Studying the relationship between adverse life events and mental health outcomes in students
Groenhof, Kai

Studying the relationship between adverse life events and mental health outcomes in students

Abstract

Research into Adverse Life Events (ALE) is rarely focused on students. ALE are a common experience among students and may have significant effects on mental health outcomes such as depression, anxiety, stress, and lifetime depression. In this study we use multiple measures for ALE, which assess several types of ALE, including life trauma, childhood trauma, bullying, childhood adversities and negative life experiences. These outcomes are measured by the PHQ-9, GAD-7, PSS-10 and the LIDAS. This study investigated the relationships between ALE and these mental health outcomes, together with the predictive role of childhood trauma, negative life experiences, being bullied and childhood adversities by using multiple regression. In addition, we explored the role of gender as a control variable and conducted an exploratory network analysis. A multicohort study provided data from a sample of 449 Dutch higher education students who completed self-report measures of mental health outcomes and ALE experiences. The results showed that negative life events are significant predictors for all four mental health outcomes. Childhood trauma predicted depression, lifetime depression and stress, and life trauma were predictive of depression. Overall, these findings were supported by network analysis. They suggest that negative life events may be more impactful to current mental health than life trauma, and that both can have a lasting impact on the mental health of students. The implications and alternative explanations for these findings are discussed, together with suggestions for future research.

Keywords: adverse life events, students, mental health, depression, anxiety, stress, trauma, network analysis

Background

Recent literature has shown that students are increasingly suffering from mental health problems. The prevalence of students with at least one common mental disorder in the last year is 31% according to the WHO (Auerbach et al., 2018). This is an increase of 10% compared to the 2016 paper by (Auerbach et al., 2016). Many studies have examined the effect of the COVID-19 pandemic and suggest students' mental health has worsened (Copeland et al., 2021; Lee et al., 2021; Zimmermann et al., 2021). A survey by Active Minds in April of 2020 found that 80% of college students in the US reported that COVID-19 negatively affected their mental health and that 56% did not know how to find professional mental health services (Horn, 2020).

Oswalt et al. (2020) speak of a trend where self-diagnoses of several mental health conditions are increasing in college students. Balon et al. (2015) suggest that college students are a vulnerable group and at an age where first episodes of mental disorders are common (Kessler et al., 2007). There are also indications that students tend to underutilize mental health services (Cage et al., 2020; Oswalt et al., 2020). This combination of vulnerability, high prevalence and underutilization of mental health services make college students a suitable group for better understanding the structures of their mental health.

Mood and anxiety disorders are the most common mental disorders among young adults, with substance use disorder being third (Aalto-Setälä et al., 2001; Auerbach et al., 2018; Kessler et al., 2005). Estimates between studies vary, but figures from Auerbach et al. (2018) suggest that the prevalence of mental disorders in the last 12 months are as follows: 18.5% for MDD, 16.7% for GAD, 4.5% for panic disorder, 3.1% for broad mania, 6.3% for alcohol use disorder, 3% for substance use disorder and 31.4% for any other mental disorder. These estimates make us wonder which factors may influence these disorders.

Adverse life events

Mental disorders are complex, multifactorial and have many different risk factors and etiologies (Borsboom, 2017; Fried et al., 2014, 2017; Kendler, 2016). Many risk factors for mental health problems are already well documented, such as having a history of depression, childhood stress, stressful life events and sex predict higher symptoms of depression (Fried et al., 2014). Other risk factors include sexual orientation, socioeconomic status, being an

undergraduate, number of working hours (Said et al., 2013), alcohol use and high stress (Xu et al., 2021).

In this paper, we will focus on Adverse Life Events (ALE) as predictors for mental health problems (Peng et al., 2012; Shankar & Park, 2016). ALE, such as natural disasters, abuse, romantic break-ups, sudden loss, and (childhood) trauma, are widely recognized as major stressors that can have a significant impact on mental health (Andersen & Teicher, 2009; Grant et al., 2004; Hammen, 2005; Kendler et al., 1999; Kim et al., 2003; March-Llanes et al., 2017). For example, Monroe et al. (1999) found that recent romantic break-ups predicted onset of major depression in adolescents. However, it did not predict recurrence of depression. Another example is a systematic review by Sheldon et al. (2021), who found that pooled prevalence of depression was 25%. Depression was predicted by current mental health problems, rumination, parent separation, and experiences of sexual harassment. Studies have shown that ALE are related to the potential onset, development, and maintenance of depression (Kessler, 1997) (Paykel, 2003) and anxiety (Miloyan et al., 2018). ALE are also linked to health risk factors, even though certain experiences are not considered traumatic at the clinical level, they are significantly associated with negative health risks across the lifespan (Felitti et al., 1998)

These papers have also shown the complexities and interplay between ALE and mental health. March-Llanes et al. (2017) suggest that ALE can be a cause, but also a consequence of psychopathological spectra. Another example is a paper by Shrout et al. (1989), who found that people with major depression are 2.5 times more likely to have experienced a negative life event than healthy controls. Other less severe seeming life events are also linked to development of depression. Grant et al. (2004) show that ALE predict increases in symptoms over time and especially people who were already vulnerable to or had mental health symptoms will worsen over time due to these ALE. Furthermore, they also support the reciprocal effect of mental disorders predicting additional ALE.

Hammen et al. (2005) and Kendler et al. (1999) mainly focus on the causal relation between life events and depression. Hammen et al. recall previous research which shows that 80% of depressed cases were preceded by major life events (Mazure, 1998), while Kendler et al. show that the odds ratios for 11 out of 15 stressful life events were significantly associated with onset of major depression in women. The largest odds ratios in the month of an event were for

assault (25.36), marital problems (8.39), housing problems (7.24), death in a social network (6.29) and financial problems (5.85) (Kendler et al., 1999).

In a sample of (n = 6053) undergraduate college students, 55.8% - 84.5% experienced at least 1 adverse event, 9% reported symptoms consistent with a clinical diagnosis of PTSD, 11% reported subclinical symptoms of PTSD and women reported higher severity of events except divorce of parents (Smyth et al., 2008). Smyth et al. (2008) emphasize the importance of identifying students who experienced ALE so university counseling services may provide their support. Furthermore, they found that ALE are associated with dropping out, poorer academic performance or not even attending higher education.

Multiple studies suggest age also plays a role in the development of mental disorders, as early exposure to stress can fundamentally alter stress sensitivity and response bias, which in turn can lead to increased drug use, earlier drug use and increased dependence on drugs (Andersen & Teicher, 2009). The mechanism behind this is that the development of the prefrontal cortex, nucleus accumbens and hippocampus are affected by early stress (Andersen & Teicher, 2009). This finding is related to a study done by Kim et al. (2003), who found that ALE can predict delinquent behavior and vice versa. In short, people who experienced ALE are more likely to suffer from a substance abuse disorder due to enhanced response rates to drug-related cues, increased drug-seeking, and dependency (Andersen & Teicher, 2009). In turn, these vicious cycles can often maintain each other.

Research into the relation between ALE and mental health has come a long way. However, students have rarely been the main subject of these studies. Sheldon et al. (2021) also note that research into student mental health is hampered by imprecise terms and highlight the importance of understanding risk factors for mental health. By understanding risk factors, such as ALE, proper interventions can be tailored to students and early recognition of at-risk students can help prevent mental health crises. As prevention is seen as the most effective way of fighting mental health, it is important to understand how ALE affect younger populations so timely intervention or even prevention can happen (Cuijpers et al., 2012; Muñoz et al., 2010).

Previous research concerning ALE in students

Holmes & Rahe (1967) were the first to create a tool to measure the impact of various life events with the Social Readjustment Rating Scale (SRRS). Most of the research publications on

life events and stressful life events from 1967 until at least 2005 included the SRRS as a form of measurement (Dohrenwend, 2006). The SRRS contains 43 life events such as marriage, death of a spouse, child leaving home, pregnancy and more. Many of the 43 events are not regularly applicable to the lives of students. This means that much of the research done using the SRRS would not necessarily be applicable to the lives of students. Therefore, the question remains on how ALE affect students specifically. In general, they will experience different types and quantities of ALE compared to older adults. For example, students are less likely to get divorced than their graduated peers. Grant et al. (2004) recommend focusing on a particular period of development, as different experiences may vary across development. By focusing on students, another benefit is that they have a greater ability to report on their stressful experiences, compared to younger children. This would lead to a better understanding of stressors in students, which could help form a better taxonomy of stressors which is highly needed in stress measurement research (Grant et al., 2004; Sheldon et al., 2021).

People who experienced four or more ALE in childhood were more likely to smoke, abuse drugs, to be obese, and have STDs (Felitti et al., 1998). These consequences were related to increased heart disease, cancer, lung disease and liver disease. Primary prevention of adverse childhood experiences is difficult to put into practice and would require societal changes to improve the quality of household environments. Secondary prevention requires recognition of the occurrence and understanding of behavioral coping to deal with the impact of these experiences. ALE in childhood also seem to influence the academic performance of students (Ji & Wang, 2018). ALE had a significant impact on working memory, cognitive flexibility, and inhibition ability, showing once more how interactive these phenomena are. This calls for increased training, communication and understanding between multiple health disciplines, which is difficult, but more feasible than wide societal change. By intervening early, the cumulative effects of negative consequences may be limited.

Davies et al. (2022) found that 37% of students meet the diagnosis for generalized anxiety disorder, with life stressors and childhood adversity being significantly associated with higher levels of anxiety and lower levels of mental health. They also mention that only a few studies investigate ALE and its effects on students specifically, for example, a comparable Australian survey found that 17.5% of students met the diagnosis for GAD (Farrer et al., 2016).

This disparity implies more research is needed to better understand the prevalence, mechanics and relationships between ALE and mental health in students.

Aims and Objectives

This study aims to bridge the gap between knowledge concerning ALE in adults and students, and entails studying the relation between diverse ALE and mental health outcomes.

On the predictor side, we will focus on a diverse set of ALE, including romantic break-ups, betrayal, sexual harassment, and childhood trauma. On the outcome side, we will focus on depression, anxiety, stress in the last two weeks and lifetime depression.

On the outcome side, we will investigate if ALE are related to depression, anxiety, stress, and lifetime depression. Overall, studying a relatively homogeneous sample of students compared to the general population may help to better understand the relation between ALE and mental health outcomes in students.

Hypothesis

Because ALE have been shown to be linked to greater prevalence of and risk for depression, anxiety, and stress, the following hypotheses have been developed:

It is expected that students who score higher on the measures of ALE will score higher on measures of depression (H1), anxiety (H2), stress (H3) and lifetime depression (H4). These hypotheses are based on studies, e.g. by Peng et al. (2012), Muscatell et al. (2009), (Nemeroff, 2004) and Miloyan et al. (2018) who found that negative life events and mental health problems are correlated, that ALE are associated with the onset of anxiety disorders, that ALE are related to increased stress responsiveness, and that people who experienced severe life events had more severe depression.

Methods

This study utilizes part of the data collected in the WARN-D project, which is a multicohort study following a total of ~2000 students living in the Netherlands for two years. The data analyzed in this study is from ($n = 449$) participants part of stage one of the WARN-D project. Stage one contains baseline assessments from one cross-sectional data point. After stage 1 is finished, the students go through two further years of assessments. In the first three months,

they wear smartwatches and receive four daily questionnaires about their mood, activities and sleep which take one to two minutes to complete. Examples include "How tired are you right now?" and "How sad are you right now?". After three months, they receive follow-up surveys to detect any changes in mental health.

Participants

The participants were recruited from Dutch educational institutions and were at least 18 years old. Of the 448 participants 15% were male ($n = 68$), 85% were female ($n = 380$). 50% had a Dutch nationality ($n = 226$), 39% had a nationality other than Dutch ($n = 176$) and 10% had more than one nationality ($n = 46$). The ages ranged from 18 to 53 with ($M = 22.65$, $SD = 3.99$). All participants were students living in the Netherlands. Participants were compensated based on the amount of completed surveys up to 90 euros in total. Participants experiencing at least moderate depression, mania, thought disorders, substance use disorder, suicidal ideation and participants indicating that seeing daily calories burnt would be stressful were excluded in a screener survey before the study started (Fried et al., 2022). More details on measurement, procedure and design can be found at https://psyarxiv.com/9qcvs.

Measures

We separate the constructs into predictors and outcomes. The predictors consist of ALE. Under ALE we consider life trauma, childhood trauma, childhood bullying, childhood adversities, and negative life experiences such as romantic break ups and serious arguments.

Life trauma is measured through the LEC-5, which assesses exposure to events that could lead to PTSD (Gray et al., 2004). This scale lists 13 questions asking participants whether these stressful events happened to them. The participants can respond 'no', 'yes' or 'doesn't apply', and if they answer 'yes', they can specify whether the event happened to them or if they witnessed it. An example event is: 'Exposure to a toxic substance (for example, dangerous chemicals, radiation)'. In this analysis we created a sum score which takes the score of events that happened personally to a participant, and the score that they witnessed, and combines them with events that happened personally weighing twice as much as witnessing events. There is no scientific backing for this as the LEC-5 was originally intended to count the number of events someone has witnessed. However, to make practical use, we decided to combine the two scores

with an intuitive scale, with the idea that experiencing an event is more traumatic than witnessing one. This way analyses can be run with a sum score that takes both into account. Furthermore, this weighted score is used to replace the happened and witnessed scores due to the strong multicollinearity between them. In the analysis, this score will be denoted as 'weighted ALE.'

Childhood trauma is measured by the CTQ-SF, which assesses a broad range of traumatic experiences in childhood (Bernstein et al., 2003). The CTQ-SF is a shorter version of the original CTQ, with 28 items instead of 70 and uses a 5-point Likert scale ranging from 'Never true' to 'Very often true'. These items assess five clinical scales, namely emotional, physical, and sexual abuse, together with emotional and physical neglect. Example items include 'People in my family hit me so hard that it left me with bruises or marks,' 'I felt loved' and 'I didn't have enough to eat'. The original CTQ has high internal consistency, with Cronbach's alpha ranging from 0.79 to 0.94 and test-rest reliability of 0.88 (Bernstein et al., 1994). Studies have shown that the CTQ-SF has good internal consistency (Cronbach's alpha = 0.85) and test-retest reliability (ICC = 0.72) (Wang et al., 2022).

Childhood bullying is measured by a self-report questionnaire provided by the Caring Universities (CU) service; CU is a free online e-health program created by various Dutch universities designed to improve the mental health of students. They offer different programs to improve mood, stress, and sleep. The CU is embedded within the WHO World Mental Health International College Student (WMH-ICS) initiative, which aims to gather data on mental disorders among college students and implement web-based interventions for these disorders (Cuijpers et al., 2019). Childhood bullying asks the participant how often they were bullied as a child or teenager with a definition of 'bullying' on a 5-point Likert scale ranging from 'Never' to 'Very often'.

Childhood adversities are measured by a self-report questionnaire provided by the Caring Universities service. The participants are asked five questions on a 5-point Likert scale ranging from 'Never' to 'Very often'. These questions relate to parental adversities and are preceded by the phrase 'How much of the time did you have each of the following experiences up through age 17?'. Examples include: 'One of your parents (or the people who raised you) was involved in criminal activities' or 'One of your parents (or the people who raised you) had a serious alcohol or drug problem'.

Negative life experiences are measured by a self-report questionnaire provided by the Caring Universities service. This questionnaire asks participants if they experienced nine stressful experiences in the past 12 months, the participants could answer 'no' or 'yes'. Examples include 'a break-up with a romantic partner', 'you were sexually harassed' and 'you had a serious legal problem'.

The outcome variables consist of anxiety, stress, depression (each measured for the last 2 weeks) as well as lifetime depression.

Anxiety is measured by the GAD-7, which measures symptoms of General Anxiety Disorder over the last two weeks (Spitzer et al., 2006). It has good internal consistency (Cronbach's alpha = 0.92) and good test-retest reliability (intraclass correlation = 0.83) (Spitzer et al., 2006). The GAD-7 had a pooled sensitivity of 0.83 and specificity of 0.84 in a sample of 5223 participants (Plummer et al., 2016). It consists of 7 items asking how often participants have been bothered by seven problems in the past two weeks. Participants can answer on a 4-point Likert scale ranging from 'Not at all' to 'Nearly every day'. Scoring ranges from 0-21, with 0-4 being minimal anxiety, 5-9 mild anxiety, 10-14 moderate anxiety and 15-21 severe anxiety. Example problems include 'Feeling nervous, anxious or on edge', 'not being able to stop or control worrying' and 'trouble relaxing'.

Stress is measured by the PSS-10, which measures stress levels in people aged 12 and above in the last two weeks (Cohen et al., 1983). It has good internal consistency with Cronbach's alpha ranging from 0.78 to 0.91 over 19 articles (Lee, 2012). The PSS-10 has 10 items on a 5-point Likert scale ranging from 'Never' to 'Very often'. Example items include 'How often have you felt nervous and stressed?' and 'How often have you been able to control irritations in your life?'. Scores range from 0-40 with 0-13 being considered low stress, 14-26 moderate and 27-40 high stress.

Depression is measured by an adapted version of the PHQ-9, (excluding irritability), which measures depressive symptoms in the last 2 weeks (Kroenke et al., 2001). This version of the PHQ aggregated symptoms by choosing the highest value of a symptom. Furthermore, it split item 3 "Trouble falling or staying asleep or sleeping too much?" into 2 separate items of insomnia and hypersomnia. This makes it have 14 items, with answers on a 4-point Likert scale ranging from 'Not at all' to 'Nearly every day'. Examples include 'poor appetite', 'feeling down or depressed' and 'little interest or pleasure in doing things. It has good internal consistency with

a Cronbach's alpha of 0.89 and good test-rest reliability of 0.84 (Kroenke et al., 2001). Furthermore, it has a sensitivity of 88% and specificity of 88% for major depression (Kroenke et al., 2001).

Lifetime depression is measured by the LIDAS, which measures the quantity and severity of depressive episodes during the participant's lifetime (Bot et al., 2017). It has a sensitivity for lifetime MDD of 0.85 and specificity of 0.80. The LIDAS consists of 28 items asking about lifetime depressive episodes, depressive weight loss, low mood prevalence etc. Participants can answer differently depending on the question. Examples include: 'Have you ever had a time in your life when you felt sad, empty or depressed for 2 weeks or longer' which can be answered by 'no' or 'yes', and 'About how old were you the first time you had a period like this', which can be answered by typing an age (in years).

Statistical analyses

The predictors are a sum score of ALE that the participants witnessed and experienced themselves measured by the LEC-5, a sum score of ALE in childhood measured by the CTQ-SF, an ordinal score measured by the Childhood Bullying questionnaire, an ordinal score measured by the Childhood adversities questionnaire and a binary score measured by Negative life experiences. The outcomes are sum scores of current depression severity measured by the PHQ-9, binary scores of lifetime depression, measured by the LIDAS, sum scores of current anxiety severity, measured by the GAD-7 and sum scores of current stress severity measured by the PSS-10.

We will conduct four multiple regression analyses to assess the relationship between ALE measured by the LEC-5, CTQ-SF, Bullying, Childhood Adversities, and Negative life experiences, and Depression, Stress and Anxiety outcomes measured by the PHQ-9, LIDAS, PSS-10 and GAD-7. The predictors will be LEC-5, CTQ-SF, Bullying, Childhood Adversities and Negative life experiences, and the outcomes will be (1) Depression measured by the PHQ-9, (2) Lifetime depression measured by the LIDAS, (3) Stress measured by the PSS-10, and (4) Anxiety measured by the GAD-7. The variable we will control for is gender, given that this has been shown to be related to mental health problems (Rosenfield & Mouzon, 2013).

If the p value is significant for the four regressions it would confirm hypotheses H1 through H4 that students with higher ALE scores will score higher on mental health outcomes

and stress. Because multiple regression will be used four times it is important to control for multiple comparisons. Bonferroni corrections would be too strict as all outcomes are correlated with each other, therefore we used False Discovery Rates (Thissen et al., 2002).

   After the main analysis, we will estimate all variables together in a single, exploratory network model to visualize the mutual dependencies among constructs. To illustrate how the variables are related to each other, an EBICglasso network graph was created using JASP version 0.17.1. We included the six predictor variables and four outcome variables in the network model. These variables are represented by nodes and feature edges, which illustrate the connections among nodes by drawing a line between nodes. The stronger and bigger the line, the bigger the connection. Edges can be seen as partial correlation coefficients, which means that the visualized connections between nodes are already controlled for by all the other edges in the network. To eliminate any false positive connections, the network uses the least absolute shrinkage and selection operator which ignores very small edges (Armour et al., 2017). This way, only edges that are important to the network are shown.

Results

   The demographics of the studied population can be found in table one. What follows is a brief aid to interpret the table. Lifetime depression is a binary value where zero means no incidence of depression and one means at least one incidence of depression in their lifetime. The mean of 0.44 indicates that 44% of participants have had depression in their lifetime. Bullying is measured on a Likert scale from 0-4, where 0 = never, 1 = rarely, 2 = sometimes, 3 = often and 4 = very often. Childhood adversities uses the same Likert scale with the same values as bullying. Negative life events has nine binary questions where zero means no and one means yes. This means that on average, participants experienced one of the life events mentioned in the questionnaire.

Table 1: Descriptive statistics of variables included in the study

Variable	Mean	SD	Range	Skewness	Kurtosis
Age	22.65	3.99	18-53	2.85	14.32

Anxiety (GAD-7)	5.45	4.16	0-19	.89	.31
Lifetime Depression (LIDAS)	0.44	0.49	0-1	.25	-1.94
Bullying (CU)	0.95	0.41	0.38-2.61	.40	-.62
Depression (PHQ-9)	7.49	4.64	0-27	.78	.57
Childhood trauma (CTQ)	7.36	2.67	5-19	1.71	3.36
Stress (PSS-10)	17.35	6.74	0-38	.10	-.17
Childhood adversities (CU)	0.44	0.39	0.16-2.83	2.19	6.50
Negative life events (CU)	1	1.22	0-7	1.42	1.98
Weighted ALE (LEC-5)	5.44	4.30	0-23	1.04	1.01

Depression

For the first hypothesis, we expected that weighted ALE would be related to higher measures of depression. A multiple regression was conducted to examine the relationship between ALE, bullying, negative life events, childhood adversities, childhood trauma and current depression whilst controlling for gender. The results indicate that weighted ALE, childhood trauma, and negative events are significantly related to higher scores of depression. Gender was significant as a control variable, with women having higher depression scores than men.

Table 2: Results of multiple regression predicting depression by adversity and gender

Variable	B	t/F	df	p	R^2
Depression model		10.19	6.436	<.001	.123
Gender	1.64	3.30	436	.003	
Bullied	.217	1.11	436	.318	
Childhood trauma	.295	3.25	436	.003	
Childhood adversities	-.234	-.401	436	.689	
Negative life events	.496	2.73	436	.014	
Weighted ALE	.129	2.45	436	.022	

Note: All p values are adjusted using the False Discovery Rate (FDR)

Anxiety

For the second hypothesis, we expected that weighted ALE would be related to higher measures of anxiety. A multiple regression was conducted to examine the relationship between ALE, bullying, negative life events, childhood adversities, childhood trauma and current anxiety whilst controlling for gender. The results indicate that experiencing more negative life events is related to higher scores of anxiety. Gender was significant as a control variable with women having higher anxiety scores than men.

Table 3: Results of multiple regression predicting anxiety by adversity and gender

Variable	B	t/F	df	p	R^2

Variable	B	t/F	df	p	R^2
Anxiety model		6.81	6.436	<.001	.293
Gender	1.31	.71	436	.012	
Bullied	.12	.71	436	.583	
Childhood trauma	.14	1.73	436	.168	
Childhood adversities	-.296	-.55	436	.583	
Negative life events	.678	4.05	436	.006	
Weighted ALE	.02	.55	436	.583	

Note: All p values are adjusted using the False Discovery Rate (FDR)

Stress

For the third hypothesis, we expected that weighted ALE would be related to higher levels of stress. A multiple regression was conducted to examine the relationship between ALE, bullying, negative life events, childhood adversities, childhood trauma and current stress whilst controlling for gender. The results indicate that childhood trauma, negative events and gender are related to higher levels of current stress.

Table 4: Results of multiple regression predicting stress by adversity and gender

Variable	B	t/F	df	p	R^2
Stress model		7.61	6.437	<.001	.095
Gender	1.84	2.54	437	.033	

Bullied	.51	1.80	437	.094
Childhood trauma	.30	2.30	437	.044
Childhood adversities	.02	.02	437	.981
Negative life events	.69	2.64	437	.033
Weighted ALE	.13	1.76	437	.094

Note: All p values are adjusted using the False Discovery Rate (FDR)

Lifetime depression

For the fourth hypothesis, we expected that weighted ALE would be related to more likelihood of lifetime depression. A multiple regression was conducted to examine the relationship between ALE, bullying, negative life events, childhood adversities, childhood trauma and lifetime depression whilst controlling for gender. The results indicate that experiencing more negative life events and childhood trauma were related to lifetime depression. Furthermore, gender is also related to lifetime depression as women are more likely to have experienced lifetime depression than men.

Table 5: Results of multiple regression predicting lifetime depression by adversity and gender

Variable	B	t/F	df	p	R^2
Lifetime depression model		14.42	6.437	<.001	.165
Gender	.17	3.33	437	.002	
Bullied	.03	1.51	437	.130	

Childhood trauma	.03	3.51	437	.002
Childhood adversities	.10	1.62	437	.126
Negative life events	.06	3.30	437	.002
Weighted ALE	.01	1.75	437	.12

Note: All p values are adjusted using the False Discovery Rate (FDR)

Main results and assumptions of linear regression

Overall, there are some consistencies, but also differences across the four mental health outcomes. While gender and negative events were significant for all outcomes, childhood trauma was significant for all outcomes except stress, and ALE was only significant for depression. The variables of bullying and childhood adversities are never significant.

The hypotheses are examined using multiple regression, for which we test 2 assumptions, the assumption of normality and linearity. First, the assumption of normality is tested using the Kolmogorov-Smirnov test, which shows that the distribution of the dependent variables deviates significantly from normality for depressive symptoms ($W(444) = 0.101$, $p < .001$), general anxiety symptoms ($W(444) = 0.127$, $p < .001$), stress symptoms ($W(448) = 0.052$, $p = .006$) and lifetime depression ($W(448) = 0.373$, $p < .001$). There are four, two, two and no outliers for anxiety, stress, depression, and lifetime depression respectively. When checking the assumptions of linearity, the data does not violate the assumptions of homoscedasticity and normality. Furthermore, all values of VIF are <10, ranging from 1.048 to 1.384, showing an absence of multicollinearity.

Exploratory analysis

This network graph shows how and how strongly the variables of interest relate to each other when controlling for all other associations. In JASP, we added our predictor and outcome variables to the dependent variables and used EBICglasso as the estimator, resulting in Figure 1. Overall, a number of things are noteworthy.

The outcome variables of depression, anxiety and stress are all strongly related to each other. This is in line with other literature, showing comorbidity between anxiety and depression to be very high and the connection between stress, anxiety, and depression (Lamers et al., 2011) (Cohen et al., 2015).

Furthermore, we see that lifetime depression is moderately related to gender, negative events, childhood trauma, current depression and being bullied. Childhood trauma is strongly related to childhood adversities and moderately related to being bullied, negative life events and lifetime depression. The strong connection between childhood trauma and adversities make sense, as parents who have trouble with mental health, drugs or crime are more likely to raise the child in an unsafe environment.

Gender and ALE are negatively related, meaning that women are less likely to experience ALE compared to men. A review of relevant studies found that men are more likely to experience traumatic events compared to women, men are exposed to traumatic events more often, men and women differ on which types of events they experience, and (Hatch & Dohrenwend, 2007). Lastly, ALE are related to lifetime depression, negative life events and childhood trauma. Childhood trauma has some items that are similar to ALE, which can explain the connection, but negative life events has completely different events. This connection implies that people who have experienced more severe ALE may also be more likely to experience less severe, more recent negative life events. One potential explanation for this could be revictimization: Widom et al. (2008) suggest that experiencing childhood victimization increases risk for victimization in adulthood. Similarly, a literature review on sexual revictimization found that two out of three victims of sexual abuse are revictimized in the future (Classen et al., 2005). This illustrates the importance of early intervention and/or prevention to reduce the risk of revictimization.

Figure 1: Network graph of variables included in the study
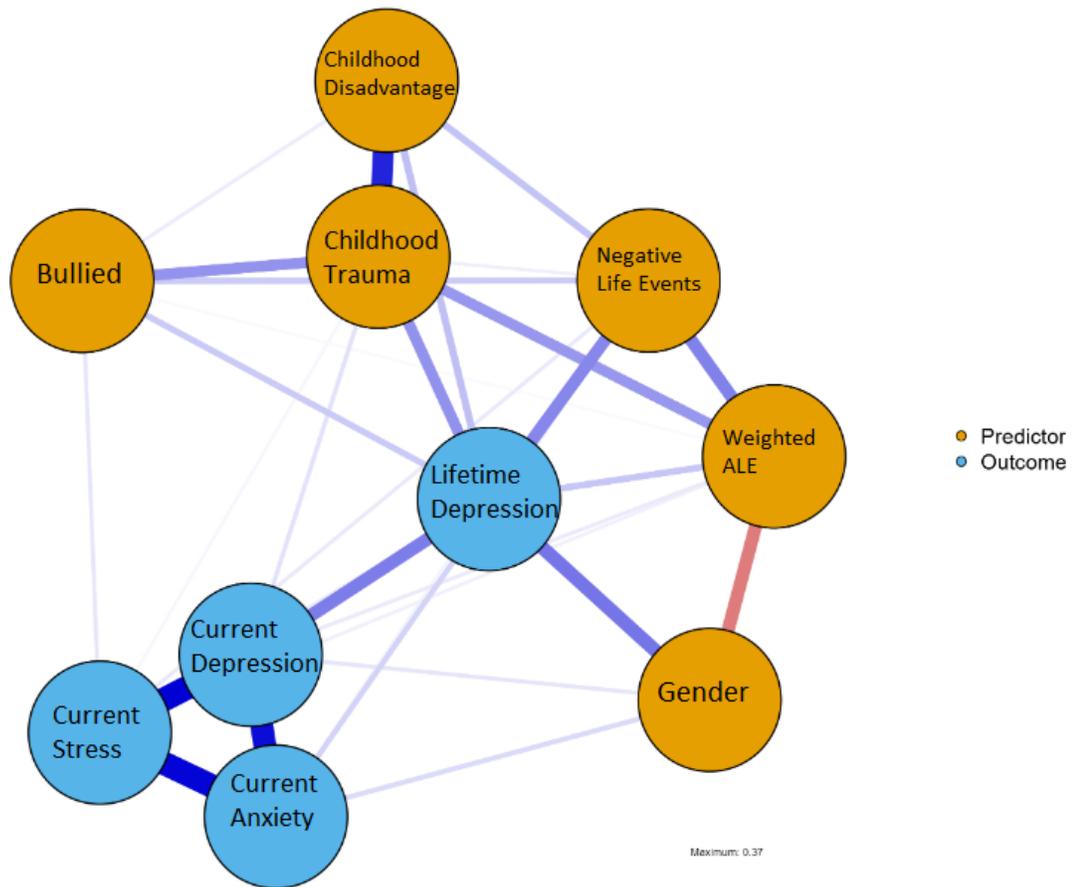
Discussion

       With this study the goal was to better understand the relationship between ALE and mental health outcomes in a more homogenous population. We included multiple variables related to ALE, such as bullying, childhood trauma, negative life events and childhood adversities to try and get a more complete picture of their relationship with current depression, anxiety, and stress as well as lifetime depression. During the analyses we controlled for gender, which is known to be associated with poorer mental health. We found that negative life events are significant as a predictor for each outcome variable. Furthermore, weighted ALE was only related to depression, and childhood trauma was related to depression, stress, and lifetime depression but not anxiety. Lastly, being bullied and childhood adversities were never significant, though they are strongly related to childhood trauma in the network analysis.

For depression, negative life events, childhood trauma, ALE and gender were significantly related to depression. A study by Muscatell et al. (2009) indicated that experiencing trauma, or preonset severe life events are related to higher levels of depression and more symptoms of depression. This led us to expect that participants who experience more ALE would be more likely to also have depression currently. The participants in the data are relatively young, with a mean age of 22.65, and effects of traumatic events may lessen over time (Center for Substance Abuse Treatment, 2014). Therefore, we also wanted to know if ALE would be related to lifetime depression. The results indicated that ALE were not significantly related to lifetime depression, but they were related to depression in the last two weeks. The data does not provide information on when the ALE were experienced, but one possible explanation is that the participants who scored higher on ALE experienced these ALE recently and currently suffer from the effects.

For anxiety, we found that gender and negative life events are significantly related to anxiety. Davies et al. (2022) suggested that ALE are related to higher levels of current anxiety and Miloyan et al. (2018) suggested that ALE are related to the onset of anxiety disorders. This inspired the hypothesis that participants who experienced more ALE would be more likely to score higher on current anxiety symptoms. The results did not support this hypothesis, but found that experiencing negative life events, such as a recent break up, was related to current anxiety. The negative events measure asks whether participants experienced any stressful experiences in the past 12 months, whilst the ALE measure asks whether the participant experienced said events throughout their life. Although the negative events include less intense events, such as infidelity of a partner, compared to ALE, such as assault, the results suggest that the timeframe of the event may be more important than the intensity of the event when looking at anxiety. It is worth noting that the ALE measures more uncommon events, such as exposure to toxic substances, compared to the negative events measure, which results in low base rates and decreased statistical power.

For stress, we found that gender, childhood trauma and negative events are significantly related to stress. Baum & Grunberg (1991) noted the many differences between genders in how they experience stress. They do not explicitly find that women experience more stress but suggest that women report more distress. Childhood trauma can seriously affect a developing brain on a neurobiological level that persists into adulthood and is linked to an increased

responsiveness to stress (Nemeroff, 2004). Furthermore, the negative events happened in the past year, which could imply the effect of these events are felt through increased stress levels.

For lifetime depression, we found that gender, childhood trauma and negative life events are significantly related. The findings suggest that experiencing childhood trauma is related to developing depression at some point in your life. Interestingly, ALE was not significant for lifetime depression, but it was for current depression. Childhood trauma and negative life events significantly predicted lifetime depression. Kessler et al. (2010) support that childhood adversities are associated with all disorders, including depression, and Nemeroff (2004) supports that childhood trauma is related to higher risk for depressive and anxiety disorders later in life.

Gender as a control variable was significant for each outcome variable, which is in line with the literature. For gender and ALE, Hatch & Dohrenwend (2007) found three studies that show men are more exposed to traumatic events. For other stressful events, men and women differ on the types of events they are more likely to suffer from. To illustrate, women report stressful sexual events far more than men, while men are more likely to report injuries, accidents, or violent events. They theorize that this can be attributed to traditional gender roles, such as women being more likely to engage in caregiving roles and value interpersonal relations more than men, which suggests that they are more likely to report stressful events. However, it is worth noting that 85% of the participants were female, which could skew the reported results.

The network results support the results found by the multiple regressions. For depression, we see connections between ALE, childhood trauma, negative life events and gender. For anxiety we see connections between gender and negative life events. For stress we see connections between childhood trauma, negative events, but not gender, which was significant in the multiple regression. We also see that bullying is connected to stress but was not significant in the multiple regression. For lifetime depression we see the strongest connections between negative life events, childhood trauma and gender.

For anxiety, negative life events was the only significant non-covariate variable. We theorize that timeframe may explain its effect. However, for lifetime depression timeframe should not be a relevant explanation, which begs the question if we can assume that ALE are more intense than negative life events. Due to the cross-sectional nature of the data, no causal conclusions may be drawn. However, a timeline can be established with the predictor variables, such as childhood trauma preceding current depression, anxiety, and stress. For lifetime

depression, this timeline can not be established because it is unknown when and how many depressive episodes took place. Future studies could take temporal data more into account, which may allow researchers to draw more causal inferences. For example, by asking when a depressive episode occurred, researchers can establish that a depressive episode at age 15 is not related to an ALE at age 17. Overstreet et al. (2017) report that female gender is consistently associated with potentially traumatic events (PTE) and symptoms of psychopathology. On top of that, a history of PTE exposure is associated with increased alcohol use (frequency and quantity), trauma related distress, anxiety symptoms and depressive symptoms. Furthermore, several other factors were associated with exposure to PTE. Examples include Asian people are at reduced risk for PTE, personality traits such as neuroticism, extraversion and openness are related to higher risk of PTE. These examples may be explained by genetic influences which can impact exposure to certain environments and experiences (Dick et al., 2005, as cited in Overstreet et al., 2017). These findings suggest certain personal attributes are related to increased exposure to ALE, and this exposure is related to negative mental health outcomes. In addition, Blom et al. (2014) find that exposure to violence in early life significantly predicts mental health outcomes and further exposure to traumatic events. Overall, this literature shows the complex interplay between ALE and mental health outcomes.

Limitations

There are a few limitations to consider. First, experts may not agree on our definition of ALE, as there are multiple definitions that differ slightly from each other. Examples include adverse childhood experiences, negative life events, stressful life events and more. Also, all the data was collected from self-report questionnaires, although we used validated measures, self-report data is always prone to biases. Furthermore, the data analyzed here was cross-sectional, which does not allow us to draw causal inferences. Also, the study likely attracted students who already have an interest in mental health, as they are rewarded with a personalized insight on their mood based on the data they provided. This may have led to a selection bias which could have attracted more students who are prone to or have a history of depression for example which limits generalizability but has benefits for statistical power. We also see that 85% of the participants ($n = 380$) are female, which could skew results such as the gender control variable.

Constructing the sum score for ALE from the LEC-5 can also be seen as a limitation. The LEC-5 is a widely used and validated measure, but measuring ALE is complex.

To paint a more complete picture, we used variables which are related to ALE, such as bullying, childhood trauma, negative life events and childhood adversities. Perhaps we should have selected the predictor variables more carefully, but the intention was to account for as many variations of ALE as possible. An explanation for these non-significant results can be that the variables lacked power, that not enough participants were bullied or faced childhood adversities for example.

The hypotheses mainly relied on weighted ALE being associated with different mental health outcomes, however in this data set, the strength of the relation was often not strong enough to be found significant. Though, we did find that different aspects of ALE are related to different mental health outcomes, such as ALE being uniquely related to depression, and childhood trauma being related to current depression, stress, and lifetime depression.

Conclusion

This study indicates that ALE, childhood trauma and negative life experiences can predict depression, anxiety, stress, and lifetime depression. Furthermore, the study shows that gender is an important control variable.

Future research could benefit from a consensus on what ALE exactly are. This study approached ALE from a broad scope, by including all measures that may be related to ALE. The results provide insights in which variables may be appropriate for further research, namely childhood trauma, negative life events and ALE. This could be further expanded to more diverse populations as their ALE may differ. In addition, future research could construct a valid measure that takes both witnessing and experiencing ALE into account. We hope that further research can provide students with preventative and early intervention care so that vulnerable students can be identified before suffering severe consequences.

References

Aalto-Setälä, T., Marttunen, M., Tuulio-Henriksson, A., Poikolainen, K., & Lönnqvist, J. (2001). One-month prevalence of depression and other DSM-IV disorders among young adults. *Psychological Medicine*, *31*(5), 791–801. https://doi.org/10.1017/S0033291701004081

Andersen, S. L., & Teicher, M. H. (2009). Desperately driven and no brakes: Developmental stress exposure and subsequent risk for substance abuse. *Neuroscience & Biobehavioral Reviews*, *33*(4), 516–524. https://doi.org/10.1016/j.neubiorev.2008.09.009

Armour, C., Fried, E. I., Deserno, M. K., Tsai, J., & Pietrzak, R. H. (2017). A network analysis of DSM-5 posttraumatic stress disorder symptoms and correlates in U.S. military veterans. *Journal of Anxiety Disorders*, *45*, 49–59. https://doi.org/10.1016/j.janxdis.2016.11.008

Auerbach, R. P., Alonso, J., Axinn, W. G., Cuijpers, P., Ebert, D. D., Green, J. G., Hwang, I., Kessler, R. C., Liu, H., Mortier, P., Nock, M. K., Pinder-Amaker, S., Sampson, N. A., Aguilar-Gaxiola, S., Al-Hamzawi, A., Andrade, L. H., Benjet, C., Caldas-de-Almeida, J. M., Demyttenaere, K., … Bruffaerts, R. (2016). Mental disorders among college students in the World Health Organization World Mental Health Surveys. *Psychological Medicine*, *46*(14), 2955–2970. https://doi.org/10.1017/S0033291716001665

Auerbach, R. P., Mortier, P., Bruffaerts, R., Alonso, J., Benjet, C., Cuijpers, P., Demyttenaere, K., Ebert, D. D., Green, J. G., Hasking, P., Murray, E., Nock, M. K., Pinder-Amaker, S., Sampson, N. A., Stein, D. J., Vilagut, G., Zaslavsky, A. M., Kessler, R. C., & WHO WMH-ICS Collaborators. (2018). WHO World Mental Health Surveys International College Student Project: Prevalence and distribution of mental disorders. *Journal of Abnormal Psychology*, *127*(7), 623–638. https://doi.org/10.1037/abn0000362

Balon, R., Beresin, E. V., Coverdale, J. H., Louie, A. K., & Roberts, L. W. (2015). College

    Mental Health: A Vulnerable Population in an Environment with Systemic Deficiencies.

    Academic Psychiatry, *39*(5), 495–497. https://doi.org/10.1007/s40596-015-0390-1

    Baum, A., & Grunberg, N. E. (1991). Gender, stress, and health. *Health Psychology*,

    10(2), 80–85. https://doi.org/10.1037/0278-6133.10.2.80

Bernstein, D. P., Fink, L., Handelsman, L., Foote, J., lovejoy, m, wenzel, k, saporeto, e, &

    ruggiero, j. (1994). Initial reliability and validity of a new retrospective measure of child

    abuse and neglect. *American Journal of Psychiatry*, *151*(8), 1132–1136.

    https://doi.org/10.1176/ajp.151.8.1132

Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., Stokes, J.,

    Handelsman, L., Medrano, M., Desmond, D., & Zule, W. (2003). Development and

    validation of a brief screening version of the Childhood Trauma Questionnaire. *Child*

    Abuse & Neglect, *27*(2), 169–190. https://doi.org/10.1016/S0145-2134(02)00541-0

Blom, H., Högberg, U., Olofsson, N., & Danielsson, I. (2014). Strong association between earlier

    abuse and revictimization in youth. BMC public health, 14, 1-10.

Borsboom, D. (2017). A network theory of mental disorders. *World Psychiatry*, *16*(1), 5–13.

    https://doi.org/10.1002/wps.20375

Bot, M., Middeldorp, C. M., de Geus, E. J. C., Lau, H. M., Sinke, M., van Nieuwenhuizen, B.,

    Smit, J. H., Boomsma, D. I., & Penninx, B. W. J. H. (2017). Validity of LIDAS (LIfetime

    Depression Assessment Self-report): A self-report online assessment of lifetime major

    depressive disorder. *Psychological Medicine*, *47*(2), 279–289.

    https://doi.org/10.1017/S0033291716002312

Cage, E., Stock, M., Sharpington, A., Pitman, E., & Batchelor, R. (2020). Barriers to accessing

support for mental health issues at university. *Studies in Higher Education*, *45*(8), 1637–1649. https://doi.org/10.1080/03075079.2018.1544237

Classen, C. C., Palesh, O. G., & Aggarwal, R. (2005). Sexual Revictimization: A Review of the Empirical Literature. *Trauma, Violence, & Abuse*, *6*(2), 103–129. https://doi.org/10.1177/1524838005275087

Center for Substance Abuse Treatment. (2014). Understanding the impact of trauma. In Trauma-informed care in behavioral health services. Substance Abuse and Mental Health Services Administration (US).

Cohen, B. E., Edmondson, D., & Kronish, I. M. (2015). State of the Art Review: Depression, Stress, Anxiety, and Cardiovascular Disease. *American Journal of Hypertension*, *28*(11), 1295–1302. https://doi.org/10.1093/ajh/hpv047

Copeland, W. E., McGinnis, E., Bai, Y., Adams, Z., Nardone, H., Devadanam, V., Rettew, J., & Hudziak, J. J. (2021). Impact of COVID-19 Pandemic on College Student Mental Health and Wellness. *Journal of the American Academy of Child & Adolescent Psychiatry*, *60*(1), 134-141.e2. https://doi.org/10.1016/j.jaac.2020.08.466

Cuijpers, P., Auerbach, R. P., Benjet, C., Bruffaerts, R., Ebert, D., Karyotaki, E., & Kessler, R. C. (2019). Introduction to the special issue: The WHO World Mental Health International College Student (WMH-ICS) initiative. *International Journal of Methods in Psychiatric Research*, *28*(2), e1762. https://doi.org/10.1002/mpr.1762

Cuijpers, P., Beekman, A. T. F., & Reynolds, C. F. (2012). Preventing Depression: A Global Priority. *JAMA*, *307*(10), 1033. https://doi.org/10.1001/jama.2012.271

Davies, E., Read, J., & Shevlin, M. (2022). The impact of adverse childhood experiences and recent life events on anxiety and quality of life in university students. *Higher Education*,

84(1), 211–224. https://doi.org/10.1007/s10734-021-00774-9

Dohrenwend, B. P. (2006). Inventorying stressful life events as risk factors for psychopathology: Toward resolution of the problem of intracategory variability. *Psychological Bulletin*, *132*(3), 477–495. https://doi.org/10.1037/0033-2909.132.3.477

Farrer, L. M., Gulliver, A., Bennett, K., Fassnacht, D. B., & Griffiths, K. M. (2016). Demographic and psychosocial predictors of major depression and generalised anxiety disorder in Australian university students. *BMC Psychiatry*, *16*(1), 241. https://doi.org/10.1186/s12888-016-0961-z

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of Childhood Abuse and Household Dysfunction to Many of the Leading Causes of Death in Adults. *American Journal of Preventive Medicine*, *14*(4), 245–258. https://doi.org/10.1016/S0749-3797(98)00017-8

Fried, E. I., Nesse, R. M., Zivin, K., Guille, C., & Sen, S. (2014). Depression is more than the sum score of its parts: Individual DSM symptoms have different risk factors. *Psychological Medicine*, *44*(10), 2067–2076. https://doi.org/10.1017/S0033291713002900

Fried, E. I., van Borkulo, C. D., Cramer, A. O. J., Boschloo, L., Schoevers, R. A., & Borsboom, D. (2017). Mental disorders as networks of problems: A review of recent insights. *Social Psychiatry and Psychiatric Epidemiology*, *52*(1), 1–10. https://doi.org/10.1007/s00127-016-1319-z

Grant, K. E., Compas, B. E., Thurm, A. E., McMahon, S. D., & Gipson, P. Y. (2004). Stressors and Child and Adolescent Psychopathology: Measurement Issues and Prospective Effects. *Journal of Clinical Child & Adolescent Psychology*, *33*(2), 412–425.

https://doi.org/10.1207/s15374424jccp3302_23

Hammen, C. (2005). Stress and Depression. *Annual Review of Clinical Psychology*, *1*(1), 293–
319. https://doi.org/10.1146/annurev.clinpsy.1.102803.143938

Hatch, S. L., & Dohrenwend, B. P. (2007). Distribution of Traumatic and Other Stressful
Life Events by Race/Ethnicity, Gender, SES and Age: A Review of the Research.
American Journal of Community Psychology, *40*(3–4), 313–332.
https://doi.org/10.1007/s10464-007-9134-z

Horn, A. (2020). Active minds and association of college and university educators release guide
on practical approaches for supporting student wellbeing and mental health. Active
Minds. https://www.activeminds.org/wp-content/uploads/2020/04/Active-Minds-ACUE-
Release_Faculty-Guide_April-2020.pdf.

Ji, S., & Wang, H. (2018). A study of the relationship between adverse childhood experiences,
life events, and executive function among college students in China. *Psicologia: Reflexão
e Crítica*, *31*(1), 28. https://doi.org/10.1186/s41155-018-0107-y

Kendler, K. S. (2016). The nature of psychiatric disorders. *World Psychiatry*, *15*(1), 5–12.
https://doi.org/10.1002/wps.20292

Kendler, K. S., Karkowski, L. M., & Prescott, C. A. (1999). Causal Relationship Between
Stressful Life Events and the Onset of Major Depression. *American Journal of
Psychiatry*, *156*(6), 837–841. https://doi.org/10.1176/ajp.156.6.837

Kessler, R. C. (1997). THE EFFECTS OF STRESSFUL LIFE EVENTS ON DEPRESSION.
Annual Review of Psychology, *48*(1), 191–214.
https://doi.org/10.1146/annurev.psych.48.1.191

Kessler, R. C., Amminger, G. P., Aguilar-Gaxiola, S., Alonso, J., Lee, S., & ??st??n, T. B.

(2007). Age of onset of mental disorders: A review of recent literature: *Current Opinion in Psychiatry*, *20*(4), 359–364. https://doi.org/10.1097/YCO.0b013e32816ebc8c

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime Prevalence and Age-of-Onset Distributions of DSM-IV Disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, *62*(6), 593. https://doi.org/10.1001/archpsyc.62.6.593

Kim, K. J., Conger, R. D., Elder, G. H., & Lorenz, F. O. (2003). Reciprocal Influences Between Stressful Life Events and Adolescent Internalizing and Externalizing Problems. *Child Development*, *74*(1), 127–143. https://doi.org/10.1111/1467-8624.00525

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, *16*(9), 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x

Lamers, F., van Oppen, P., Comijs, H. C., Smit, J. H., Spinhoven, P., van Balkom, A. J. L. M., Nolen, W. A., Zitman, F. G., Beekman, A. T. F., & Penninx, B. W. J. H. (2011). Comorbidity Patterns of Anxiety and Depressive Disorders in a Large Cohort Study: The Netherlands Study of Depression and Anxiety (NESDA). *The Journal of Clinical Psychiatry*, *72*(03), 341–348. https://doi.org/10.4088/JCP.10m06176blu

Lee, E.-H. (2012). Review of the Psychometric Evidence of the Perceived Stress Scale. *Asian Nursing Research*, *6*(4), 121–127. https://doi.org/10.1016/j.anr.2012.08.004

Lee, J., Jeong, H. J., & Kim, S. (2021). Stress, Anxiety, and Depression Among Undergraduate Students during the COVID-19 Pandemic and their Use of Mental Health Services. *Innovative Higher Education*, *46*(5), 519–538. https://doi.org/10.1007/s10755-021-09552-y

March-Llanes, J., Marqués-Feixa, L., Mezquita, L., Fañanás, L., & Moya-Higueras, J. (2017). Stressful life events during adolescence and risk for externalizing and internalizing psychopathology: A meta-analysis. *European Child & Adolescent Psychiatry*, *26*(12), 1409–1422. https://doi.org/10.1007/s00787-017-0996-9

Mazure CM. 1998. Life stressors as risk factors in depression. Clin. Psychol. Sci. Pract. 5:291–313

Miloyan, B., Joseph Bienvenu, O., Brilot, B., & Eaton, W. W. (2018). Adverse life events and the onset of anxiety disorders. *Psychiatry Research*, *259*, 488–492. https://doi.org/10.1016/j.psychres.2017.11.027

Monroe, S. M., Rohde, P., Seeley, J. R., & Lewinsohn, P. M. (1999). Life events and depression in adolescence: Relationship loss as a prospective risk factor for first onset of major depressive disorder. *Journal of Abnormal Psychology*, *108*(4), 606–614. https://doi.org/10.1037/0021-843X.108.4.606

Muñoz, R. F., Cuijpers, P., Smit, F., Barrera, A. Z., & Leykin, Y. (2010). Prevention of Major Depression. *Annual Review of Clinical Psychology*, *6*(1), 181–212. https://doi.org/10.1146/annurev-clinpsy-033109-132040

Muscatell, K. A., Slavich, G. M., Monroe, S. M., & Gotlib, I. H. (2009). Stressful Life Events, Chronic Difficulties, and the Symptoms of Clinical Depression. *Journal of Nervous & Mental Disease*, *197*(3), 154–160. https://doi.org/10.1097/NMD.0b013e318199f77b

Nemeroff, C. B. (2004). Neurobiological consequences of childhood trauma. *The Journal of Clinical Psychiatry*, *65 Suppl 1*, 18–28.

Oswalt, S. B., Lederer, A. M., Chestnut-Steich, K., Day, C., Halbritter, A., & Ortiz, D. (2020). Trends in college students' mental health diagnoses and utilization of services, 2009–

2015. *Journal of American College Health*, *68*(1), 41–51.

https://doi.org/10.1080/07448481.2018.1515748

Overstreet, C., Berenz, E. C., Kendler, K. S., Dick, D. M., & Amstadter, A. B. (2017). Predictors

and mental health outcomes of potentially traumatic event exposure. Psychiatry research,

247, 296-304.

Paykel, E. S. (2003). Life events and affective disorders: Life events and affective disorders.

Acta Psychiatrica Scandinavica, *108*, 61–66. https://doi.org/10.1034/j.1600-

0447.108.s418.13.x

Peng, L., Zhang, J., Li, M., Li, P., Zhang, Y., Zuo, X., Miao, Y., & Xu, Y. (2012). Negative life

events and mental health of Chinese medical students: The effect of resilience,

personality and social support. *Psychiatry Research*, *196*(1), 138–141.

https://doi.org/10.1016/j.psychres.2011.12.006

Plummer, F., Manea, L., Trepel, D., & McMillan, D. (2016). Screening for anxiety disorders

with the GAD-7 and GAD-2: A systematic review and diagnostic metaanalysis. *General

Hospital Psychiatry*, *39*, 24–31. https://doi.org/10.1016/j.genhosppsych.2015.11.005

Rosenfield, S., & Mouzon, D. (2013). Gender and Mental Health. In C. S. Aneshensel, J.

C. Phelan, & A. Bierman (Eds.), *Handbook of the Sociology of Mental Health* (pp. 277–

296). Springer Netherlands. https://doi.org/10.1007/978-94-007-4276-5_14

Said, D., Kypri, K., & Bowman, J. (2013). Risk factors for mental disorder among university

students in Australia: Findings from a web-based cross-sectional survey. *Social

Psychiatry and Psychiatric Epidemiology*, *48*(6), 935–944.

https://doi.org/10.1007/s00127-012-0574-x

Shankar, N. L., & Park, C. L. (2016). Effects of stress on students' physical and mental health

and academic success. *International Journal of School & Educational Psychology*, *4*(1),

5–9. https://doi.org/10.1080/21683603.2016.1130532

Sheldon, E., Simmonds-Buckley, M., Bone, C., Mascarenhas, T., Chan, N., Wincott, M.,

Gleeson, H., Sow, K., Hind, D., & Barkham, M. (2021). Prevalence and risk factors for

mental health problems in university undergraduate students: A systematic review with

meta-analysis. *Journal of Affective Disorders*, *287*, 282–292.

https://doi.org/10.1016/j.jad.2021.03.054

Shrout, P. E., Link, B. G., Dohrenwend, B. P., Skodol, A. E., Stueve, A., & Mirotznik, J. (1989).

Characterizing life events as risk factors for depression: The role of fateful loss events.

Journal of Abnormal Psychology, *98*(4), 460–467. https://doi.org/10.1037/0021-

843X.98.4.460

Smyth, J. M., Hockemeyer, J. R., Heron, K. E., Wonderlich, S. A., & Pennebaker, J. W. (2008).

Prevalence, Type, Disclosure, and Severity of Adverse Life Events in College Students.

Journal of American College Health, *57*(1), 69–76.

https://doi.org/10.3200/JACH.57.1.69-76

Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A Brief Measure for

Assessing Generalized Anxiety Disorder: The GAD-7. *Archives of Internal Medicine*,

166(10), 1092. https://doi.org/10.1001/archinte.166.10.1092

Thissen, D., Steinberg, L., & Kuang, D. (2002). Quick and Easy Implementation of the

Benjamini-Hochberg Procedure for Controlling the False Positive Rate in Multiple

Comparisons. *Journal of Educational and Behavioral Statistics*, *27*(1), 77–83.

https://doi.org/10.3102/10769986027001077

Wang, X., Ding, F., Cheng, C., He, J., Wang, X., & Yao, S. (2022). Psychometric Properties and

Measurement Invariance of the Childhood Trauma Questionnaire (Short Form) Across

Genders, Time Points and Presence of Major Depressive Disorder Among Chinese

Adolescents. *Frontiers in Psychology*, *13*, 816051.

https://doi.org/10.3389/fpsyg.2022.816051

Widom, C. S., Czaja, S. J., & Dutton, M. A. (2008). Childhood victimization and lifetime

revictimization. *Child Abuse & Neglect*, *32*(8), 785–796.

https://doi.org/10.1016/j.chiabu.2007.12.006

Xu, Y., Su, S., Jiang, Z., Guo, S., Lu, Q., Liu, L., Zhao, Y., Wu, P., Que, J., Shi, L., Deng, J.,

Meng, S., Yan, W., Sun, Y., Yuan, K., Lin, X., Sun, S., Ravindran, A. V., Chen, S., …

Lu, L. (2021). Prevalence and Risk Factors of Mental Health Symptoms and Suicidal

Behavior Among University Students in Wuhan, China During the COVID-19 Pandemic.

Frontiers in Psychiatry, *12*, 695017. https://doi.org/10.3389/fpsyt.2021.695017

Zimmermann, M., Bledsoe, C., & Papa, A. (2021). Initial impact of the COVID-19 pandemic on

college student mental health: A longitudinal examination of risk and protective factors.

Psychiatry Research, *305*, 114254. https://doi.org/10.1016/j.psychres.2021.114254