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Mediators between Adversity and Well-Being of College Students

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Abstract

Although the concurrent link between adverse childhood experiences (ACEs) and both physical and mental health is established, little is known about the mechanisms that explain it. We investigated the relationship between ACEs and well-being and the mediating roles of coping, executive function (EF), and cognitive failure in a non-clinical sample of college students.

Participants ($N = 194$) completed behavioral measures and self-reports. More than half of the sample had at least one ACE. Correlational and mediational analyses examined the relationships between ACEs, college adaptation, psychopathology, substance use, coping, and cognitive failure. ACEs did not correlate with indices of EF or cognitive failure but there was a positive relationship between cognitive failure and negative coping. ACEs positively correlated with college adaptation, psychopathology and substance abuse. There was a full mediation from ACE via negative coping and cognitive failure for college adaptation and psychopathology and via negative coping for alcohol, and drug use. ACEs relate with reliance on negative coping which in turn predicts directly and indirectly, through cognitive failure, poor adaptation and heightened symptomatology for psychopathology.

Keywords: Adverse childhood experiences, coping, executive function, cognitive failure, college adaptation, well-being

Adversity, Coping, Executive Function, Cognitive Failure, and Well-Being

More than 50% of adults experience at least one form of childhood adversity, such as poverty, forms of maltreatment, and disruptive family dynamics while almost 20% report four or more adversities (Font & Maguire-Jack, 2016). Research has shown that adversity in childhood is linked to both physical and mental health concurrently in children (McLaughlin & Sheridan, 2016) and retrospectively in middle to late adulthood (Felitti et al., 1998). However, little is known about the mechanisms that explain this link. Exposure to trauma associates with ineffective coping in childhood (Shelton & Harold, 2007), which in turn is involved in psychopathology (Sroufe et al., 2005). Childhood trauma is also significantly associated with impairment in executive functions (Best & Miller, 2010) and such deficits are evident in mental health problems such as attention deficit hyperactivity disorder (Barkley, 1997) and post-traumatic stress disorder (Leskin & White, 2007). Given the negative association of childhood adversity and adult outcomes as well as the links between adversity, coping, and executive functioning in childhood, it is important to examine possible mediating mechanisms in retrospective studies as well.

Childhood Adversity

Felitti, et al. (1998) were first to consider the long term effects of childhood adversity in adulthood. Consistent with the theory of cumulative risk, they created the Adverse Childhood Experiences (ACE) scale to take a count of multiple adversities (i.e., emotional, physical, sexual abuse; parental substance abuse; parental mental illness; domestic violence; criminal behavior), from ages 0 to 18. Based on the health records of a large sample, Felitti et al. (1998) revealed a

graded relationship between the ACE score and several outcomes that increase mortality. Moreover, those with at least four ACEs had a 4 to 12-fold increased risk for drug abuse, alcoholism, suicide attempt, and depression compared to those with no ACE. Follow-up studies confirmed the link between ACEs and problems in mental (Anda et al., 2002; Lejonclou et al., 2014) and physical health (Felitti et al., 2010, Jakubowski et al., 2018).

Coping

Recent research has examined the mechanisms through which ACEs connect with problems in adulthood by focusing on dysregulated emotion and ineffective coping because these variables are linked to both adversity and psychological outcomes (Morris et al., 2007). Using a community sample, Rudenstine et al. (2018) found that behavioral (e.g., non-acceptance of negative feelings) and cognitive (e.g., being unclear about one's own feelings) dimensions of emotion regulation mediated the relationship between adversity and psychological distress, explaining 36% of the variance. In a similar study, Abravanel and Sinha (2015) reported an indirect effect of ACE through emotion dysregulation on depressive symptoms among adults in a community sample, explaining 50% of the variance. However, the direct effect continued to be significant. The mediating role of emotion dysregulation was also found between adversity and general risk behaviors, alcohol related behaviors, and risky sexual behaviors (Espeleta et al., 2019). Moreover, the lack of positive or constructive forms of coping was found to moderate the relationship between ACE and depression (Poole et al., 2017). Lastly, emotion-focused but not problem-focused coping was a significant mediator between childhood adversity and health as well as psychiatric symptoms in adulthood (Sheffler et al., 2019).

Executive Function and Cognitive Failure

Executive function includes a cluster of cognitive abilities that are involved in making and executing plans and decisions about thoughts and behaviors and includes components such as focusing, sustaining and shifting attention, working memory span, speed of processing, and inhibition (Boelema et al., 2014). Exposure to ACE may interfere with the development of EF. For example, harsh parenting predicted poorer inhibition in early (Treat et al., 2019) and middle (Halse et al., 2019) childhood and early exposure to trauma related to hyperarousal that interfered with the development of cognitive inhibitory control (van der Kolk, 2017). In turn, deficits in EF were linked with developmental disorders, psychopathology (Brunnekreef et al., 2007; Barkley, 1997), and academic difficulties (Fitzpatrick et al., 2014) although the link between ACE and psychopathology was not always clear. For example, not all children who experienced adversity and developed post-traumatic stress disorder exhibited EF deficits (Lund et al., 2020). Furthermore, retrospective research with adults points out that exposure to ACE matters in executive functioning. Unpredictable harsh and stressful early environment was associated with impaired inhibition (Mittal et al., 2015) and diminished performance in working memory tasks by demanding more cognitive sources (Philip et al., 2015). Similar results were obtained by Mark et al. (2018) who used EEG metrics to show the link between history of abuse and overload during working memory tasks.

Adversity in adulthood does not necessarily relate to EF in a negative way (Kim et al., 2019; Mittal et al., 2015), but there is ample evidence that adversity is involved in EF deficits and that such deficits are related to psychological outcomes. Additionally, there is limited evidence of how EF may explain the link between ACE and outcomes with some exceptions suggesting that attention mediates childhood neglect and adult psychosis (Mansuetto et al.,

2019), and that metacognition mediates trauma and externalizing problems in children (Hodgdon et al., 2018).

Although not an executive function, cognitive failure expressed in everyday blunders, mind wandering, and absentmindedness is seen as evidence of poor executive control (McVay & Kane, 2010). Cognitive failure is indeed correlated with measures of poor sustained attention and a tendency to trade speed over precision in cognitive tasks (Wallace et al., 2002). Findings that resilience is related with fewer everyday cognitive failures among older adults (Lamond et al., 2008) imply that adversity would positively relate with cognitive failures. In addition, there is evidence that cognitive failures are linked to several psychological outcomes and risky behaviors (Carrigan & Barkus, 2016), making cognitive failure another possible mediator.

Present Study

The reviewed literature shows that ACEs positively relate to emotion dysregulation (Morris et al., 2007), which in turn predicts affective disorders (Abravanel & Sinha, 2015; Rudenstine et al., 2018) and risky behaviors (Espeleta et al., 2019). Ineffective coping in a form of venting, denial, and disengagement mediates the link between ACE and psychiatric disorders (Sheffler et al., 2019). This indirect effect of emotion dysregulation is significant in adults from community samples. Adversity also seems to negatively relate with executive function (Lund et al., 2020; Mark et al., 2018; Mittal et al., 2015; Philip et al., 2015; Treat et al., 2019;) which then is linked to learning and developmental disorders (Barkley, 1997; Brunnekreef et al., 2007; Fitzpatrick, et al., 2014; van der Kolk, 2017). However, whether EF plays a mediating role between adversity and negative outcomes has only been studied in adults with severe disorders (Mansuetto et al., 2019) or youth in residential homes (Hodgdon et al., 2018) and is very limited (Lund et al., 2020). Moreover, the literature has focused on adult groups that vary greatly in age

range, typically from 18 to 70s. There is a lack of research investigating these links during the transition from family to college life when young adults are expected to be independent on their own. As young adults cope with this transition to adulthood, they rely on coping methods that may not be as effective as the ones older participants in previous samples might have had the chance to develop. Furthermore, studying the role of ACE in EF that is still developing in this younger group allows for timely interventions. Lastly, the role of cognitive failure is largely understudied.

Our research addresses these limitations by investigating the relationship between early adversity and well-being of college students. We broadened our definition of well-being to include positive constructs such as successful adaptation in college (Ryff & Keyes, 1995) in addition to indices of psychopathology, and risky behaviors. Adaptation here is viewed as an outcome of specific coping strategies (Mikulincer & Florian, 1996) rather than a coping mechanism on its own. We focused on cognitive inhibition as an index of EF and additionally examined the role of cognitive failure.

Based on the above findings, we expected significant correlations between ACEs, coping, and EF, and cognitive failure which then would be linked to well-being outcomes. We also expected a direct negative link between ACEs and our measures of well-being as well as a mediating pathway between ACEs and well-being through coping, EF, and cognitive failure (Figure 1).

Method

Participants

Participants were 194 undergraduate college students (80.4% female) from a small college in the Northeast. The mean age was 19.31 years ($SD = 1.11$) with first-year students

comprising 36.6% of the sample (30.4% sophomores, 18.6% juniors, 14.4 seniors. The majority identified as White (83%, 4.1% African American, 5.2% Asian American, 4.6 % Latinx, 3.1% Other) and came from intact families (70%, 17.9% divorced, 3.7% single parent, 8.4% other) One third reported a family income of \$100,000 - 150,000, 30% of \$50,000-100,000, 25% of less \$50,000, and 12.3% of more than \$150,000. The average age for mothers (or other caregiver) was 50.25 years (range: 35-91) and for fathers (or other caregiver) was 52.92 years (range: 37-93). Most of mothers and fathers held a college degree (46.4% and 39.8% respectively). We recruited participants from undergraduate classes and athletic teams. Students were compensated with a \$5.00 gift card and/or extra course credit. Data collection took place during the academic year of 2015-2016 after the project was approved by the Institutional Review Board of the college.

Measures

In addition to providing demographic information, participants completed questionnaires that assessed adversity, college adaptation, psychopathology, substance abuse, coping, and cognitive failure. They also completed two computer tasks that measured cognitive inhibition, a component of executive function.

Childhood Adversity

We used the ACE Questionnaire (Felitti et al., 1998) to measure childhood adversity. This is a yes-or-no questionnaire with seven different categories that include more than one questions about: psychological, physical, and sexual abuse, substance abuse, mental illness, domestic violence, and criminal behavior in the household. A point of 1 is assigned to one of the seven categories if the participants experienced it, therefore the ACE scores range from 0 to 7).

The ACE Questionnaire is widely used to assess childhood adversity (e.g., Espeleta et al., 2018; Rudenstine et al., 2018).

Well-Being

College Student Adaptation. The Student Adaptation to College Questionnaire (SACQ) (Baker & Siryk, 2011) includes 67 items that yield a total adjustment score and four adaptation variables. The academic subscale measures a student's ability to cope with the educational demands of college, the social subscale refers to one's capacity to cope with societal, the personal-emotional subscale quantifies a general sense of how a student feels physically and psychologically and the attachment subscale refers to a student's satisfaction with the institution attended. The participants responded to each item on a 9-point scale, ranging from "applies very closely to me" to "does not apply to me at all." The scale has been used in counseling as a diagnostic tool and in basic research with high reliability and validity (Baker & Siryk, 2011). The Cronbach's alpha for the scale was .92 (alphas for subscales ranged from .73 to .87).

Psychopathology. The Outcome Questionnaire-45 (OQ-45) is a 45-item self-report scale used to estimate an individual's index of mental health for those older than 18 years (Lambert et al., 2011). It provides a total score of quality of life and three subscales: symptom distress (e.g., "I have trouble falling asleep or staying asleep"), interpersonal relations (e.g., "I am concerned about family troubles"), and social role (e.g., "I feel stressed at work / school"). Each item is rated on a 5-point Likert scale (0 = Never, 4 = Almost Always). A higher score indicates that participants experience greater symptomatology, their symptoms of distress are high and their perceived quality of life, interpersonal relations, and social role are low. This instrument is often used to identify individuals who present symptoms of clinical significance. The cut-off score is more than 63 for quality of life, 36 for symptom distress, 15 for interpersonal relations and 12 for

social role. The Cronbach's alpha symptom distress was .91, for interpersonal relations was .83, for social role was .68 and for the whole scale was .95.

Alcohol and Drug Use. The Short Michigan Alcohol Screening Test (SMAST) is a 13-item self-report questionnaire that measures an individual's problems experienced as a result of drinking alcohol (Selzer et al., 1975). It is strongly recommended that the SMAST be used along with the Drug Abuse Screening Test-10 (DAST-10). The DAST-10 is a 10-item self-report questionnaire that measures problems experienced as a result of drug use (not including alcohol or tobacco use; Skinner, 1982). In both scales, questions are answered with "Yes" or "No" answers only (e.g., "Do you ever feel guilty about your drinking?", "Have you used drugs other than those required for medical reasons?") and each "Yes" receives 1 point, resulting in a total score. A score of three or more calls for further clinical assessment. The Kuder-Richardson 20 was .74 for SMAST and .70 for DAST.

Coping

To measure coping strategies we used the Brief COPE (Carver, 1997). It consists of 28 items which participants rated using a 4-point Likert scale (0 = I haven't been doing this at all, 3 = I have been doing this a lot). The Cronbach's alpha for the scale was .71. The scale provided 14 coping variables which we further reduced by performing a principal component analysis with varimax rotation. Two factors were saved as variables using the method of regression: positive coping (active coping, planning, positive reframing, acceptance, humor, religion, using emotional support, using instrumental support, self-distraction) and negative coping (denial, venting, substance use, behavioral disengagement, and self-blame). The Kaiser-Meyer-Olkin value was .76 ($p < .001$) validating the appropriateness of the analysis (factor loadings are available upon request).

Cognitive Failure

The Cognitive Failures Questionnaire (CFQ; Broadbent et al., 1982) assesses memory deficit (e.g., forgetting if one turned off the light), distractibility or absent-mindedness (e.g., daydreaming when ought to be listening), and behavioral slips (e.g., saying something that one realizes it might be taken as an insult). The scale consists of 25 statements that were rated on a 5-point Likert scale (4 = very often to 0 = never) and the total score was used in the analyses. The Cronbach's alpha was .81.

Executive Function: Cognitive Inhibition Computer Tasks

We adopted two tasks from the National Institute of Health's Executive Abilities: Measures and Instruments for Neurobehavioral Evaluation and Research (NIH-EXAMINER; Kramer et al., 2013).

Flanker Task. While the participants focused on a small cross in the middle of the computer screen, a row of five arrows was shown either above or below the cross. The participant determined whether the center arrow pointed left or right by pressing either the left or right arrow key. The arrows either faced the same direction (congruent) or the opposite (incongruent) of the center arrow. Each condition was presented in random order. The Flanker score was based on accuracy and ranged from 0 to 10, with 10 indicating highest inhibition.

Continuous Performance Test (CPT). Participants saw different images in the center of the computer screen and were told to press the left arrow key if the image was the target image. The non-target images looked similar in shape and size to the target (e.g., target = green five-pointed star; non-target = green six-pointed star). In a total of 100 trials, 80% of the time it was the target image. Accuracy in both conditions was used in the analyses (Max score: 100).

Procedure

Data collection took place at the campus' psychology computer lab that has seven computer stations separated by wall dividers to ensure privacy. Participants first completed the EF tasks and then accessed PsychData to fill out the questionnaires. The procedure took approximately 45 to 60 minutes.

Results

Data Analysis Plan

We initially conducted descriptive analyses of study variables (Table 1) as well as correlational analyses among all variables (Tables 2, 3, and 4). Based on these results, we tested the mediation models in which coping and cognitive failure were the mediators between ACEs and the well-being variables of college adaptation, psychopathology, alcohol and drug abuse. To test the mediation models we used AMOS for SPSS (Arbuckle, 2014). The analyses were based on 1,000 bootstrapped samples and a 95% bias corrected bootstrap confidence interval. Missing values (see Table 1) were replaced by the mean values in the mediation analyses to satisfy the requirements of the bootstrapping method. Lastly, we considered whether an increased number of ACEs related to a greater likelihood to present clinically significant symptoms regarding general psychopathology and alcohol and drug abuse by conducting chi square analyses. We identified as a high risk group those with two or more ACEs and used the cut-off scores provided by the instruments to define those with symptoms of clinical significance.

Types of ACEs

Descriptive analyses indicated that 51.55% of the participants reported at least one ACE while 29% had at least two. Among those with at least one ACE, the most frequent one was

mental health problems in the family (61%) followed by psychological abuse (45%), substance abuse (40%), and physical abuse (25%). The least frequent was sexual abuse (7%).

Bivariate Correlational Analyses

Contrary to expectation, ACEs did not correlate with positive coping, EF, and cognitive failure but the positive correlation between ACEs and negative coping, $r = .28, p < .001$ was significant as expected. A notable positive correlation was the one between negative coping and cognitive failure, $r = .43, p < .001$ (Table 2). ACEs negatively correlated with personal adaptation, $r = -.18, p = .031$, social adaptation, $r = -.15, p = .031$, and attachment to college, $r = -.17, p = .015$, as well as total adaptation. There were significant positive correlations between ACE and psychopathology including distress symptoms, $r = .26, p < .001$, interpersonal relations, $r = .25, p < .001$, and quality of life, $r = .26, p < .001$, as well as alcohol, $r = .16, p = .031$, and drug abuse, $r = .24, p = .00$. Lastly, negative coping and cognitive failure significantly correlated with all well-being variables (Table 3). All of these relationships were in accordance to our hypotheses.

Mediation Analyses

The correlational analyses support the inclusion of negative coping in the mediation analyses. None of the EF tasks and cognitive failure correlated with ACEs, however, cognitive failure strongly correlated with the other mediator, negative coping, as well as all of the outcome variables, allowing us to explore the additional indirect path from negative coping to cognitive failure (Figure 1). Previous research using the same measures as in the present study has also demonstrated a strong association between dysfunctional coping and cognitive failure (Leung, 2018). Therefore, we tested the model that included the path ACEs → Negative Coping → Outcome, as well as the indirect path ACEs → Negative Coping → Cognitive Failure →

Outcome (Table 5). The indirect effect was calculated by adding the two possible indirect paths: $\beta_a * \beta_b + (\beta_a * \beta_c * \beta_d)$ (Table 6, Figure 2). We tested this model four times with adaptation, quality of life (i.e., the psychopathology variable), alcohol abuse, and drug abuse as the dependent variable. We also performed the same analyses with a model that restricted the path via negative coping and cognitive failure to demonstrate better fit of the proposed model.

College Adaptation. For college adaptation, ACE's direct effect was nonsignificant. ACE predicted adaptation via negative coping ($.20 * -.45$) and also via negative coping and cognitive failure ($.29 * .43 * -.23$) (Table 6, Figure 2). The total indirect effect was $-.16$. All variables explained 35.7% of the variance in college adjustment, $\chi^2(1) = .134$, $p = .714$, $RMSEA = .00$, $CFI = 1$. When we eliminated the indirect path via cognitive failure, the model resulted in poorer fit, $\chi^2(3) = 12.70$, $p = .005$, $RMSEA = .129$, $CFI = .929$.

Quality of Life. Similarly, the direct path of ACE to quality of life (indicator of psychopathology) was nonsignificant while the two indirect paths were ($.29 * .53 + .29 * .43 * .29$) (Table 6, Figure 2), indicating full mediation. The total indirect effect $.18$. The total variance explained in quality of life was 53.1%, $\chi^2(1) = .134$, $p = .714$, $RMSEA = .00$, $CFI = .99$. When we eliminated the indirect path via cognitive failure, the model resulted in poorer fit, $\chi^2(3) = 26.982$, $p < .015$, $RMSEA = .204$, $CFI = .878$.

Alcohol Abuse. For alcohol abuse, the direct path was fully mediated by the one indirect path via negative coping ($.29 * .26 = .08$) (Table 6, Figure 2). The path from cognitive failure to alcohol use was not significant. ACE and negative coping predicted 9.6% of the variance in alcohol abuse, $\chi^2(1) = .134$, $p = .714$, $RMSEA = .00$, $CFI = 1$. When constraining the indirect pathways via cognitive failure to zero, the model resulted in a similar fit to the non-restricted

model, $\chi^2(3) = .359$, $p = .949$, $RMSEA = .000$, $CFI = 1$ and the χ^2 difference between the two models was not significant. The total variance predicted was still 9.6%.

Drug Abuse. Likewise, while the direct path between ACE and drug abuse was fully mediated, only the indirect path via negative coping alone was significant. The indirect effect was .10 (29*.35) (Table 6, Figure 2). $\chi^2(1) = .134$, $p = .714$, $RMSEA = .00$, $CFI = 1$. When constraining the indirect pathways via cognitive failure to zero, the model resulted in a similar fit to the non-restricted model, $\chi^2(3) = .548$, $p = .908$, $RMSEA = .000$, $CFI = 1$ and the χ^2 difference between the two models was not significant. The total variance explained in drug abuse by ACE and negative coping was 19%.

Risk for Psychopathology and Addiction

To discover if those with high ACEs were more likely to present symptoms of clinical significance, we performed 2X2 chi square analyses and compared column proportions with a Bonferroni adjustment. The effect of ACEs on quality of life was significant, $\chi^2(1) = 13.39$, $p < .001$, showing that 20.6% of the low risk group vs 46% of the high risk group were in the clinical condition. The effect of ACE on interpersonal relationships was also significant $\chi^2(1) = 10.72$, $p < .001$, with more individuals from the high risk group (44.2%) reaching a clinically significant level compared to the low risk group (21.8%). Similar significant effect was found for distress symptoms, $\chi^2(1) = 7.645$, $p < .001$, with 66.5% of high risk participants presenting clinical symptoms compared to 33.5% of the low risk group. Lastly, the high risk group was represented more in the clinical category for drug abuse (54.5%) than the low risk group (25.6%), $\chi^2(1) = 7.97$, $p < .01$. The effects of ACEs on social role and alcohol dependency were not significant.

Discussion

We examined the relationships between ACE and indices of well-being, including college adaptation, psychopathology, and alcohol and drug use. We also aimed to provide support for the mediating role of coping, EF, and cognitive failure between ACE and outcomes in young adulthood. The results indicate that such mechanisms exist for negative coping and self-reported cognitive failure.

Childhood adversity has direct links to important aspects of college adaptation, including fitting in, keeping-up with schoolwork, and being able to adjust to stressful situations in college. Moreover, ACE had a direct link with alcohol and drug use as well as quality of life, a variable reflecting symptomatology of emotional disorders. These findings add to existing retrospective studies (Felitti et al., 1998; Felitti et al., 2010; Lejonclou et al., 2014) by expanding associations between adversity and well-being outcomes to a targeted younger age group of adults as they transition to living away from home.

When examining potential mediators, we confirmed that negative coping is related to both ACE and all of our well-being outcomes. This finding expands research by Rothman et al. (2010), who showed that ACE related to maladaptive coping strategies, such as underage drinking among adolescents, and research by Thomson and Jaque (2019) who demonstrated that young adults with ACEs relied on emotional-oriented coping and experienced increased stress. Participants in our study who used strategies such as self-blame and denial tended to experience low adjustment in their personal, social, and academic life. They were also more likely to experience distress symptoms, have interpersonal difficulties, and abuse alcohol and drugs.

Contrary to expectation, ACE was not related to cognitive failure and any of the EF tasks. It is possible that each subcomponent of EF is affected differently by different types of

adversity as it continues to develop in childhood, adolescence, and young adulthood (Boelema et al., 2014). Future research could further examine the joined effects of ineffective coping and EF. There is some evidence, for example, that higher inhibition combined with lower disengagement (i.e., similar to negative coping) protected young adults from depression (Morris et al. 2015). Our measure of cognitive failure, however, was strongly correlated with negative coping and poor college adaptation complementing evidence linking cognitive failure to risky behaviors (Carrigan & Barkus, 2016). Our results show that negative coping and cognitive failure shared a good amount of variance. This relationship is probably bidirectional but in the mediation analyses maladaptive coping led to cognitive blunders in everyday life, like being distracted and forgetful.

The mediation analyses confirmed the role of maladaptive coping in partially explaining the long term associations of ACE with well-being outcomes. Negative coping was a significant mediator for college adaptation, symptoms of psychopathology, and risk for alcohol and drug abuse. Additionally, the path through negative coping and cognitive failure was significant for adaptation and symptoms of psychopathology. Including these variables in the mediation analyses resulted in a better model fit than restricting them. These findings build on and significantly expand recent retrospective studies linking ACE via emotional dysregulation to emotional distress (Rudenstine et al., 2018; Abravanel & Sinha, 2015) and risky behaviors (Espeleta et al., 2019). Moreover, our mediators explained similar portions of the outcome variables reported in the above studies.

Contrary to expectation, positive coping did not relate with ACE or any of the well-being outcomes. Thomson and Jaque (2019) found no difference in the ability to engage in positive coping under stress among individuals who varied in number of ACEs. When such coping is

learned is not clear. Familial contexts filled with adversity do not offer opportunities to children to learn effective coping. In fact, the most common ACEs in this study were parental mental health and substance abuse, both of which contribute to parental modeling of ineffective coping. Further, whether positive coping is effective in protecting young adults from risk remains unknown. The current results suggest that negative outcomes are more influenced by the maladaptive behaviors that individuals likely learn in their families.

Limitations, Future Research, and Clinical Implications

Because of the overrepresentation of women in the sample it was not possible to analyze gender effects. Although previous research does not suggest gender differences in ACEs (Felitti et al, 1998), researchers have documented such differences in coping strategies (Calvete et al., 2011), implying that the coping pathway linking ACEs and college adaptation maybe different for men and women. Additionally, the sample is restrictive to the college population and does not include young adults who may have experienced other transitions to living away from home or perhaps are still at home. The sample is selective as it includes participants who were resilient enough to overcome adversity and achieve admission to college. The retrospective design of the study also limits the interpretation of the findings. It is not possible to know how young adults have constructed their own personal histories to achieve coherence in their identities, a bias that has been shown in many recall studies (Ross, 1989). Participants may have exaggerated their ability to change in response to adversity, for example. Moreover, the lack of a longitudinal examination limits the understanding of how such personal histories were built over time in response to life adversity.

A common critique of the ACE scale is that it does not account for the differential impact of stressors (e.g., Dennison et al., 2019), or the effect of their acuity, timing, and longevity. For

example, an unexpected tragedy such as parental divorce is not associated with negative outcomes, but family instability predicts alcohol and drug abuse, and family violence predicts psychopathology in ages 16-22 years (Beal et al., 2019). Further, recent evidence points out that the timing of adversity predicts DNA methylation more so than accumulation of adversity or its recency (Dunn et al., 2019). Despite the criticism of taking a cumulative risk approach, childhood adversity undeniably predicts overall physical and mental health outcomes in adulthood (Felitti et al., 1998; Anda et al., 2002, Felitti et al., 2010; Lejonclou et al., 2014).

Future research could expand the role of possible mediators. As more research shows that traumatic experiences change the chemistry and perhaps the functionality of the brain (Dennison et al., 2019; Mark et al., 2018), more neurophysiological assessments are needed to assess mediators such as ability to plan. Protective mediators like personality traits and attachment styles could also be identified. For example, Perera, et al., (2014) found that conscientious participants used more positive coping methods and were likely better adjusted academically. Lastly, a secure attachment orientation seems to protect individuals with adversity history from alcohol addiction (Ennis & Trearty, 2019).

The current results can be used to develop intervention programs to support successful college adaptation by raising awareness of using ineffective coping strategies and the increased risk of substance abuse and developing psychopathology. Our findings suggest that ACE through negative coping predicts almost 10% of the variance in alcohol use and almost double that amount in drug use. Furthermore, almost half of the students who had two or more ACEs presented symptoms of clinical significance for overall psychopathology, and specifically for difficulties in interpersonal relationships and emotional distress, as well as drug abuse. Identifying students with history of adversity might be a strategic plan for colleges to provide

appropriate support for these students. Screening adults for ACE is not uncommon (Ford et al., 2019) but it has not yet been done in a college setting.

Conclusion

This is the first study that draws attention to the potential effects of childhood adversity and the well-being of young adults during the college years. In the context of increasing rates of emotional disorders among college students (ACHA, 2018), the findings pinpoint that childhood adversity relates to reliance on negative coping which in turn predicts directly and indirectly through cognitive failure poor adaptation and heightened symptomatology for psychopathology. Lastly, negative coping fully mediates the effect that childhood adversity has on alcohol and drug abuse. The findings invite the development of intervention programs to support college students with a history of adversity and the future study of other possible mediators while considering the differential effect of types of stressors, their timing, intensity and duration.

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Table 1.
Descriptive Statistics of Main Study Variables

Variable	<i>M</i>	<i>SD</i>	95% <i>Lower CI</i>	95% <i>Upper CI</i>	<i>N</i>	% Missing
ACE	1.40	2.06	1.12	1.67	194	
Positive Coping	0.00	1.00	-0.14	.14	194	
Negative Coping	0.00	1.00	-0.14	.14	194	
Cognitive Failure	2.72	0.45	2.66	2.78	194	
Flanker Task	8.91	0.65	8.83	9.00	192	1%
CPT Score	97.38	2.50	97.01	97.75	181	6.7%
Adaptation Total Score	6.38	0.88	6.26	6.51	194	
Personal Adaptation	5.96	1.22	5.96	5.79	194	
Social Adaptation	6.33	1.03	6.32	6.18	194	
Academic Adaptation	6.29	1.03	6.29	6.15	194	
Attachment to Institution	6.71	0.93	6.71	6.58	194	
Quality of Life	53.37	24.27	53.37	49.93	194	
Distress Symptoms	30.88	15.51	30.88	28.68	194	
Interpersonal relations	11.34	7.07	11.34	10.33	194	
Social Role	11.15	4.10	11.14	10.57	194	
Alcohol Use	0.93	1.45	0.93	.72	192	1%
Drug Use	0.87	1.22	0.87	.70	194	

Note. *N* = 194. ACE = Adverse Childhood Experience; CPT = Continuous Performance Test.

Table 2.

Intercorrelations between ACE, Coping, Executive Function, and Cognitive Failure

	1	2	3	4	5	6
1.ACE	-	.06	.29**	.02	.10	-.10
2.Positive Coping		-	.00	-.01	-.04	-.07
3.Negative Coping			-	.003	-.04	.43**
4.Flanker Task				-	.25**	-.02
5.CPT					-	-.08
6.Cognitive Failure						-

Note. $N = 194$. ACE = Adverse Childhood Experience; CPT = Continuous Performance Test.

$p^* < .05$, $p^{**} < .01$.

Table 3.

Correlations between ACE, Coping, Executive Function, Cognitive Failure, and Well-Being Variables

	Total College Adaptation	Personal Adaptation	Social Adaptation	Academic Adaptation	Attachment to Institution	Quality of Life	Distress Symptoms	Inter- personal Relations	Social Role	Alcohol Use	Drug Use
ACE	-.17*	-.18*	-.15*	-.10	-.17*	.26**	.26*	.26**	.12	.16*	.24**
Positive Coping	.14	-.10	-.02	.10	-.08	.00	.00	.04	-.08	-.01	-.15*
Negative Coping	-.56***	-.58***	-.34***	-.49***	-.32***	.67**	.64**	.60**	.53**	.30**	.41**
Flanker Task	.11	.03	.10	.10	.13	-.04	-.04	.03	-.11	.03	-.03
CPT	.05	.04	-.01	.10	-.04	-.03	-.01	-.03	-.11	-.07	-.19*
Cognitive Failure	-.43**	-.41***	-.29*	-.40**	-.19*	.53**	.53**	.40**	.42**	.16*	.21**

Note. $N = 194$. High scores of quality of life, distress symptoms, interpersonal difficulties, and social role indicate poor functioning.

ACE = Adverse Childhood Experience; CPT = Continuous Performance Test.

$p^* < .05$; $p^{**} < .01$; $p^{***} < .001$

Table 4.
Intercorrelations Among Well-Being Variables

	1	2	3	4	5	6	7	8	9	10	11
1.Total Adaptation	-	.79*	.80*	.84*	.75*	-.71*	-.67*	-.58*	-.68*	-.13	-.22*
2.Personal Adaptation		-	.54**	.57**	.40**	-.75**	-.75**	-.60**	-.59**	-.08	-.18*
3.Social Adaptation			-	.45**	.77**	-.51**	-.48**	-.47**	-.39**	-.06	-.10
4.Academic Adaptation				-	.51**	-.57**	-.50**	-.44**	-.70**	-.18*	-.25**
5.Attachment to Institution					-	-.40**	-.37**	-.35**	-.40**	-.08	-.15*
6.Quality of Life						-	.97**	.86**	.77**	.22**	.29**
7.Distress Symptoms							-	.74**	.69**	.18*	.23**
8.Interpersonal Relations								-	.56**	.25**	.34**
9.Social Role									-	.22**	.26**
10.Alcohol Use										-	.42**
11.Drug Use											-

Note. $N = 194$. High scores of quality of life, distress symptoms, interpersonal difficulties, and social role indicate poor functioning.
 $p^* < .05$; $p^{**} < .01$; $p^{***} < .001$

Table 5.

Unstandardized and Standardized Estimates of Paths in the Model

Adaptation	<i>B</i>	<i>SE</i>	β
ACE → Adaptation	-.01	.02	-.02
ACE → Negative coping	.14***	.03	.29
Negative Coping → Adaptation	-.40***	.06	-.45
Negative Coping → Cognitive Failure	.20***	.03	.43
Cognitive Failure → Adaptation	-.45***	.12	-.23
Quality of Life			
ACE → Quality of Life	.90	.60	.08
ACE → Negative coping	.14***	.03	.29
Negative Coping → Quality of Life	12.77***	1.37	.53
Negative Coping → Cognitive Failure	.20***	.03	.43
Cognitive Failure → Quality of Life	15.77	2.94	.29
Alcohol Use			
ACE → Alcohol Use	.05	.05	.08
ACE → Negative coping	.14***	.03	.29
Negative Coping → Alcohol Use	.38***	.11	.26
Negative Coping → Cognitive Failure	.20***	.03	.43
Cognitive Failure → Alcohol Use	.11	.24	.04
Drug Use			
ACE → Drug Use	.08	.04	.14
ACE → Negative coping	.14***	.03	.29
Negative Coping → Drug Use	.43***	.09	.35
Negative Coping → Cognitive Failure	.20***	.03	.43
Cognitive Failure → Drug Use	.12	.19	.05

Note. High quality life scores indicate greater symptoms of psychopathology

Table 6.

Mediation Model Examining the Effects of Childhood Adversity on College Adaptation and Psychopathology (Quality of Life, Alcohol and Drug Abuse Use)

ACEs-→Adaptation	β	Lower Bound	Upper Bound	p
Total Effect	-.18	-.30	-.04	.013
Indirect Effect via Negative Coping and Cognitive Failure	-.16	-.26	-.07	.000
Direct Effect	-.02	-.13	.10	.779
ACEs-→Quality of Life				
Total Effect	.26	.12	.40	.000
Indirect Effect via Negative Coping and Cognitive Failure	.18	.08	.29	.000
Direct Effect	.08	-.05	.19	.221
ACEs-→Alcohol Use				
Total Effect	.15	-.08	.38	.208
Indirect Effect via Negative Coping	.08	.03	.15	.000
Direct Effect	.07	-.15	.31	.527
ACEs-→Drug Use				
Total Effect	.24	.06	.45	.000
Indirect Effect via Negative Coping	.10	.05	.18	.000
Direct Effect	.14	-.03	.32	.132

Note. Standardized estimates were based on 1,000 bootstrapped samples using a 95% bias corrected bootstrap confidence interval. ACEs = Adverse Childhood Experiences. High quality life scores indicate greater symptoms of psychopathology

Figures

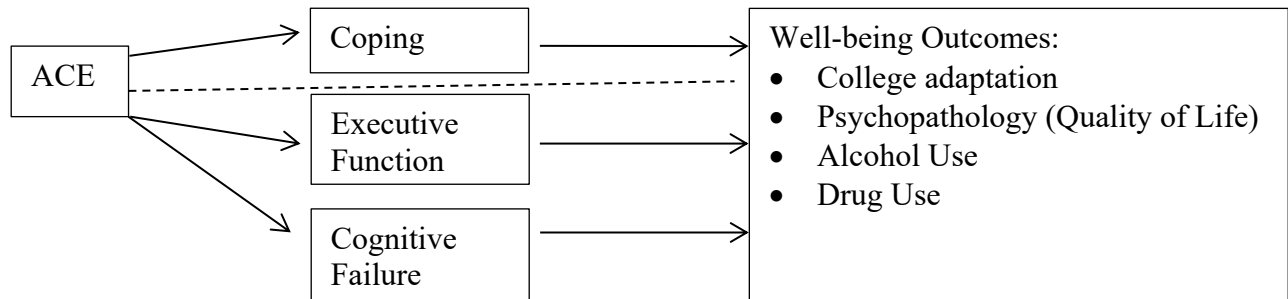


Figure 1. Proposed Model: Coping, Executive Function, and Cognitive Failure Mediate between ACEs and Well-Being

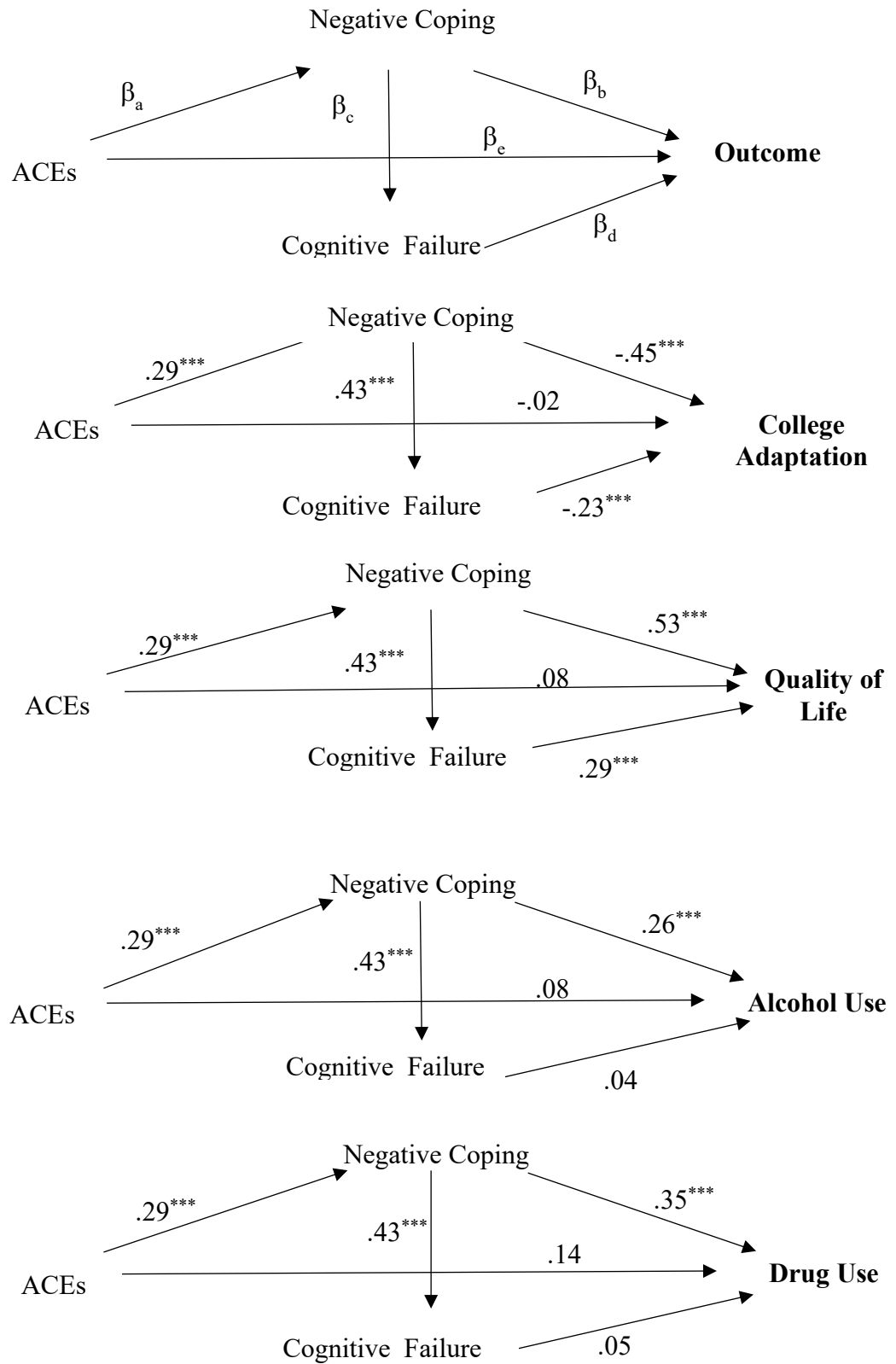


Figure 2. Tested Model: ACE Effects via Negative Coping and Cognitive Failure.