*β*	SE	95% CI	*t*	*p*
Model 1					
Intercept	-0.03	0.11	[-0.25, 0.19]	-0.26	.796
Positive memory specificity	0.16	0.14	[-0.12, 0.44]	1.13	.259
Model 2					
Intercept	0.46	1.36	[-2.25, 3.16]	0.34	.738
Positive memory specificity	0.17	0.14	[-0.11, 0.45]	1.19	.236
Maltreatment experiences	0.11	0.12	[-0.12, 0.34]	0.96	.339
Age	-0.01	0.06	[-0.13, 0.11]	-0.13	.898
Gender identity	-0.18	0.27	[-0.72, 0.36]	-0.66	.511

Table S1.2.2. Model estimates for all robust hierarchical multiple regression models predicting perceived stress. The best fitting model was #1. *β* = standardized coefficients; 95% CI = 95% confidence interval.

Model	AIC	BIC
1: Negative memory specificity	265.98	273.61
2: Negative memory specificity + maltreatment experiences + age + gender identity	271.15	286.41

Table S1.2.3. Model fit statistic for all robust hierarchical multiple regression models predicting perceived stress. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	*β*	SE	95% CI	*t*	*p*
Model 1					
Intercept	-0.03	0.11	[-0.24, 0.20]	-0.16	.872
Negative memory specificity	0.07	0.15	[-0.22, 0.36]	0.48	.632
Model 2					
Intercept	0.57	1.39	[-2.21, 3.34]	0.41	.686
Negative memory specificity	0.07	0.15	[-0.23, 0.36]	0.45	.654
Maltreatment experiences	0.11	0.12	[-0.13, 0.34]	0.89	.376
Age	-0.01	0.06	[-0.13, 0.11]	-0.20	.843
Gender identity	-0.18	0.28	[-0.74, 0.38]	-0.64	.523

Table S1.2.4. Model estimates for all robust hierarchical multiple regression models predicting perceived stress. The best fitting model was #1. β = standardized coefficients; 95% CI = 95% confidence interval.

Associations between Autobiographical Friendship Memory Specificity and Depressive Symptoms

Model	AIC	BIC
1: Positive memory specificity	248.78	256.41
2: Positive memory specificity + maltreatment experiences + age + gender identity	243.53	258.78

Table S1.3.1. Model fit statistic for all robust hierarchical multiple regression models predicting depressive symptoms. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	β	SE	95% CI	t	p
Model 1					
Intercept	-0.09	0.09	[-0.28, 0.09]	-1.02	.310
Positive memory specificity	0.05	0.12	[-0.18, 0.28]	0.42	.677
Model 2					
Intercept	-0.21	1.06	[-2.31, 1.90]	-0.20	.844
Positive memory specificity	0.07	0.11	[-0.15, 0.29]	1.59	.556
Maltreatment experiences	0.33	0.09	[0.15, 0.51]	3.65	**< .001**
Age	-0.003	0.05	[-0.10, 0.09]	-0.06	.949
Gender identity	0.10	0.21	[-0.33, 0.52]	0.45	.653

Table S1.3.2. Model estimates for all robust hierarchical multiple regression models predicting depressive symptoms. The best fitting model was #2 with f_p^2 = 0.13, p_{FDW} = .001 for maltreatment experiences. β = standardized coefficients; 95% CI = 95% confidence interval. Bold denotes significant effects.

Model	AIC	BIC
1: Negative memory specificity	247.83	255.46
2: Negative memory specificity + maltreatment experiences + age + gender identity	242.68	257.93

Table S1.3.3. Model fit statistic for all robust hierarchical multiple regression models predicting depressive symptoms. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	β	SE	95% CI	t	p
Model 1					
Intercept	-0.10	0.09	[-0.28, 0.08]	-1.12	.265
Negative memory specificity	0.13	0.12	[-0.11, 0.36]	1.07	.289
Model 2					
Intercept	-0.17	1.03	[-2.23, 1.88]	-0.17	.868
Negative memory specificity	0.11	0.11	[-0.11, 0.33]	0.98	.328
Maltreatment experiences	0.33	0.09	[0.15, 0.51]	3.72	**< .001**
Age	-0.003	0.05	[-0.09, 0.09]	-0.09	.932
Gender identity	0.08	0.21	[-0.33, 0.50]	0.41	.686

Table S1.3.4. Model estimates for all robust hierarchical multiple regression models predicting depressive symptoms. The best fitting model was #2 with f_p^2 = 0.13, p_{FDR} = .001 for maltreatment experiences. β = standardized coefficients; 95% CI = 95% confidence interval. Bold denotes significant effects.

Testing for Normality

	Outcome Variable	W	p	Skewness	Kurtosis
Model 1	Positive memory specificity	0.883	**< .001**	-0.78	-0.25
Model 2	Negative memory specificity	0.891	**< .001**	-0.59	-0.42
Model 3	Perceived stress	0.991	.789	0.07	-0.51
Model 4	Depressive symptoms	0.913	**< .001**	0.81	-0.31

Table S2. Shapiro–Wilk tests to assess normality of main variables after outlier removal (N = 98). W = Shapiro–Wilk test statistic. Bold denotes significant effects.

Robust Hierarchical Multiple Regressions
Associations between Friendship Support and Autobiographical Friendship Memory Specificity

Model	AIC	BIC
1: Friendship support	276.30	284.06
2: Friendship support + maltreatment experiences + age + gender identity	280.36	295.87

Table S3.1.1. Model fit statistic for all robust hierarchical multiple regression models predicting positive autobiographical friendship memory specificity. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	*β*	SE	95% CI	*t*	*p*
Model 1					
Intercept	0.07	0.10	[-0.12, 0.27]	0.76	.452
Friendship support	0.15	0.11	[-0.07, 0.38]	1.34	.183
Model 2					
Intercept	0.22	1.25	[-2.26, 2.70]	0.18	.859
Friendship support	0.10	0.12	[-0.14, 0.35]	0.83	.407
Maltreatment experiences	-0.05	0.11	[-0.27, 0.17]	-0.43	.669
Age	-0.03	0.05	[-0.14, 0.08]	-0.56	.579
Gender identity	0.28	0.24	[-0.21, 0.76]	1.14	.257

Table S3.1.2. Model estimates for all robust hierarchical multiple regression models predicting positive autobiographical friendship memory specificity. The best fitting model was #1. β = standardized coefficients; 95% CI = 95% confidence interval.

Model	AIC	BIC
1: Friendship support	280.39	288.15
2: Friendship support + maltreatment experiences + age + gender identity	285.08	300.59

Table S3.1.3. Model fit statistic for all robust hierarchical multiple regression models predicting negative autobiographical friendship memory specificity. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	*β*	SE	95% CI	*t*	*p*
Model 1					
Intercept	0.09	0.10	[-0.12, 0.29]	0.83	.410
Friendship support	0.02	0.12	[-0.22, 0.26]	0.16	.869
Model 2					
Intercept	0.36	1.35	[-2.33, 3.04]	0.26	.794
Friendship support	0.04	0.13	[-0.23, 0.30]	0.28	.783
Maltreatment experiences	0.09	0.12	[-0.15, 0.33]	0.76	.447
Age	-0.02	0.06	[-0.14, 0.10]	-0.36	.718
Gender identity	0.10	0.27	[-0.43, 0.62]	0.36	.721

Table S3.1.4. Model estimates for all robust hierarchical multiple regression models predicting negative autobiographical friendship memory specificity. The best fitting model was #1. *β* = standardized coefficients; 95% CI = 95% confidence interval.

Association between Friendship Support and Perceived Stress

Model	AIC	BIC
1: Friendship support	268.95	276.71
2: Friendship support + maltreatment experiences + age + gender identity	274.64	290.15

Table S3.2.1. Model fit statistic for all robust hierarchical multiple regression models predicting perceived stress. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	*β*	SE	95% CI	*t*	*p*
Model 1					
Intercept	-0.01	0.10	[-0.21, 0.19]	-0.11	.410
Friendship support	-0.44	0.12	[-0.68, -0.21]	-3.74	**< .001**
Model 2					
Intercept	-0.03	1.31	[-2.64, 2.58]	-0.02	.981
Friendship support	-0.47	0.13	[-0.72, -0.21]	-3.58	**< .001**
Maltreatment experiences	-0.04	0.12	[-0.27, 0.20]	-0.31	.754
Age	-0.01	0.06	[-0.12, 0.11]	-0.14	.891
Gender identity	0.10	0.26	[-0.41, 0.61]	0.40	.686

Table S3.2.2. Model estimates for all robust hierarchical multiple regression models predicting perceived stress. The best fitting model was #1 with $f_p^2 = 0.16$ for friendship support. *β* = standardized coefficients; 95% CI = 95% confidence interval. Bold denotes significant effects.

Association between Friendship Support and Depressive Symptoms

Model	AIC	BIC
1: Friendship support	255.66	263.42
2: Friendship support + maltreatment experiences + age + gender identity	253.50	269.01

Table S3.3.1. Model fit statistic for all robust hierarchical multiple regression models predicting depressive symptoms. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	*β*	SE	95% CI	*t*	*p*
Model 1					
Intercept	-0.10	0.09	[-0.27, 0.07]	-1.14	.256
Friendship support	-0.30	0.10	[-0.50, -0.10]	-2.97	**.004**
Model 2					
Intercept	-0.34	1.03	[-2.39, 1.71]	-0.33	.742
Friendship support	-0.21	0.10	[-0.42, -0.01]	-2.07	**.041**
Maltreatment experiences	0.25	0.09	[0.07, 0.44]	2.72	**.008**
Age	-0.01	0.05	[-0.10, 0.08]	-0.20	.844
Gender identity	0.24	0.20	[-0.16, 0.64]	1.18	.242

Table S3.3.2. Model estimates for all robust hierarchical multiple regression models predicting depressive symptoms. The best fitting model was #2 with f_p^2 = 0.07 for friendship support and f_p^2 = 0.08 for maltreatment experiences. β = standardized coefficients; 95% CI = 95% confidence interval. Bold denotes significant effects.

Associations between Autobiographical Friendship Memory Specificity and Perceived Stress

Model	AIC	BIC
1: Positive memory specificity	280.80	288.56
2: Positive memory specificity + maltreatment experiences + age + gender identity	285.61	301.12

Table S3.4.1. Model fit statistic for all robust hierarchical multiple regression models predicting perceived stress. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	*β*	SE	95% CI	*t*	*p*
Model 1					
Intercept	-0.02	0.11	[-0.24, 0.19]	-0.23	.818
Positive memory specificity	0.18	0.11	[-0.04, 0.41]	1.65	.102
Model 2					
Intercept	0.66	1.34	[-2.00, 3.33]	0.49	.623
Positive memory specificity	0.20	0.11	[-0.02, 0.43]	1.82	.072
Maltreatment experiences	0.13	0.12	[-0.10, 0.36]	1.13	.262
Age	-0.02	0.06	[-0.14, 0.10]	-0.30	.761
Gender identity	-0.17	0.26	[-0.68, 0.34]	-0.65	.514

Table S3.4.2. Model estimates for all robust hierarchical multiple regression models predicting perceived stress. The best fitting model was #1. β = standardized coefficients; 95% CI = 95% confidence interval.

Model	AIC	BIC
1: Negative memory specificity	278.87	286.62
2: Negative memory specificity + maltreatment experiences + age + gender identity	284.11	299.62

Table S3.4.3. Model fit statistic for all robust hierarchical multiple regression models predicting perceived stress. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	*β*	SE	95% CI	*t*	*p*
Model 1					
Intercept	-0.03	0.11	[-0.24, 0.19]	-0.24	.812
Negative memory specificity	0.20	0.11	[-0.02, 0.41]	1.84	.069
Model 2					
Intercept	0.77	1.38	[-1.97, 3.50]	0.55	.580
Negative memory specificity	0.19	0.11	[-0.04, 0.41]	1.66	.100
Maltreatment experiences	0.09	0.12	[-0.15, 0.32]	0.73	.466
Age	-0.03	0.06	[-0.15, 0.09]	-0.43	.668
Gender identity	-0.13	0.26	[-0.65, 0.40]	-0.48	.630

Table S3.4.4. Model estimates for all robust hierarchical multiple regression models predicting perceived stress. The best fitting model was #1. β = standardized coefficients; 95% CI = 95% confidence interval.

Associations between Autobiographical Friendship Memory Specificity and Depressive Symptoms

Model	AIC	BIC
1: Positive memory specificity	260.87	268.63
2: Positive memory specificity + maltreatment experiences + age + gender identity	255.73	271.24

Table S3.5.1. Model fit statistic for all robust hierarchical multiple regression models predicting depressive symptoms. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	β	SE	95% CI	t	p
Model 1					
Intercept	-0.10	0.09	[-0.28, 0.07]	-1.19	.236
Positive memory specificity	0.10	0.09	[-0.07, 0.28]	1.16	.251
Model 2					
Intercept	-0.02	1.01	[-2.02, 1.99]	-0.02	.987
Positive memory specificity	0.12	0.08	[-0.05, 0.29]	1.43	.157
Maltreatment experiences	0.34	0.09	[0.16, 0.51]	3.87	**< .001**
Age	-0.01	0.04	[-0.10, 0.08]	-0.26	.794
Gender identity	0.09	0.19	[-0.30, 0.47]	0.44	.659

Table S3.5.2. Model estimates for all robust hierarchical multiple regression models predicting depressive symptoms. The best fitting model was #2 with f_p^2 = 0.12, p_{FDR} = .001 for maltreatment experiences. β = standardized coefficients; 95% CI = 95% confidence interval. Bold denotes significant effects.

Model	AIC	BIC
1: Negative memory specificity	255.49	263.24
2: Negative memory specificity + maltreatment experiences + age + gender identity	251.35	266.86

Table S3.5.3. Model fit statistic for all robust hierarchical multiple regression models predicting depressive symptoms. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	β	SE	95% CI	t	p
Model 1					
Intercept	-0.10	0.09	[-0.28, 0.07]	-1.20	.234
Negative memory specificity	0.21	0.09	[0.04, 0.39]	2.40	**.018**
Model 2					
Intercept	0.13	1.03	[-1.91, 2.17]	0.13	.898
Negative memory specificity	0.17	0.08	[0.01, 0.34]	2.07	**.041**
Maltreatment experiences	0.30	0.09	[0.13, 0.48]	3.44	**< .001**
Age	-0.02	0.05	[-0.11, 0.07]	-0.38	.706
Gender identity	0.08	0.20	[-0.31, 0.47]	0.40	.688

Table S3.5.4. Model estimates for all robust hierarchical multiple regression models predicting depressive symptoms. The best fitting model was #2 with f_p^2 = 0.07, p_{FDR} = .082 for negative memory specificity and f_p^2 = 0.11, p_{FDR} = .001 for maltreatment experiences. β = standardized coefficients; 95% CI = 95% confidence interval. Bold denotes significant effects.

Association between Perceived Stress and Depressive Symptoms

Model	AIC	BIC
1: Perceived stress	212.86	220.62
2: Perceived stress + maltreatment experiences + age + gender identity	204.31	219.82

Table S3.6.1. Model fit statistic for all robust hierarchical multiple regression models predicting depressive symptoms. AIC = Akaike information criterion; BIC = Bayesian information criterion.

Parameters	β	SE	95% CI	t	p
Model 1					
Intercept	-0.10	0.06	[-0.22, 0.02]	-1.64	.104
Perceived stress	0.58	0.06	[0.46, 0.70]	9.39	< **.001**
Model 2					
Intercept	-0.19	0.78	[-1.74, 1.36]	-0.24	.810
Perceived stress	0.56	0.06	[0.43, 0.68]	8.87	< **.001**
Maltreatment experiences	0.21	0.07	[0.08, 0.35]	3.20	**.002**
Age	-0.01	0.03	[-0.08, 0.06]	-0.27	.786
Gender identity	0.17	0.15	[-0.13, 0.46]	1.12	.267

Table S3.6.2. Model estimates for all robust hierarchical multiple regression models predicting depressive symptoms. The best fitting model was #2 with f_p^2 = 0.77 for perceived stress and f_p^2 = 0.15 for maltreatment experiences. β = standardized coefficients; 95% CI = 95% confidence interval. Bold denotes significant effects.

Spearman's Rank Correlations

Non-parametric Spearman's rank correlations (r_s) are presented in Table 4.1 alongside significance levels. Correlation coefficients can be interpreted as small (r_s = .15 to .24), medium (r_s = .25 to .34), or large ($r_s \geq .35$) (Gignac & Szodorai, 2016; Schober et al., 2018). First, the correlations between friendship support and specificity of both positive (r_s = .09, p = .392) and negative (r_s = .05, p = .653) autobiographical friendship memories were non-significant (rejecting hypothesis 1.1). However, we observed a moderate negative correlation between friendship support and perceived stress (r_s = -.34, 95% $CI_{bootstrap}$ [-0.51, -0.16], p < .001; confirming hypothesis 1.2) as well as a moderate negative correlation between friendship support and depressive symptoms (r_s = -.25, 95% $CI_{bootstrap}$ [-0.45, -0.04], p = .018; confirming hypothesis 1.3). Second, the correlations between specificity of positive autobiographical friendship memories and perceived stress (r_s = .13, p = .209) as well as between positive memory specificity and depressive symptoms (r_s = .11, p = .335) were non-significant (rejecting hypotheses 2.1 and 2.2). Third, we observed a strong positive correlation between perceived stress and depressive symptoms (r_s = .67, 95% $CI_{bootstrap}$ [0.53, 0.78], p < .001; confirming hypothesis 3).

In addition to our a priori hypotheses, we observed a small positive correlation between specificity of positive and negative autobiographical friendship memories (r_s = .21, 95% $CI_{bootstrap}$ [0.02, 0.39], p = .032). Next, we observed a small positive correlation between specificity of negative autobiographical friendship memories and depressive symptoms (r_s = .20, 95% $CI_{bootstrap}$ [0.01,

0.39], p = .042). Further, we observed a moderate negative correlation between maltreatment experiences and friendship support (r_s = -.27, 95% $CI_{bootstrap}$ [-0.45, -0.07], p = .006). In addition, maltreatment experiences were positively correlated with depressive symptoms (r_s =.39, 95% $CI_{bootstrap}$ [0.23, 0.54], p < .001).

	Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1.	Age	-						
2.	Gender identity (female)	.01	-					
3.	Positive memory specificity	-.10	.10	-				
4.	Negative memory specificity	-.03	.04	**.21***	-			
5.	Maltreatment experiences	.07	.12	-.09	.10	-		
6.	Friendship support	.08	.12	.09	.05	**-.27****	-	
7.	Depressive symptoms	-.01	.09	.11	**.20***	**.39*****	**-.25***	-
8.	Perceived stress	-.05	-.04	.13	.18	.18	**-.34*****	**.67*****

Table 4.1. Spearman's rank correlations between study variables (N = 97). Gender identity was dummy coded with female as the reference category (female = 1, male = 0). To simplify interpretation, the non-binary category (n = 1) was excluded from these bivariate correlation analyses, which did not significantly affect the reported correlation coefficients. Significant correlations appear in bold. $^{***}p < .001$, $^{**}p < .01$, $^{*}p < .05$.