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Rumination as a Moderator of the Relation Between Childhood Adversity Exposure and College Students' Psychological Distress

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ABSTRACT

American college students ($N = 598$) completed self-report questionnaires assessing rumination, psychological distress while attending college (i.e., general distress, anhedonic depression, anxious arousal), and exposure to specific types of childhood adversity (i.e., emotional abuse, sexual abuse, physical abuse, emotional neglect, and physical neglect). Latent Moderated Structural Equation Modeling indicated that 1) rumination was associated with all three indicators of psychological distress, and 2) rumination moderated associations between childhood adversity exposure and college students' reports of general distress and anxious arousal such that associations were strongest at higher levels of rumination and weaker at lower levels of rumination. Implications regarding higher education professionals' efforts to support college student well-being are discussed.

Keywords: adversity exposure, childhood trauma, psychological distress, college students, latent variable moderation

Emerging adulthood (ages 18 to 29), a developmental period that characterizes many college students, is marked by instability, identity development, and personal growth even under ideal conditions (Arnett, 2004). For some students, this period of life may be further complicated by experiences of childhood trauma and adversity. Childhood adversity exposure has been linked with psychological risk while attending college (Grigsby et al., 2020; Husky et al., 2023). However, the extent that childhood

adversities are linked with psychological risk during the college years is dependent upon students' coping abilities (Kuhar & Zager Kocjan, 2021; Zhao et al., 2020). In this study, we sought to understand the connection between specific types of childhood adversity (emotional abuse, sexual abuse, physical abuse, emotional neglect, physical neglect) and psychological distress (general distress, anhedonic depression, and anxious arousal) while attending college. We additionally investigated the extent to which such associations were moderated by students' levels of depressive rumination, defined as the extent to which individuals respond to low mood by engaging in negative, self-focused, perseverative thought (e.g., thinking about the causes of feeling down including all your shortcomings, failings, faults, mistakes), as opposed to active problem-solving (Treynor et al., 2003).

Types of Childhood Adversity Experienced by College Students

According to the Centers for Disease Control and Prevention (CDC), approximately 61% of adults report having been exposed to at least one type of childhood adversity before the age of eighteen (CDC, 2022). Examples of childhood adversity include emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, and other forms of child maltreatment (McLaughlin et al., 2019; Prock, 2015; Substance Abuse and Mental Health Services Administration, 2023, para. 1). In general, research on adverse childhood experiences has indicated that early adversity exposure predicts poor outcomes later in life, including alcohol and substance abuse, academic risk, and emotional and behavioral problems (Arseneault et al., 2011; Fergusson et al., 2005; Rodgers et al., 2004). Importantly, these negative effects are not just observed during childhood, but rather extend well into early and late adulthood (Lawson & Quinn, 2013; Maier et al., 2020; Vrshek-Schallhorn et al., 2014). This phenomenon has been explained by the fact that children who have experienced trauma were not provided a safe, trusting environment within which they could form close emotional bonds with others and develop critical interpersonal skills. Children who experience trauma at the hands of their parents experience difficulties forming secure attachments, ultimately distorting their inner working models of healthy, positive relationships (Downey & Crummy, 2022). Additionally, Steinberg et al. (2013) proposed that emotional abuse directly permeates self-schemas (i.e., beliefs about the self) with negative ideas. It is crucial for researchers to study the impacts of early adversity exposure on college students, as it may place them at risk during a period characterized by normative instability associated with identity exploration and autonomy development (Arnett, 2004; Clark, 2005; Oswalt et al., 2020).

Psychological Distress Among College Students

In recent years, college students' declining mental health has become a pressing concern on American college campuses. Oswalt et al. (2020) documented college students' self-reported diagnoses and treatment of mental health problems from 2009 to 2015 and found that, controlling for demographic characteristics, students' mental health problems increased across this period of time. Focusing on data collected at

over 100 American universities, the Healthy Minds Network (2023) reported that 44% of college students currently fit the criteria for major or moderate depression and 37% fit criteria for generalized anxiety disorder. Stowell et al. (2021) reported that in a sample of college students from the Midwest, 36% of participants reported experiencing depression, 10% reported high levels of stress, and 56% reported moderate levels of stress. Students' mental health difficulties have been attributed to high levels of academic stress and pressure (Baik et al., 2019; Reddy et al., 2018), family and relationship problems (Covarrubias et al., 2019; Levin et al., 2017), and financial or employment stress (Jones et al., 2018; Payne-Sturges et al., 2018). In addition, childhood trauma has been shown to be an important factor in predicting general health and well-being outcomes (Grigsby et al., 2020; Kelifa et al., 2021; Mcnutt et al., 2002) as well as mental health (Lee et al., 2021; Schneider et al., 2020) across the lifespan. Research with college students has consistently documented this association.

Grigsby et al. (2020) investigated whether cumulative adverse childhood experiences predicted a wide range of health indicators within a sample of college students. Results indicated that as the number of adverse experiences increased, individuals were more likely to report drug or alcohol abuse, engage in risky sexual behaviors, express suicide attempts or ideation, and be diagnosed with depression (Grigsby et al., 2020). Similarly, Karatekin (2018) found that college students who experienced more adverse childhood experiences were at increased risk for depression, anxiety, and suicidality. Other researchers have sought to disentangle types of childhood adversity exposure when considering how they might relate to college students' psychological distress. For example, Silvern et al. (1995) found that retrospective reports of childhood exposure to parental partner abuse were linked with depression and anxiety among college students. Colburn et al. (2021) reported that childhood experiences of emotional neglect and abuse predicted college students' reports of stress, while emotional neglect and emotional abuse were more strongly associated with students' degree of social support. Berzenski and Yates (2011) conducted a latent class analysis with a sample of college students who had experienced at least one type of adverse childhood experience to determine whether students' reports of emotional, physical, and sexual abuse formed distinctive groups. Results indicated four distinct classes that were differentially associated with mental health outcomes. The emotional abuse group of students were found to report higher scores on indicators of psychological distress (anxiety, depression, and emotional dysregulation) as compared to groups characterized by physical abuse or family violence (Berzenski & Yates, 2011). In the present study, we aimed to apply a similar latent variable modeling approach by examining whether rumination moderated the relationship between childhood adversity exposure (emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect) and indicators of psychological distress (general distress, anhedonic depression, anxious arousal).

Moderators of College Students' Childhood Adversity Exposure and Psychological Distress

Researchers have sought to determine factors that may change the direction and or/strength of the relationship between adverse childhood experiences and indicators of psychological distress (Littleton et al., 2007; Zhao et al., 2022). A systematic review of 33 studies found that resilience, mindfulness, perceived locus of control, and negative thoughts moderated the relation between childhood adversity (i.e., measures of childhood abuse and neglect) and later reports of depression (Zhao et al., 2022). Among these, one showed that negative thoughts moderated the association between adverse life events and greater symptoms of negative self-esteem among ethnic minority youth (Reinemann & Ellison, 2004). McKeen et al. (2020) also found that the "aware" subscale of a mindfulness measure moderated the relationship between greater cumulative adverse childhood experiences and reports of depression, such that young adults with higher levels of awareness did not report increases in depression as their number of adverse childhood experiences increased.

Rumination is a type of a maladaptive stress response that involves obsessive thought patterns that cause individuals to focus on negative content (Nolen-Hoeksema et al., 2008; Sansone & Sansone, 2012). An example of rumination is over-analyzing events to try to understand why one feels down, sad, or depressed, including the errors one makes or traits one dislikes about oneself. Within adult populations, rumination is strongly associated with poor mental and physical health outcomes (Harrington & Loffredo, 2010; Nolen-Hoeksema, 1991; Watkins & Roberts, 2020). Individuals who have been exposed to some type of adversity in their childhood may be more likely to adopt cognitive patterns that perpetuate negative thoughts, thus making it more difficult to cope with daily stressors and increasing their risk for psychological problems (Sheffler et al., 2020). More research is currently needed to further explore this moderator model within a sample of American college students.

Current Study

In this study, we sought to answer two research questions. First, are distinct types of childhood adversity exposure (emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect) associated with psychological distress (general distress, anhedonic depression, anxious arousal) among American college students? We predicted that higher levels of each type of adversity exposure would be associated with greater reports of general distress and anxious arousal and lower reports of anhedonic depression (scale was reversed such that high levels reflected high positive affect and low levels reflected a lack of positive affect). Second, does rumination moderate the associations between childhood adversity exposure and psychological distress? We hypothesized that rumination would moderate associations between types of childhood adversity exposure and psychological distress outcomes. Specifically, we expected to find that associations linking adversity exposure with symptom endorsement would be stronger at higher levels of rumination and weaker at lower levels of rumination. Answering these research questions will help inform higher education professionals about the extent to which interventions to reduce rumination may be useful in improving college student well-being.

METHODS

Participants

Participants were 598 undergraduate college students enrolled in a large, introductory social science course at a southeastern university. The age of participants ranged from 18 to 55 (M = 19.52, SD = 4.02). Participants reported their gender identities as women (n = 449; 75.1%), men (n = 128; 21.4%), gender fluid or another gender identity (n = 19; 3.2%). Two participants did not answer this item. Participants identified their racial/ethnic identities as Black or African American (n = 210; 35.1%), White (n = 204; 34.1%), Hispanic or Latino/a/x (n = 85; 14.2%), Multiethnic or Biracial (n = 38; 6.4%), and other racial and ethnic identities (n = 61; 10.2%). Forty-five percent of participants were first-generation college students, defined by not having a parent who completed a four-year post-secondary degree (Department of Health, 1965/1998).

Procedure

All study materials and procedures were approved by the university's Institutional Review Board (IRB). Participants were recruited from a large, social science course subject pool such that students could elect to receive course credit for research participation (with eight total credits required over the semester) or to complete an alternate assignment. Data for the current study were collected at two separate points in time. First, all students enrolled in the subject pool were invited to participate in a mass screening ("baseline") within the first three weeks of the Fall 2021 semester. The mass screening assigned several credits to students for completing surveys from a variety of investigations. Our study was a small component of the mass screening. The second data collection was between semester weeks six and 15. For this midsemester study, participants received one credit towards their overall research participation credits for the semester.

Among participants, 163 students only completed the mass screening questionnaire, 262 students only completed the mid-semester follow-up questionnaire, and 173 students completed both the mass screening and mid-semester follow-up questionnaires, for a total of 598 student participants. When completing a survey, students first viewed an IRB-approved consent document and indicated their consent to participate within the Qualtrics survey. Students then proceeded through each section of the self-administered survey.

Measures

Demographic Covariates

Gender identity was represented as two dummy coded variables representing those who identified as men and those who identified as gender fluid. Those who identified as women served as the reference group. Racial/ethnic identity was similarly dummy coded with four variables indicating identities of Black/African American, Hispanic or Latino/a, Multiethnic or Multiracial, and another race or

ethnicity. White racial/ethnic identity served as the reference group. Thus, a total of six demographic dummy coded variables were included as covariates in models for the focal analyses.

Adversity Exposure

Respondents' perceptions of pre-college adversity were measured at mid-semester data collection using the Childhood Trauma Questionnaire – Short Form (Bernstein et al., 2003). This measure asked participants to rate the extent to which childhood adversity experience statements were true of their lives. The original measure consisted of 30 items with each subscale containing five items. Subscales included: Emotional Abuse, Physical Abuse, Sexual Abuse, Emotional Neglect, Physical Neglect. Sample items subscales included "I believe that I was emotionally abused" (Emotional Abuse), "I was punished with a belt, a board, a cord, or some other hard object" (Physical Abuse), "Someone molested me" (Sexual Abuse), "I felt loved" (Emotional Neglect; negative wording), and "I didn't have enough to eat" (Physical Neglect). Participants rated these statements on a scale ranging from 0 (*Never true*) to 4 (*Very often true*). Negatively worded items were reverse-coded. Higher scores indicated more experiences of pre-college adversity exposure. Cronbach's alpha for the current study indicated strong reliability for Emotional Abuse (α = .90), Physical Abuse (α = .81), Sexual Abuse (α = .94), Emotional Neglect (α = .90), and Physical Neglect (α = .79). Each subscale was conceptualized as a latent construct variable with individual subscale items as indicators.

Psychological Distress

Psychological distress was measured at baseline data collection using the Mood and Anxiety Symptom Questionnaire – Short Form (Wardenaar et al., 2010). Respondents were asked to rate how much they had felt certain feelings, sensations, problems, and experiences in the past week. This measure included 30 items with each subscale containing ten items. Subscales included General Distress, Anhedonic Depression, and Anxious Arousal with sample items, "I felt confused" (General Distress), "Felt successful" (Anhedonic Depression), and "Startled easily" (Anxious Arousal). Items were rated on a scale ranging from 1 (*Not at all*) to 5 (*Extremely*). Higher scores indicated more internalizing problems. Cronbach's alpha for this study indicated strong reliability for General Distress (α = .89), Anhedonic Depression (α = .91), and Anxious Arousal (α = .86). The anhedonic depression scale was reversed, such that high levels indicated high positive affect, and low levels reflected a lack of positive affect, or high anhedonic depression; as such, we anticipated effect sizes with signs opposite those of the other two symptom scales. Each subscale was conceptualized as a latent construct variable with individual subscale items as indicators.

Rumination

Rumination was measured at baseline data collection using the Ruminative Response Survey (Treynor et al., 2003). Students were asked to report how often they thought of doing or do certain behaviors while feeling down, sad, or depressed. This measure included 22 items with sample items such as, "Think about all your shortcomings, failings, faults, and mistakes," and "Think about how passive and unmotivated you feel." Items were rated on a scale of 1 (*Almost never*) to 4 (*Almost always*). Higher scores indicated higher occurrences of rumination. The Cronbach's alpha for this measure in the current study was $\alpha = .94$. For focal analyses, rumination was conceptualized as a latent construct variable with three indicator parcels, each consisting of seven items. The item "Write down what you are thinking and analyze it" was dropped due to a poor factor loading of 0.204.

Data Analysis

Prior to conducting analysis, we examined skewness and kurtosis for each item across all measures. Following recommendations made by Byrne (2010), two items on the CTQ were dropped from further analyses for falling outside of the acceptable range for skewness (+2 to -2) and kurtosis (+7 to -7). These items were "I got hit so hard by someone in my family that I had to see a doctor or go to the hospital," (Skewness = 3.35; Kurtosis = 11.26) and "I got hit or beaten so badly that it was noticed by someone like a teacher, neighbor, or doctor," (Skewness = 3.16; Kurtosis = 9.97). Specifically, nearly 89% and 88% of participants who responded to these statements selected these events as "never true," resulting in unacceptably high levels of skewness and kurtosis. Hypotheses were tested using the latent moderated structural equations method (LMS) outlined in Maslowsky et al. (2015). Analyses were conducted in Mplus Version 8.6 (Muthén & Muthén, 2017), and were estimated using robust maximum likelihood estimation (MLR) and full information maximum likelihood (FIML) to handle missing data. To maintain best practices for structural equation modeling, evaluations of model fit were determined by checking for improper solutions (e.g., negative R-square values, negative variances, cross-loadings of factors) and based on recommended criteria of fit indices. Comparative Fit Index (CFI) values greater than 0.90, Standardized Root Mean Squared Residual (SRMR) values less than 0.1, and Root Mean Square Area of Approximation (RMSEA) values less than 0.08 all indicated acceptable fit (Bentler, 1990; Brown, 2015; Browne & Cudeck, 1993).

When probing latent variable interactions, interactions must be tested one variable at a time (Maslowsky et al., 2015). Due to this, we chose to conduct separate models for each dimension of adversity exposure as predictive of each assessment of psychological distress, resulting in 15 separate tests. Using the LMS method, two models are estimated in order to interpret interactions between latent variables within the framework of structural equation modeling. The first model, which is referred to as Model 0, included the main effects of pre-college adversity exposure (emotional abuse, sexual abuse, physical abuse, emotional neglect, and physical neglect) as predictive of psychological distress (general distress, anhedonic depression, and anxious arousal). Model 0 provided the fit indices that were then compared to the model containing the latent interaction term ("Model 1") between rumination and

each of the adversity exposure domains. To reduce the complexity of Model 1, the rumination measure was modeled using three indicator parcels. Each parcel was created by examining item factor loadings and distributing items across parcels to balance the average loadings across the three parcel indicators. To compare the models, a log-likelihood ratio test was computed. A significant log-likelihood ratio test indicated that Model 0 represented significantly poorer model fit as compared to Model 1 (Satorra, 2000), thus suggesting that adding the interaction term (the only distinction between Model 0 and Model 1) provided a significant improvement. We then compared the R^2 statistics provided by Model 0 and Model 1 to calculate the variance explained by the latent interaction term. All models controlled for participants' gender and racial/ethnic identities.

Following recommendations made by Johnson and Neyman (1936) and Lin (2020), significant interactions were probed using the Johnson-Neyman technique by graphing the relationship between adversity exposure and each dimension of psychological distress (y-axis) as a function of rumination level (x-axis). These plots provided the region of significance denoting the range of rumination values for which the association between adversity exposure and psychological distress excluded 0 within its 95% confidence interval. We then subtracted the R^2 value of the main effects model (Model 0) from the R^2 value of the interaction model (Model 1) to determine the amount of variance attributed to the latent interaction term.

RESULTS

Correlations Among Key Study Variables

Bivariate correlations and descriptive statistics are shown in Table 1. Most variables were utilized as latent constructs in the focal analysis; however, bivariate correlations and descriptive statistics reflect total mean scores. Correlation results indicated that rumination was significantly and positively associated with all types of adversity exposure. Additionally, rumination was significantly and positively associated with general distress and anxious arousal, while significantly and negatively associated with anhedonic depression. General distress was significantly and positively associated with all five indicators of adversity exposure, while anxious arousal was significantly and positively associated with emotional abuse, physical abuse, sexual abuse, and physical neglect. Anhedonic depression was not significantly correlated with any of the indicators of adversity exposure.

Table 1: Pearson Bivariate Correlations and Descriptive Statistics for Key Study

	1	2	3	4	5	6	7	8	9
1. Emotional Abuse	–								
2. Physical Abuse	0.57**	–							
3. Sexual Abuse	0.50**	0.45**	–						

4. Emotional Neglect	0.61**	0.40**	0.30**	–						
5. Physical Neglect	0.55**	0.57**	0.49**	0.57**	–					
6. General distress	0.34**	0.15*	0.24**	0.21**	0.27**	–				
7. Anhedonic Depression	-0.01	0.05	0.03	0.14	0.08	-0.27**	–			
8. Anxious arousal	0.37**	0.20**	0.27**	0.14	0.25**	0.68**	-0.06	–		
9. Rumination	0.46**	0.23**	0.28**	0.27**	0.30**	0.68**	-0.30**	0.53**	–	
N	433	433	433	433	433	336	336	336	336	
Mean	2.37	1.57	1.61	1.16	1.19	2.49	3.04	1.91	2.54	
SD	1.16	0.73	1.05	0.93	0.71	0.89	0.84	0.77	0.70	

Note. $^{**}p < .001$, $^{*}p < .05$.

Main Effects of Rumination and Adversity Exposure on Psychological Distress

Model fit statistics for Model 0 suggested good fit for all models, with CFI values ranging from 0.901 to 0.966; RMSEA values ranging from 0.029 to 0.051; SRMR values ranging from 0.055 to 0.072. As shown in Tables 3-5, levels of adversity exposure were not significantly associated with any of the three indicators of psychological distress; as such, our first hypothesis was not supported. As seen in Tables 3-5, rumination was associated with more anxious arousal, general distress, and anxious arousal across all models (β range -0.346 to 0.734; p range < .001 to .900; *SE* range 0.036 to 0.095).

Rumination as a Moderator of Associations between Adversity Exposure and Psychological Distress

We tested a total of fifteen interaction models for the combination of the five types of early adversity (emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect) interacting with rumination to predict each of the three types of symptoms (general distress, anxious arousal, anhedonic depression). Table 2 provides fit statistics for Model 0 and statistics comparing Model 0 and Model 1.

Table 2: Model 0 Fit Statistics and Model 1 Comparison by Psychological Distress Outcome and Adversity Exposure

		Model 0							Comparison of Model 0 and Model 1				
Outcome	Adversity Exposure	X^2	*df*	*CFI*	*SRMR*	*RMSEA*	LL H0	R^2_{y0}	LL H0	-2LL value	R^2_{y1}	ΔR^2	*p*-value
General distress	EA	389.761	243	0.958	0.060	0.033	-8427.020	0.559	-8424.531	2.49	0.586	0.027	NS
	PA	330.445	191	0.950	0.060	0.035	-7088.101	0.558	-7086.705	1.40	0.569	0.011	NS
	SA	441.264	234	0.948	0.062	0.039	-7739.187	0.561	-7735.943	3.24	0.575	0.014	0.05
	EN	436.683	234	0.946	0.060	0.038	-7875.796	0.558	-7871.560	4.24	0.588	0.030	0.005
	PN	429.785	243	0.936	0.060	0.037	-7932.597	0.566	-7929.490	3.11	0.602	0.036	0.02
Anhedonic depression	EA	550.384	234	0.917	0.072	0.048	-8096.968	0.171	-8096.782	0.19	0.170	0.001	NS
	PA	466.345	191	0.906	0.064	0.049	-6758.947	0.156	-6758.905	0.04	0.158	0.002	NS
	SA	603.566	243	0.912	0.072	0.051	-7411.039	0.152	-7411.039	0.00	0.152	0.000	NS
	EN	557.994	234	0.916	0.065	0.048	-7546.711	0.158	-7545.918	0.79	0.167	0.009	NS
	PN	550.324	234	0.901	0.069	0.048	-7605.285	0.153	-7604.955	0.33	0.159	0.006	NS
Anxious arousal	EA	315.390	212	0.966	0.056	0.029	-8040.487	0.354	-8035.059	5.43	0.437	0.083	0.001
	PA	255.763	171	0.962	0.055	0.029	-6702.638	0.344	-6700.729	1.91	0.367	0.023	NS
	SA	363.200	212	0.954	0.060	0.035	-7353.539	0.347	-7349.879	3.66	0.383	0.036	0.01
	EN	347.413	212	0.956	0.055	0.033	-7491.515	0.337	-7490.597	0.92	0.343	0.006	NS
	PN	349.920	212	0.944	0.057	0.033	-7547.915	0.348	-7543.503	4.41	0.418	0.070	0.005

Note. EA = Emotional Abuse; PA = Physical Abuse; SA = Sexual Abuse; EN = Emotional Neglect; PN = Physical Neglect; CI = Confidence Interval. Trait rumination was included in all models. Covariates for gender identity and racial/ethnic identity were included in all models.

General Distress

For the general distress outcome, the log-likelihood ratio tests comparing the fit of Models 0 and Model 1 were significant for the sexual abuse ($D = 4.37$, $df = 1$, $p < .05$), emotional neglect ($D = 8.47$, $df = 1$, $p = .005$), and physical neglect ($D = 6.21$, $df = 1$, $p = .02$) interaction models. These findings suggested that Model 0 represented a significant decrease in model fit when compared to Model 1; in other words, the interaction effect significantly improved these models. Path coefficients for Model 0 and Model 1 are shown in Table 3.

Table 3: Path Coefficients for Model 0 and Model 1 for General Distress Outcome

		Model 0			Model 1		
Outcome	Predictor	β (std.)	SE	p-value	β (std.)	SE	p-value
	Emotional Abuse	0.026	0.076	0.735			
General Distress	Rumination	**0.724**	0.049	**<0.001**			
	Interaction				0.122	0.077	0.115
	Physical Abuse	0.009	0.073	0.900			
General Distress	Rumination	**0.734**	0.036	**<0.001**			
	Interaction				0.090	0.071	0.205
	Sexual Abuse	0.058	0.056	0.298			
General Distress	Rumination	**0.721**	0.038	**<0.001**			
	Interaction				**0.108**	0.043	**0.012**
	Emotional Neglect	0.040	0.056	0.475			
General Distress	Rumination	**0.725**	0.036	**<0.001**			
	Interaction				**0.148**	0.057	**0.010**
	Physical Neglect	0.099	0.073	0.171			
General Distress	Rumination	**0.706**	0.040	**<0.001**			
	Interaction				**0.154**	0.078	**0.048**

Note. Interaction = Type of Adversity Exposure x Rumination interaction. Bolded β and p values denote statistical significance at $p \leq .05$.

Table 4: Path Coefficients for Model 0 and Model 1 for Anhedonic Depression Outcome

		Model 0			Model 1		
Outcome	Predictor	β (std.)	SE	p-value	β (std.)	SE	p-value
Anhedonic Depression	Emotional Abuse	0.173	0.095	0.070			
	Rumination	**-0.451**	0.067	**<0.001**			
	Interaction				0.042	0.083	0.612
Anhedonic Depression	Physical Abuse	0.066	0.082	0.420			
	Rumination	**-0.383**	0.056	**<0.001**			
	Interaction				-0.023	0.089	0.792
Anhedonic Depression	Sexual Abuse	0.008	0.070	0.908			
	Rumination	**-0.369**	0.059	**<0.001**			
	Interaction				-0.003	0.073	0.964
Anhedonic Depression	Emotional Neglect	-0.078	0.082	0.339			
	Rumination	**-0.346**	0.062	**<0.001**			
	Interaction				-0.086	0.074	0.242
Anhedonic Depression	Physical Neglect	-0.021	0.078	0.792			
	Rumination	**-0.361**	0.058	**<0.001**			
	Interaction				0.081	0.115	0.479

Note. Interaction = Type of Adversity Exposure x Rumination interaction. Bolded β and p values denote statistical significance at $p \leq .05$.

The Sexual Abuse by Rumination interaction term was significant ($\beta = 0.108$; $SE = 0.04$; $p = .012$) and accounted for 1.4% of the variance in general distress ($R^2 = .575$). The association between sexual abuse and general distress was strongest at higher levels of rumination and weaker at lower levels of rumination and was significant above approximately 0.09 standard deviations above the mean of rumination (Figure 1A). The Emotional Neglect by Rumination interaction term was significant ($\beta = 0.148$; $SE = 0.06$; $p = .010$) and accounted for 3% of the variance in general distress ($R^2 = .588$). The association between emotional neglect and general distress was strongest at higher levels of rumination and weaker at lower levels of rumination and was significant above approximately 0.22 standard deviations from the average rumination score (Figure 1B). The Physical Neglect by Rumination interaction term was significant ($\beta = 0.154$; $SE = 0.08$; $p = .048$) and accounted for 3.6% of the variance in general distress ($R^2 = .602$). The association between physical neglect and general distress was strongest at higher levels of rumination and weaker at lower levels of rumination and was significant above approximately 0.24 standard

deviations from the average rumination score (Figure 1C). These findings suggested that not only were higher levels of rumination consistently associated with greater symptom endorsement of general distress, but importantly that higher levels of rumination were associated with intensified effects of early adversity (specifically that of sexual abuse, emotional neglect, and physical neglect) on the endorsement of general distress symptoms. Rumination did not moderate the relationship between emotional abuse or physical abuse on the general distress outcome.

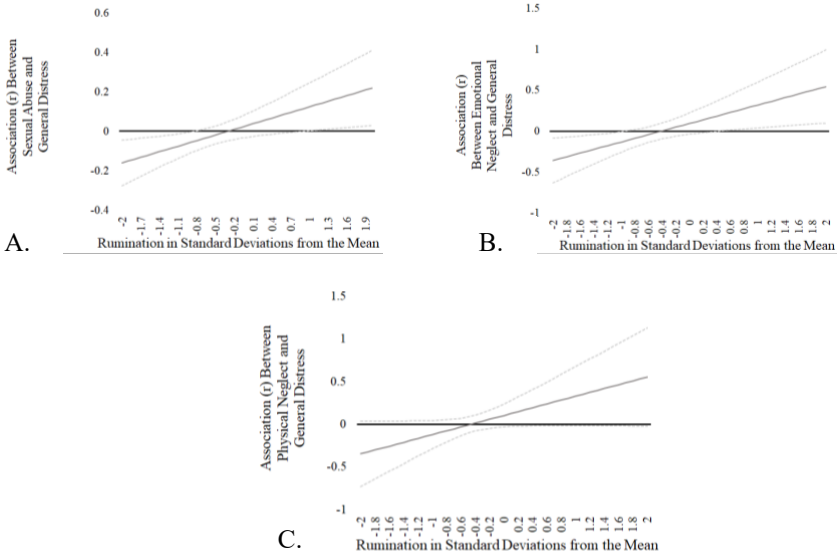

Figure 1: Johnson-Neyman Plots for the Interactions Between Types of Adversity Exposure x Rumination Predicting General Distress

Note. Solid lines represent model-estimated association between types of adversity exposure and psychological distress outcome. Dotted lines represent the upper and lower 95% confidence intervals for model-estimated associations.

Anxious Arousal

The log-likelihood ratio tests comparing the fit of Models 0 and Model 1 were significant for the emotional abuse (D = 10.86, df = 1, p < .001), sexual abuse (D = 7.32, df = 1, p = .01), and physical neglect (D = 8.82, df = 1, p = .005) interaction models. These findings suggested that Model 0 represented a significant decrease in model fit when compared to Model 1. Path coefficients are shown in Table 5.

Table 5: Path Coefficients for Model 0 and Model 1 for Anxious Arousal Outcome

		Model 0			Model 1		
Outcome	Predictor	β (std.)	SE	p-value	β (std.)	SE	p-value
	Emotional Abuse	0.151	0.081	0.061			
Anxious Arousal	Rumination	**0.491**	0.056	**<0.001**			
	Interaction				**0.211**	0.079	**0.007**
	Physical Abuse	0.085	0.089	0.341			
Anxious Arousal	Rumination	**0.542**	0.045	**<0.001**			
	Interaction				0.125	0.081	0.121
	Sexual Abuse	0.115	0.074	0.117			
Anxious Arousal	Rumination	**0.534**	0.048	**<0.001**			
	Interaction				**0.170**	0.064	**0.008**
	Emotional Neglect	-0.015	0.061	0.808			
Anxious Arousal	Rumination	**0.565**	0.042	**<0.001**			
	Interaction				0.084	0.071	0.236
	Physical Neglect	0.121	0.071	0.191			
Anxious Arousal	Rumination	**0.527**	0.047	**<0.001**			
	Interaction				**0.220**	0.088	**0.013**

Note. Interaction = Type of Adversity Exposure x Rumination interaction. Bolded β and p values denote statistical significance at $p \leq .05$

The Emotional Abuse by Rumination interaction term was significant ($\beta = 0.211$; $SE = 0.08$; $p = .007$) and accounted for 8.3% of the variance in anxious arousal ($R^2 = .437$). The association between emotional abuse and anxious arousal was strongest at higher levels of rumination and weaker at lower levels of rumination and was significant above approximately 0.25 standard deviations from the average rumination score (Figure 2A). The Sexual Abuse by Rumination interaction term was significant ($\beta = 0.170$; $SE = 0.06$; $p = .008$) and accounted for 3.6% of the variance in anxious arousal ($R^2 = .383$). The association between sexual abuse and anxious arousal was strongest at higher levels of rumination and weaker at lower levels of rumination and was significant above approximately 0.13 standard deviations above the mean of rumination (Figure 2B). The Physical Neglect by Rumination interaction term was significant ($\beta = 0.220$; $SE = 0.09$; $p = .013$) and accounted for 7% of the variance in anxious arousal ($R^2 = .418$). The association between physical neglect and anxious arousal was strongest at higher levels of rumination and weaker at lower levels of rumination and was significant above approximately 0.29 standard deviations above the mean of rumination (Figure 2C). Similar to findings identified

for the general distress outcome, these results indicate that not only were higher levels of rumination consistently associated with greater symptom endorsement of anxious arousal, but importantly that higher levels of rumination were associated with intensified effects of early adversity (specifically that of emotional abuse, sexual abuse, and physical neglect) on the endorsement of anxious arousal symptoms. Rumination did not moderate the relationship between physical abuse or emotional neglect on the anxious arousal outcome.

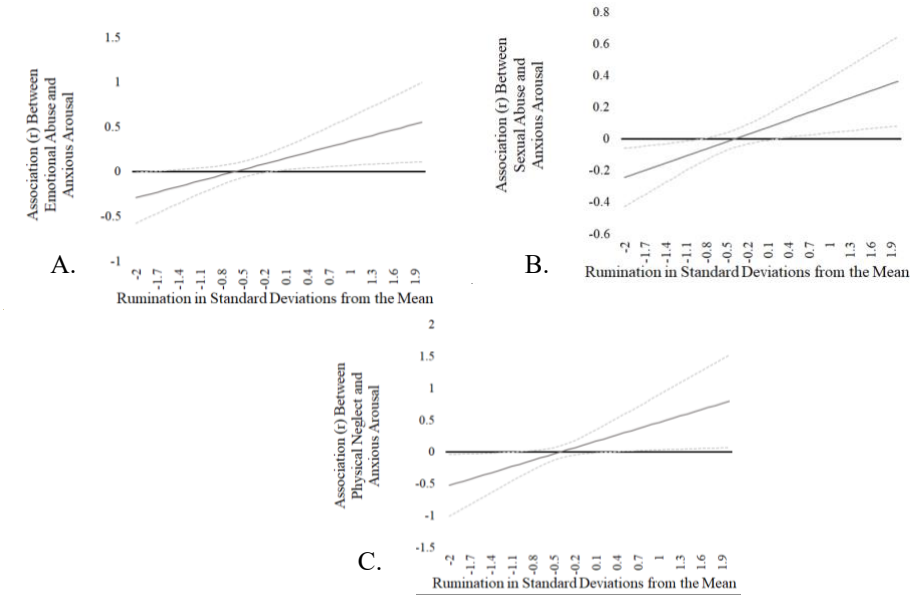

Figure 2: Johnson-Neyman Plots for the Interactions Between Types of Adversity Exposure x Rumination Predicting General Distress

Note. Solid lines represent model-estimated association between types of adversity exposure and psychological distress outcome. Dotted lines represent the upper and lower 95% confidence intervals for model-estimated associations.

Anhedonic Depression

None of the interaction models predicting anhedonic depression were significant. The log-likelihood ratio test comparing the fit of Models 0 and Models 1 were not significant, indicating that Model 0 fit just as well as Model 1. Path coefficients are shown in Table 3.

DISCUSSION

In one of few studies to test moderation of early adversity by rumination on depression and anxiety symptoms in college students, we showed that higher levels of rumination were consistently associated with more symptom endorsement, and that

in several cases, they were associated with intensified effects of early adversity on symptom endorsement. Findings from this study indicated that higher levels of rumination among college students were associated with less positive psychological adjustment (i.e., higher levels of general distress, higher levels of anhedonic depression, higher levels of anxious arousal). Retrospective reports of childhood adversity (however indexed: emotional abuse, sexual abuse, physical abuse, emotional neglect, or physical neglect) were not significantly associated with these same three indicators of well-being among college students. However, rumination moderated associations between specific indicators of childhood adversity and well-being in college. Positive associations between sexual abuse, emotional neglect, and physical neglect and general distress were significant only at higher levels of rumination. Positive associations between emotional abuse, sexual abuse, and physical neglect and anxious arousal were significant only at higher levels of rumination.

Findings for the main effects of rumination in relation to indicators of psychological distress were consistent with existing work suggesting that rumination is a predictor of college students' mental health problems (Sheldon et al., 2021). Rumination is understood as a perseverative thought pattern that reflects an unhealthy and passive preoccupation with life stressors and a negative, inward focus on the self (Nolen-Hoeksema et al., 2008; Sansone & Sansone, 2012). Individuals prone to using rumination as a maladaptive coping strategy may encounter difficulties in dealing with daily life events, in part due to this passivity, which may ultimately impact their mental health (Sheffler et al., 2020). Watkins and Roberts (2020) hypothesized that rumination can exacerbate psychological issues by: a) intensifying and prolonging existing negative mood states and thoughts, b) interfering with problem-solving abilities, c) disrupting active behaviors, and d) minimizing sensitivity to changes in circumstances and/or environments (e.g., not recognizing when situations improve).

Contrary to our hypotheses, we did not find significant direct associations between retrospective reports of any types of childhood adversity exposure and indicators of psychological distress during college. This result was somewhat surprising given existing studies on college students that indicated experiences of childhood adversity exposure were associated with poor psychological adjustment in adulthood, such as levels of depression, anxiety, and stress (Colburn et al., 2021; Silvern et al., 1995). Importantly, much research that has documented associations between childhood adversity exposure and psychological adjustment among college students has relied on summary measures of adversity exposure that does not distinguish between abuse and neglect or among different types of abuse and neglect. Including distinct types of childhood adversity within a single model accounted for covariation among types of abuse, thus potentially making it more difficult to detect main effects. However, our approach did allow us to consider ways in which rumination moderated associations between different types of childhood adversity and indicators of well-being among college students, which proved to be important.

Prior to conducting analyses, we expected to find that the association between types of adversity exposure and psychological distress would be stronger at higher levels of rumination. Our hypotheses were formed based on existing literature that has suggested coping skills moderate the relationship between childhood

psychological trauma and mental health during adulthood (Lee et al., 2021). We hypothesized that rumination would moderate the associations between college students' reports of distinct types of adversity exposure experienced during childhood and their psychological distress during college, measured in terms of general distress, anhedonic depression, and anxious arousal. We generally anticipated that associations between higher levels of childhood adversity and higher levels of psychological distress would be stronger at higher levels of rumination. However, our findings indicated a much more complex set of findings. First, higher levels of rumination exacerbated the risk conferred by some indicators of childhood adversity in terms of negative adjustment (i.e., general distress, anxious arousal), but were not associated with elevated risk in terms of high levels of anhedonic depression. By definition, rumination constitutes an approach to managing one's mood and stress that involves obsessively focusing on negative content (Sansone & Sansone, 2012). Engaging in this type of behavior in the context of a history of childhood adversity makes college students feel worse. Second, only some types of childhood adversity interacted with rumination to place students at risk in terms of general distress and anxious arousal. These were sexual abuse and physical neglect (for both general distress and anxious arousal), emotional neglect (for general distress) and emotional abuse (for anxious arousal). Rumination did not combine with physical abuse to predict either general distress or anxious arousal. This may be attributed to the fact that two items were dropped from the physical abuse subscale due to high skewness and kurtosis values, consistent with an interpretation that most of the sample experienced little physical abuse, and as such might be less likely to reveal interactions. Nearly all participants reported never experiencing items "I got hit so hard by someone in my family that I had to see a doctor or go to the hospital," and "I got hit or beaten so badly that it was noticed by someone like a teacher, neighbor, or doctor."

Importantly, our findings portray an optimistic picture of the potential to ameliorate the potential risk conferred by at least some types of childhood adversity by implementing interventions that could target students' tendencies to ruminate on their negative experiences. There are a variety of interventions that have been shown to be effective at reducing ruminative thought patterns. For example, a meta-analysis of several mindfulness intervention studies indicated that mindfulness-focused cognitive therapy significantly reduced patients' ruminative thoughts (Perestelo-Perez et al., 2017). Additionally, Edge et al. (2021) are currently developing and testing a mobile phone app intervention that provides information and skills on how to reduce chronic negative thoughts (including worry and rumination). Making successful interventions targeting rumination more widely available through counseling and mental health services across college campuses has the potential to improve student well-being for those students enter the postsecondary environment having experienced childhood adversity and with a greater tendency to engage in rumination. Although the current study did not assess students' academic success or performance, existing studies have indicated that adverse childhood experiences are also associated with academic risk (Arnekrans et al., 2018; Watt et al., 2021). Higher levels of rumination are also associated with academic risk (Constantin et al., 2018). The availability of proven interventions to target rumination within college student

populations has the potential to benefit students both psychologically and academically.

Strengths and Limitations

The present study is strengthened by a diverse sample drawn from a university that, during our 2021 data collection, enrolled over 50% students of color (UNC Greensboro, 2021). That said, data were collected from a single university in the southeastern region of the U.S., and therefore findings may not be generalizable to all college students. Additionally, 75% of participants identified as women, which is consistent with the predominant enrollment of women at the institution and in social science courses. Future work in this area should focus on groups of students diverse with respect to type of institution, location of institution, and especially gender identity. The current study provided novel findings regarding the moderating role of rumination on the relation between college students' specific types of adversity exposure and psychological distress outcomes. Future studies should assess the timing, severity, and/or duration of adversity exposure to further elucidate the specific circumstances under which adversity exposure and rumination are linked with psychological distress. All data for the current study were obtained from students' own self reports. Thus, we cannot eliminate the possibility of shared source variance as an explanation for associations among study variables. We also are unable to determine the direction of identified effects, as our design was cross-sectional. However, a key strength to our study is the utilization of structural equation modeling, which can account for measurement error and can assess whether associations between variables reflect the data well (Nachtigall et al., 2003).

CONCLUSION

Given the prevalence of adverse childhood experiences (CDC, 2022), as well as the mental health crisis unfolding within higher education (Healthy Minds Network, 2023; Oswalt et al., 2020), it is imperative that researchers focus on identifying personal characteristics of students that potentially increase risk associated with specific types of adversity exposure. Utilizing a sample of diverse college students, we found that: 1) rumination was associated with college students' psychological distress, measured by self-reports of general distress, anhedonic depression, and anxious arousal and 2) the potential negative impacts of some types of childhood adversity exposure on college students' self-reports of general distress and anxious arousal were exacerbated in the presence of high levels of rumination. The knowledge gained from this research has important implications for mental health professionals and higher education administrators who wish to provide evidence-based support to students in need.

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