Journal of Child & Adolescent Trauma (2023) 16:615–627
https://doi.org/10.1007/s40653-023-00527-z

ORIGINAL ARTICLE

Does Coping Mediate the Relationship Between Adverse Childhood Experiences and Health Outcomes in Young Adults?

Marvin A. Solberg[1] · **Rosalind M. Peters**[1] · **Stella M. Resko**[2,3] · **Thomas N. Templin**[1]

Accepted: 16 February 2023 / Published online: 22 February 2023

Abstract

Adverse childhood experiences (ACEs) affect 22–75% of American young adults. ACEs are associated with adverse health outcomes that begin in young adulthood. Yet, scant research has examined if coping can mediate the relationship between ACEs and adverse outcomes. The current study determined if coping mediates the relationship between ACEs and body mass index (BMI), substance use, and mental health outcomes in young adults. A community sample of 100 White and 100 Black young adults 18–34 years of age participated in a cross-sectional study conducted via Zoom conferencing. Participants provided demographic data, height/weight, and completed measures of ACEs, coping, substance use, and mental health outcomes. Coping was measured using an established three-factor model consisting of adaptive, support, and disengaged coping. Structural equation modeling (SEM) examined the relationships of ACEs to outcomes as mediated by coping. Participants were predominantly female ($n = 117$; 58.5%) and mid-young adult ($M = 25.5$ years; $SD = 4.1$). SEM results indicated good model fit: (CMIN/$df = 1.52$, CFI = 0.94, RMSEA = 0.05 [90% CI = 0.03-0.07], SRMR = 0.06). Only disengaged coping mediated the ACE and substance use (β = 0.36, $p = .008$), smoking (β = 0.13, $p = .004$), and mental health (β=-0.26, $p = .008$) relationships. Disengaged coping styles may be a critical mechanism in developing adverse mental health and substance use outcomes among ACE-exposed individuals. Future ACE and health outcomes research should examine the role of coping. Interventions focusing on adaptive coping may improve the health of individuals exposed to ACEs.

Keywords Adverse childhood experiences · Young adult · Coping · Mediation · Structural equation modeling · Black

Introduction

Adverse childhood experiences (ACEs) are a critical factor that negatively impacts development throughout the lifespan (Centers for Disease Control and Prevention [CDC], 2021; Felitti et al., 1998). ACEs are linked to adverse physical, psychological, risk behavior, and social outcomes that often begin in young adulthood (e.g., Felitti et al., 1998; Merrick et al., 2019; Park et al., 2021). More than 61% of adults in the United States (U.S.) report experiencing at least one ACE, and 17% report experiencing four or more, with those reporting more being at higher risk for adverse health outcomes (Merrick et al., 2019). Although the effects of ACEs are well established, limited research has been conducted examining the mediating role of coping in the ACE and health outcome relationship, let alone in young adults. Evidence supports that ACE exposure can impact how individuals cope with stress contributing to adverse health outcomes (Sheffler et al., 2019). Accordingly, examining

✉ Marvin A. Solberg
marvin.solberg@wayne.edu

Rosalind M. Peters
ad7736@wayne.edu

Stella M. Resko
eg2092@wayne.edu

Thomas N. Templin
ac0410@wayne.edu

[1] College of Nursing, Wayne State University, 5557 Cass Avenue, 48202 Detroit, MI, USA

[2] School of Social Work, Wayne State University, 5447 Woodward Avenue, 48202 Detroit, MI, USA

[3] Merrill Palmer Skillman Institute, Wayne State University, 71 E Ferry Street, 48202 Detroit, MI, USA

coping among ACE-exposed young adults is critical; intervening in young adults may prevent or mitigate the adverse effects of ACEs. Thus, the purpose of the current study is to address if coping styles mediate the ACE and health outcome relationship in a community sample of young adults.

ACEs and Health Outcomes

ACEs are stressful, toxic experiences varying in severity that occur before 18 years of age (Felitti et al., 1998; Kalmakis & Chandler, 2014). Historically, adverse childhood events were measured individually (e.g., childhood sexual abuse, childhood physical abuse). The ACE Study changed how childhood events were measured by aggregating multiple adversities (Felitti et al., 1998). Doing so provided a more comprehensive understanding of the effects of collective adverse experiences on later health outcomes. Felitti and colleagues (1998) aggregated adverse experiences into three main categories: abuse, neglect, and household dysfunction.

The prevalence of ACEs among young adults in the United States (U.S.) is alarmingly high (Merrick et al., 2019). A recently published scoping review indicated that 22.2–75.5% of young adults reported experiencing at least one ACE, while 8–21.7% reported experiencing four or more (Park et al., 2021). Experiencing ACEs is associated with increased body mass index (BMI), poor mental health (e.g., depression, anxiety, and stress), and increased substance use (e.g., alcohol, cannabis, cigarette, and electronic cigarette use) (Merrick et al., 2019; Park et al., 2021; Shin et al., 2019).

Graded relationships indicate that experiencing four more or more ACEs is linked with increased adverse outcomes than persons with no ACE exposure (Merrick et al., 2019; Petruccelli et al., 2019). However, most research examining graded relationships between ACE and health outcomes has mainly been conducted with middle- and older-adult samples (Hughes et al., 2017; Merrick et al., 2019). In the limited research highlighting young adults, those reporting four or more ACEs compared to those without were nearly 10 times likely to consume alcohol (Bellis et al., 2014), two times more likely to smoke cannabis (Mersky et al., 2013), three times more likely to smoke cigarettes (Bellis et al., 2014), and two times more likely to use electronic cigarettes (Melka et al., 2019). Despite these alarming findings, a paucity of research exists that examines potential pathways in the development of adverse outcomes related to ACEs.

ACEs and Coping

Emerging evidence demonstrates that coping style may mediate the ACE and outcome relationship. Defined broadly, coping involves cognitive and behavioral strategies to handle internal or external demands evaluated as challenging (Lazarus & Folkman, 1984). Through time, these coping strategies become habitual.

Although coping strategies typically evolve throughout the lifespan, the type of strategies used may be affected by exposure to ACEs. Limited data has found that persons with histories of ACEs predominantly exhibit emotion-focused (regulate emotional response without changing reality of the situation) and avoidant coping styles (e.g., denial, disengagement; Lee et al., 2017; Sesar et al., 2010; Sheffler et al., 2019). A plausible explanation for the use of these coping styles may be that continued ACE exposure in childhood can lead to neurobiological changes leading to heightened vigilance and threat perception in their environments, altering one's appraisal of stress (Danese & McEwen, 2012; Nusslock & Miller, 2016). Consequentially, persons using emotion-focused and avoidant strategies may exhibit poorer physical and psychological health outcomes in adulthood. Alternatively, the use of problem-focused coping (e.g., changing the reality of the situation) was found to be protective against poor physical and psychological outcomes among persons exposed to ACEs (Sesar et al., 2010). However, few studies have specifically investigated coping as a mediator between ACEs and health outcomes, let alone in young adults.

To date, limited studies have examined coping as a mediator in the ACE/health outcome relationship. Among those studies, most consisted of predominantly middle- to older-aged White samples (Hager & Runtz, 2012; Sheffler et al., 2019; Su et al., 2020), while one investigated predominantly White college students (Kalpidou et al., 2021) and one investigated Turkish adolescents (Arslan, 2017). Findings from these studies illustrate that emotion-focused coping worsened psychiatric outcomes (e.g., depression, anxiety, panic disorder), substance use (e.g., alcohol and illicit drug use), and physical health concerns (e.g., nausea, fatigue) among those reporting ACEs (Arslan, 2017; Hager & Runtz, 2012; Sheffler et al., 2019). Alternatively, findings with problem-focused coping are mixed. One study found that problem-focused coping improved mental health outcomes (Su et al., 2020), while others did not find a mediating effect on psychiatric outcomes (Sheffler et al., 2019) or physical health concerns in women (Hager & Runtz, 2012). Although these studies provide beginning evidence for a mediating role of coping, considerable gaps in knowledge exist. Currently, a paucity of studies was found that investigated the mediating role of coping in the ACE and health outcome relationship among young adults.

Given the significant developmental brain changes that occur in young adulthood, it is vital that relationship between ACEs, coping, and health outcomes be examined

in this population. Research indicates that the brain undergoes significant restructuring during adolescence that continues throughout young adulthood (Konrad et al., 2013; Park et al., 2021). Of key importance is the physiological development of the prefrontal cortex; the area of the brain responsible for executive functioning involved with behavioral control, planning, and risk assessment (Mizrahi, 2018; Park et al., 2021). Maturation is also occurring within the amygdala, affecting assessment of environmental stressors and regulating a person's emotional response to the stressors. In addition, the prefrontal cortex and the amygdala are largely responsible for how one copes with environmental threats and stressors (Andolina et al., 2013). Unfortunately, exposure to adverse events in early childhood may alter development of the prefrontal cortex resulting in heightened vigilance and altered threat-perception (Danese & McEwen, 2012; Nusslock & Miller, 2016). Alterations in the amygdala may explain why older persons exposed to ACEs are more likely to use disengaged coping styles (e.g., denial, disengagement, substance use) rather than adaptive coping (Lee et al., 2017; Sesar et al., 2010; Sheffler et al., 2019). However, scant literature exists that examines how ACE-exposed young adults cope. Thus, the full relationship of ACEs to adverse health outcomes in young adults is not known. Examining coping among ACE-exposed young adults is critical in providing foundational knowledge necessary to develop coping interventions to mitigate the adverse effects of ACEs.

The onset of mental health and substance use disorders typically occurs in young adulthood. The onset of these disorders may be exacerbated among ACE-exposed young adults (Kessler et al., 2007). When compounded by the deleterious effects of ACEs, young adults are at high risk for adverse health outcomes. Accordingly, examining coping among ACE-exposed young adults is critical; intervening in young adults may prevent or mitigate the adverse effects of ACEs. Thus, the purpose of the current study is to address if coping styles mediate the ACE and health outcome relationship in a community sample of young adults.

Current Study

The current study addresses the gap in ACE literature by examining the mediating role of coping. Specifically, we examine whether a postulated three-factor measure of coping (adaptive, support, and disengaged coping) mediates the relationship between ACEs and health outcomes among young adults. The outcomes examined included: BMI, mental health (depression, anxiety, stress), and substance use (alcohol, cannabis, smoking). It is essential to understand the role of coping in the ACE and adverse health outcome relationship in young adults to develop effective interventions and prevention efforts to curtail the negative impact of ACEs later in the lifespan. Three specific hypotheses guided the current study:

H1 Adaptive coping will fully mediate the relationship between ACEs and positive health outcomes.

H2 Support coping will fully mediate the relationship between ACEs and positive health outcomes.

H3 Disengaged coping will fully mediate the relationship between ACEs and negative health outcomes.

Methods

Study Design, Sample, and Recruitment

Data were collected using a cross-sectional design. A non-probability, quota sampling approach was used to recruit Black and White young adults. Recruitment continued until 100 Black and 100 White young adults agreed to participate. Following Institutional Review Board approval, study participants were recruited using online methods (e.g., Facebook, Instagram, university emails, university online postings) from an urban, Midwest university, and local health-focused organizations. Interested participants were screened for eligibility using Zoom. Inclusion criteria included being a young adult (18–34 years old), identifying as Black or White, speaking and reading English, and having computer and internet access. Exclusion criteria included self-reported cognitive impairment or a current diagnosis of a severe psychiatric disorder (e.g., schizophrenia, psychosis).

Procedure

Due to COVID-19 considerations, data collection took place virtually through Zoom using Qualtrics XM software. Participants interested in the study emailed the primary investigator (P.I.). The P.I. sent prospective participants a Zoom link for eligibility screening. A unique Qualtrics link was sent to participants immediately if eligibility was met. If participants were ineligible, they were thanked for their time, and the Zoom interview was stopped. Before completing study measures, participants reviewed an information sheet describing the study and indicating that consent was obtained by completing study measures. Participants then completed a demographic questionnaire and completed self-report measures of ACEs, dispositional coping, mental health (i.e., depression, anxiety, current stress), and substance use

(i.e., alcohol, cannabis, cigarette, and electronic cigarette use). Participants reported height and weight, and body mass index (BMI) was calculated using the English System: weight (lb.) / [height (in)]^2 × 703 (CDC, 2021b). BMI served as a proxy for inflammation, with evidence to support that inflammation is linked to increased weight gain (Fogarty et al., 2008). Participants had the option to mute their camera and microphone. To maintain confidential data collection, no screensharing was used, and IP addresses were not collected. Further, there was no way to connect Qualtrics data with participants whether or not they muted their camera and/or microphone. However, the P.I. remained in the Zoom meeting to assist participants with study questions or psychological distress related to completing the ACE and mental health measures. If needed, participants were provided psychological support materials and mental health referrals. A $15 electronic gift card to Amazon was provided to participants following completion of at least 90% of the study measures.

Measures

Demographic Data

Participant characteristic data was obtained using an investigator-developed demographic questionnaire. Age, biological sex at birth, income, psychotropic medication use, height in inches, and weight in pounds were collected.

ACEs

ACEs were collected using two measures, including the Adverse Childhood Experiences Questionnaire (ACE-Q; CDC, 2021) and Cumulative Trauma Scale Short Form (CTS-S; Source blinded for review). The ACE-Q comprises 10 items that assess three categories of ACE, including abuse, neglect, and household dysfunction. A *yes* (1) response indicates having experienced that item while *no* (0) does not. Summed "yes" responses create the composite ACE score ranging from 0 to 10, with higher scores indicating increased ACEs. Internal consistency reliability for the ACE-Q was $\alpha = 0.72$ in the current study. However, the ACE-Q has been predominantly used with White, middle- to upper-middle-class samples and has been critiqued as simplistic and non-encompassing of adversities experienced by racially diverse populations (Cronholm et al., 2015). The current study also included the CTS-S to expand the scope of adversities measured.

The CTS-S comprises 32 items assessing the occurrence and frequency of several adversities not measured in the ACE-Q (e.g., racism, accidents, disasters). A five-point Likert scale ranging from 0 (*never*) to 4 (*more than once*) was used to score occurrence and frequency. Summed scores were calculated for a composite occurrence and composite frequency score, with higher scores indicating increased occurrence and frequency. Internal consistency reliability for CTS-S occurrence was $\alpha = 0.85$ and for CTS-S frequency was $\alpha = 86$.

Brief COPE

The Brief COPE was used to measure coping (Carver, 1997). It can measure situational (state) coping or how one copes to a specific stressor during a specific time. It can also measure dispositional (trait) coping or how one habitually copes (Carver, 1997). The dispositional version was used in the study, where questions are framed in terms of what the participant usually does, using present tense (e.g., I learn to live with it; I criticize myself; Carver, 1997). The Brief COPE is comprised of 28 items divided into 14 theoretical factors. A four-point Likert scale ranging from 1 (*I don't do this at all*) to 4 (*I do this a lot*) was used to score the frequency of each coping style. Summed scores were calculated to determine the frequency of coping style used, with higher scores indicating increased use. Internal consistency reliability for the Brief COPE was $\alpha = 0.69$. In the current study, a second-order, three-factor model was used to measure coping, including adaptive coping, support coping, and disengaged coping as based on the work of (Source blinded for review). A total of 24 items were used on the three factors. Specifically, adaptive coping was assessed with 10 items (e.g., positive reframing), support coping was comprised of four items (e.g., use of emotional support), and disengaged coping was comprised of 10 items (e.g., denial; Source blinded for review). Four items were not estimated due to low reliability and thus were omitted. The identified factors exhibited good internal consistency reliabilities: adaptive coping $\alpha = 0.81$, support coping $\alpha = 0.87$, and disengaged coping $\alpha = 0.71$.

Substance Use

Substance use was collected using four measures, including the Alcohol Use Disorders Identification Test (AUDIT; Babor et al., 2001), Cannabis Use Disorders Identification Test-Revised (CUDIT-R; Adamson et al., 2010), Penn State Cigarette Dependence Index (PSCDI; Foulds et al., 2015), and Penn State Electronic Cigarette Dependence Index (PSECDI; Foulds et al., 2015).

The AUDIT is a 10-item measure that assesses harmful alcohol consumption. The first eight questions were scored using a five-point Likert scale ranging from 0 (*never*) to 4 (*4 or more times a week, 10 or more*, or *daily or almost daily*). The final two questions use a three-point Likert scale using

increments of 2 ranging from 0 (*no*) to 4 (*yes, during the last year*). Cumulative scores range from 0 to 40, with a score of 8 indicating problematic alcohol use. Internal consistency reliability was α = 0.79 in the current study.

The CUDIT-R is an eight-item measure that assesses harmful cannabis use. The first seven questions use a five-point Likert scale ranging from 0 (*never*) to 4 (*four or more times a week, 7 or more hours, or daily or almost daily*). The last question uses a three-point Likert scale in increments of two, ranging from 0 (*never*) to 4 (*yes, during the last six months*). Cumulative scores range from 0 to 32, with a score of 8 or higher indicating harmful cannabis use and scores of 13 or more indicating cannabis use disorder. Internal consistency reliability was α = 0.90.

The PSCDI and PSECDI are two individual, 10-item measures that assess cigarette and electronic cigarette dependence, including quantity smoked, difficulty quitting, craving, withdrawal symptoms, night use, and urgency. Both PSCDI and PSECDI have three, five, and six-point Likert scales and dichotomous *yes* or *no* questions. Cumulative scores range from 0 to 20 and are divided into severity levels of dependence, including: no dependence (0 to 3), low dependence (4 to 8), medium dependence (9 to 12), and high dependence (13 or more). Internal consistency reliability for the PSCDI was α = 0.85 while it was α = 0.68 for the PSECDI in the current study.

Mental Health

Mental health was examined using three measures, including the Centers for.

Epidemiologic Studies Depression Scale 10-Item (CES-D-10; Andresen et al., 1994), Generalized Anxiety Disorder Scale 7-Item (GAD-7; Spitzer et al., 2006), and the Perceived Stress Scale 10-Item (PSS-10; Cohen et al., 1983).

The CES-D-10 is a 10-item measure that examines depressive symptomology during the past week. Each item is scored using a four-point Likert scale ranging from 0 (*rarely or none of the time*) to 3 (*all of the time*). Cumulative scores range from 0 to 30, with higher scores indicating increased depressive symptoms. A score of 10 or higher is indicative of significant symptoms. Internal consistency reliability for the current study was α = 0.85.

The GAD-7 is a seven-item measure that assesses anxious symptomology in the past two weeks. Items are scored using a four-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*). Cumulative scores range from 0 to 21with higher scores indicative of greater anxiety. Scores of 10 or greater indicate significant anxiety symptoms. Scores are also organized into quartiles, including none or minimal anxiety (0 to 4), mild anxiety (5 to 9), moderate anxiety (10 to 14), and severe anxiety (15 to 21). Internal consistency reliability for the current study was α = 0.91.

The PSS-10 is a 10-item measure examining perceived current stress in the past 30 days. Items are scored using a five-point Likert scale from 0 (*never*) to 4 (*very often*). Four items are reverse coded. Cumulative scores range from 0 to 40, with higher scores indicating increased stress. Internal consistency reliability in the current study was α = 0.89.

Covariates and Confounding Variables

Research has shown that race, income, and biological sex influence ACEs (Mersky et al., 2021; Sacks & Murphey, 2018). As such, these variables were used as potential covariates in the current study. Further, psychotropic medication use served as a confounding variable to mental health outcomes. Race, biological sex, and psychotropic medication use were dichotomized. Income was divided into six categories: $0 to $24,999, $25,000 to $49,999, $50,000 to $74,999, $75,000 to $99,999, $100,000 to $149,999, and $150,000 or higher.

Analysis

IBM SPSS Version 28 software was used for descriptive statistical analysis. Descriptive statistics were conducted to characterize participants and measures. Independent *t*-tests and chi-square tests (X^2) were conducted to determine racial or biological sex differences.

SEM was conducted using IBM AMOS 28 software. The original hypothesized model (see Fig. 1) comprised an exogenous, latent variable labeled ACE comprised of ACE-Q and CTS-S scores as empirical indicators. The three coping subscales were represented as empirical, mediating indicators. BMI was an endogenous, empirical indicator. Substance use was an endogenous latent variable comprised of four empirical indicators: alcohol use, cannabis use, cigarette dependence, and electronic cigarette dependence. Lastly, mental health was an endogenous latent variable comprised of depressive symptomology, anxious symptomology, and perceived current stress. Confounding variables including biological sex, race, and income were represented as empirical indicators correlating with the ACE latent. Psychotropic medication use was represented as an empirical indicator with a path to the mental health latent variable. Empirical indicators with factor loadings > 0.30 were considered significant to identify latent constructs. The sample size was determined based on a minimum sample of $N = 200$, as suggested by Kline (2016).

Multiple fit indices and their respective acceptable values were examined, including chi-square X^2, chi-square divided by degrees of freedom (CMIN/*df*), comparative

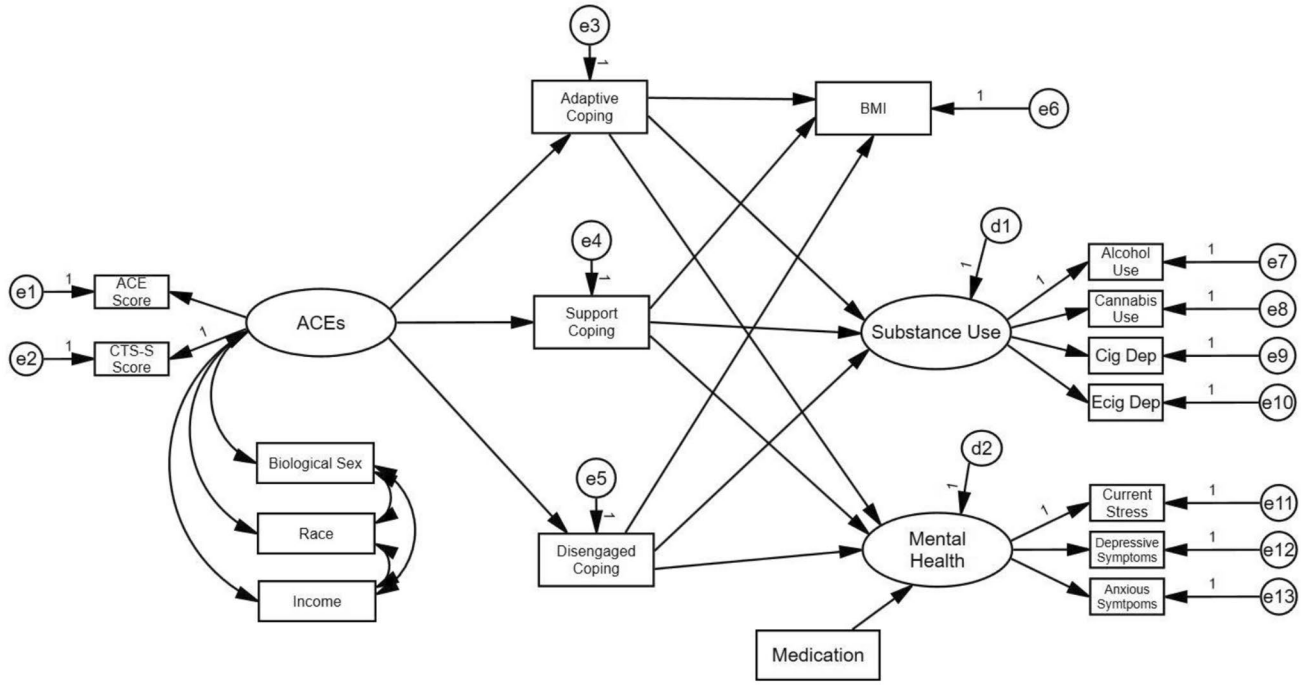

Fig. 1 Original Hypothesized SEM Model. *Note.* ACE = adverse childhood experiences; BMI = body mass index

fit index (CFI), the root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), and Akaike Information Criterion (AIC) (Hooper et al., 2008; Kline, 2016; Tabachnick & Fidell, 2013). Chi-square (X^2), a measure of absolute fit, was examined with a significance value of $p > .05$, indicating good fit. However, X^2 is sensitive to sample size, thus chi-square divided by degrees of freedom (CMIN/*df*), with values ≤ 2.0 indicating good fit, was also examined. The comparative fit index (CFI) examined relative fit, with values ≥ 0.90 indicative of good fit. The root mean square error of approximation (RMSEA) examined goodness of fit, with values ≤ 0.08 indicative of good fit. A confidence interval (CI) was also generated when calculating RMSEA. Lower CI values should be closer to zero, while upper limit values should be < 0.08. The standardized root mean residual (SRMR), a measure of absolute fit, was also examined with values ≤ 0.08 indicative of good fit. Last, the Akaike Information Criterion (AIC) was assessed and compared fit between models with smaller values indicating better fit (Hooper et al., 2008; Kline, 2016; Tabachnick & Fidell, 2013).

Results

Sample and Measure Characteristics

A total of 200 young adults, evenly divided by race ($n = 100$ Black and $n = 100$ White), participated in the current study. Participants were 18 to 34 years of age ($M = 25.5$, $SD = 4.1$), predominantly female ($n = 117$; 58.5%), most (68%) reported household incomes less than $75,000, most ($n = 170$; 85%) did not take psychotropic medications and were overweight on average (BMI $M = 28.0$, $SD = 7.1$). Black young adults reported significantly lower incomes compared to White young adults (X^2 (1, 200) = 21.21, $p < .001$). However, no significant differences were noted on the demographic variables by biological sex. Instrument descriptive statistics can be found in Table 1.

As expected, Black young adults reported significantly more adverse childhood experiences. Compared to White participants, Blacks had significantly higher mean ACE scores ($M = 3.30$, $SD = 2.23$ vs. $M = 2.30$, $SD = 2.28$, $p = .002$), higher mean CTS-S occurrence scores ($M = 11.71$, $SD = 5.31$ vs. $M = 6.64$, $SD = 4.64$, $p < .001$), and higher mean CTS-S frequency scores ($M = 27.22$, $SD = 15.40$ vs., $M = 13.71$, $SD = 12.62$, $p < .001$). Despite significant racial differences in adversity scores, there were no significant racial differences in coping styles or any of the health outcomes between White and Black participants.

Table 1 *Instrument Descriptive Statistics*

Instrument	Cronbach's Alpha	Possible Range	Study Range	*M*	*SD*
ACE-Q	0.72	0–10	0 – 9	2.8	2.3
CTS-S (occurrence)	0.85	0–32	0–28	9.2	5.6
CTS-S (frequency)	0.86	0–128	0–90	20.5	16.0
Brief COPE	0.69	28–112	49–93	71.6	8.4
AUDIT	0.79	0–40	1–24	4.9	4.0
CUDIT	0.90	0–32	0–27	2.8	5.3
PSCDI	0.85	0–20	0–17	1.0	2.9
PSECDI	0.68	0–20	0–13	0.6	2.0
CES-D-10	0.85	0–30	0–27	10.3	6.2
GAD-7	0.91	0–21	0–21	7.0	5.6
PSS-10	0.89	0–40	2–39	18.3	7.5

Note. ACE-Q = Adverse Childhood Experiences Questionnaire, CTS-S = Cumulative Trauma Scale Short Form; AUDIT = Alcohol Use Disorders Identification Test; CUDIT-R = Cannabis Use Disorders Identification Test Revised; PSCDI = Penn State Cigarette Dependence Index; PSECDI = Penn State E-Cigarette Dependence Index; CES-D 10 = Centers for Epidemiological Studies Depression Scale-10; GAD-7 = Generalized Anxiety Disorder-7 Item; PSS-10 = Perceived Stress Scale 10-Item

Table 2 *Model Fit Indices*

Fit Indices	Model 1	Model 2	Model 3	Model 4	Model 5
X^2	297.22	180.74	152.80	147.70	150.44
df	108	95	93	92	99
(p-value)	($p < .001$)	($p < .001$)	($p < .001$)	($p < .001$)	($p < .001$)
CMIN/*df*	2.75	1.90	1.64	1.61	1.52
CFI	0.79	0.90	0.93	0.94	0.94
RMSEA	0.09	0.07	0.06	0.06	0.05
90% CI	0.08 – 0.11	0.05 – 0.08	0.04 – 0.07	0.04 – 0.07	0.03 – 0.07
SRMR	0.10	0.07	0.06	0.06	0.06
AIC	387.22	296.74	272.80	269.70	258.44

Note. X^2 = chi-square; *df* = degrees of freedom; CMIN/*df* = Chi-square/degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence Interval; SRMR = standardized root mean residual; AIC = Akaike's Information Criterion

Overall SEM Model

SEM analysis was conducted to determine if coping mediated the relationship between ACE and health outcomes. The original hypothesized model (see Model 1, Fig. 1) was examined first and exhibited poor fit (see Table 2). Based on theoretical and statistical considerations, changes were made to the model. Modification indices (MI) were examined to determine areas of misfit in the original model. The M.I.s suggested adding covariances between the error terms of adaptive and support coping; adaptive and disengaged coping; medication and ACE; and medication and race. In re-specifying the model, eight regression paths were added from confounding variables: race to disengaged coping; medication use to BMI, support coping, and mental health; biological sex to support coping and mental health; and income to substance use and mental health. Following additions of covariances and paths, a new model, Model 2, exhibited adequate fit (see Table 2).

Upon reviewing Model 2, it was observed that the substance use latent was poorly measured, as evidenced by MI suggesting paths to substance use empirical indicators rather than to the latent itself. A principal components analysis (PCA) was then conducted on the four empirical substance use indicators to determine if two latent constructs were present. The four indicators' factorability was examined using Kaiser-Meyer-Olkin (KMO) statistics, Bartlett's Test of Sphericity, anti-image correlations, and commonalities. The KMO is a measure indicating the degree to which each variable is predicted by other variables without error, with a value of 0.51 considered acceptable (IBM Documentation, 2014). Bartlett's Test of Sphericity was conducted to determine redundancy between variables. A significant result indicated that the empirical indicators were correlated, and a factor analysis would be beneficial: X^2 (6, $N = 200$) = 52.48, $p < .001$. Anti-image correlations are the negatives of partial correlation among variables and were greater than the recommended cutoff of 0.50 (Hauben et al., 2017). Communalities were also assessed, the proportion of a variable's variance explained by other indicators (Hauben et al., 2017). Values should be greater than and were above 0.30 in the current PCA.

A varimax rotation was used, and two components were extracted, explaining 64.9% of the variance. Component 1 was comprised of electronic cigarette dependence (.85) and cigarette dependence (.81), and component 2 was comprised of alcohol (.77) and cannabis (.75) use. Thus, the substance use latent measure was divided into two latent variables: 'smoking' and 'substance use.' After identifying two new latent variables, the model was re-run to determine if model fit resulted in adequate fit (see Model 3, Table 2). M.I.s suggested adding a path from income to smoking. The regression path from income to substance use from model 3 was omitted as the original substance use latent was removed. Following modifications, the model was re-run resulting in Model 4 exhibiting a good fit (see Table 2).

To create a more parsimonious model, regression coefficients of < 0.10 were omitted. Although the path from ACE to adaptive coping was < 0.10, that path was retained to allow mediation to be examined. The model was re-run with no improper solutions, no negative variances, standard error ranges were appropriate, and no further modification was warranted. The resulting Model 5 achieved very good fit: X^2 (99, $N = 200$) = 150.44, $p < .001$; CMIN/*df* = 1.52; CFI = 0.94; RMSEA = 0.05 [90% CI = 0.03, 0.07]; SRMR = 0.06; and AIC = 258.44 (see Fig. 2; Table 2). Further, each hypothesized

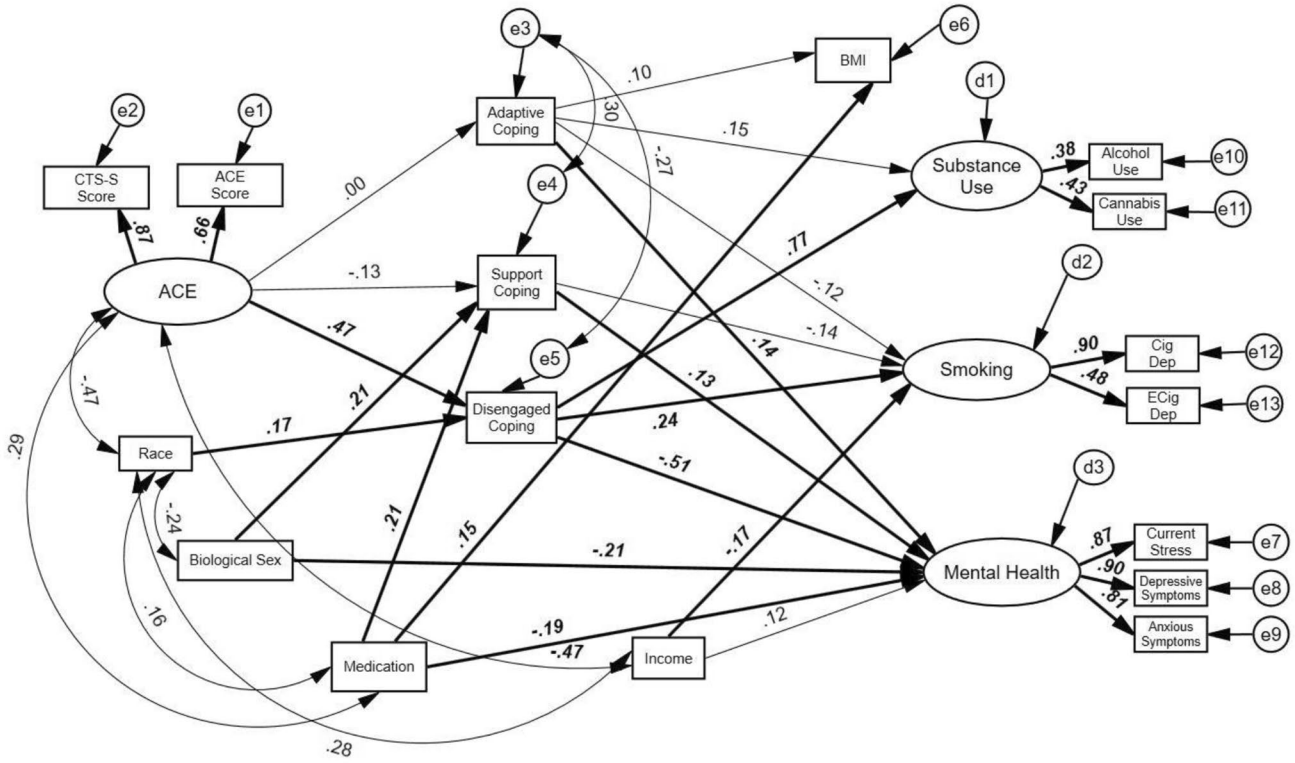

Fig. 2 Model 3, Final SEM Model. *Note.* ACE = adverse childhood experiences; BMI = body mass index

latent variable was modeled well by their empirical indicators. Factor loadings were above the recommended cut point of 0.30 and ranged from 0.38 (alcohol use) to 0.90 (cigarette dependence and depressive symptoms).

ACE and Coping

As observed in Model 5 (see Fig. 2), a moderately strong, positive significant relationship was identified between ACEs and disengaged coping (β = 0.47, $p = .005$) when controlling for race. Conversely, no significant associations were noted between ACEs with adaptive (β = 0.00, $p = .91$) or support (β = −0.13, $p = .09$) coping. Those reporting ACEs had a propensity to employ disengaged coping styles.

Coping and Health Outcomes

Disengaged coping exhibited the most significant relationships with health outcomes of the three coping styles. Adaptive and support coping exhibited significant, weak, positive relationships with mental health after controlling for biological sex and psychotropic medication use (β = 0.14, $p = .032$ and β = 13, $p = .015$, respectively). Neither adaptive nor support coping had a significant relationship with the other health outcomes. Conversely, disengaged coping exhibited a significant relationship with substance use (β = 0.77, $p = .014$), as well as with smoking after controlling for income (β = 0.24, $p = .008$). Disengaged coping had a moderately strong, inverse relationship with mental health outcomes (β = −0.51, $p = .020$) after controlling for biological sex, psychotropic medication use, and income. Results indicate that participants using disengaged coping reported increased substance use, increased smoking, and decreased mental health.

Mediation Pathways

It was hypothesized that adaptive and support coping would fully mediate the ACE and positive health outcome, while disengaged coping would fully mediate the relationship between the ACE and negative health outcome. As such, the final SEM model (Model 5) comprised of 12 indirect coping mediated pathways. Significance of indirect paths is achieved if both direct paths (ACE to coping, coping to health outcome) are statistically significant. Of the 12 postulated mediation paths, only three were significant: all through disengaged coping when controlling for race, biological sex, income, and psychotropic medication use. The significant indirect effects included ACE and substance use (β = 0.36, $p = .004$), ACE and smoking (β = 0.13, $p = .008$), and ACE and mental health (β = 0.26, $p = .004$) (Table 3).

Table 3 *Indirect Mediated Effects*

Parameter	Indirect Effect
	β 90% CI
ACE → Substance use	0.36** [0.22, 0.73]
ACE → Smoking	0.13** [0.06, 0.26]
ACE → Mental Health	−0.26** [-0.35, −0.18]

Note. *$p < .05$, **$p < .01$, ***$p < .001$ based on 200 bootstrapping sample. ACE = adverse childhood experiences

Discussion

To date, the current study is one of a handful of studies (Arslan, 2017; Hager & Runtz, 2012; Kalpidou et al., 2021; Sheffler et al., 2019; Su et al., 2020) that examined the mediating role of coping in the ACE and health outcome relationship. Three salient findings were observed: ACEs were associated with disengaged coping, disengaged coping was associated with poorer health outcomes, and disengaged coping mediated the ACE and substance use, smoking, and mental health outcomes.

ACE, Coping, and Health

Of the three coping styles examined in the current study, ACEs only exhibited a significant positive association with disengaged coping. Disengaged coping refers to strategies employed to avoid stressors or the associated affective response to stressors (e.g., avoidance, self-blame, denial; Carver, 2014; Dijkstra & Homan, 2016). The current study noted no significant relationships between ACEs and adaptive or support coping. The findings of the current study coincide with previously published correlational and mediational studies that suggest ACEs may be associated with disengaged coping styles (Arslan, 2017; Kalpidou et al., 2021; Lee et al., 2017; Sesar et al., 2010; Sheffler et al., 2019). Chronic ACE exposures alter neurobiological and psychological development leading to social, emotional, and cognitive impairment, which may explain the development of and habitual use of disengaged coping styles (CDC, 2021). Consequentially, children chronically exposed to ACEs may perceive their environments as unpredictable. When faced with stressors, the focus shifts to managing the affective response to the stressor, with the primary goal of escaping potential feelings of distress rather than resolving the stressor itself (Carver, 2014). Through time, disengaged coping becomes ineffective as the perceived stressor or its impact has not been resolved and remains. Ultimately, the perceived stressors may become increasingly difficult or complex to manage, which can have adverse consequences (Carver, 2014).

Specific coping styles are also linked to psychological and physical health outcomes (Aldwin & Park, 2004; Smith et al., 2016; Taylor & Stanton, 2007). Positive or adaptive coping styles can be protective from illness, while disengaged coping is linked to poorer physical and psychological health (Aldwin & Park, 2004; Smith et al., 2016; Taylor & Stanton, 2007). In the current study, adaptive and support coping were weakly associated with improved mental health, while disengaged coping was significantly associated with increased substance use, smoking, and decreased mental health. These results are similar to the findings of Arslan (2017), Kalpidou and colleagues (2021), and Sheffler and colleagues (2019) that found the use of disengaged coping was associated with poorer mental health, increased psychiatric symptoms and increased substance use.

Mediating Role of Coping

To date, limited studies have examined the mediating role of coping in the ACE and health outcome relationship. The current study reveals that disengaged coping fully mediated the relationship between ACEs and substance use, smoking, and mental health among Black and White young adults, making a significant contribution to the extant body of literature. A novel contribution of this study is that disengaged coping mediated the relationship of ACEs with both substance use and smoking. To our knowledge, one other study has investigated alcohol and illicit drug use (Kalpidou et al., 2021). Other studies that investigated the mediating role of coping primarily assessed physical and mental health outcomes (Arslan, 2017; Hager & Runtz, 2012; Sheffler et al., 2019; Su et al., 2020).

Current findings revealed that the use of disengaged coping was associated with poorer mental health outcomes (depression, anxiety, stress) and substance use. These results resemble those of three other studies that examined coping as a mediator in the ACE and mental health or substance use outcome relationship (Arslan, 2017; Kalpidou et al., 2021; Sheffler et al., 2019). Specifically, Sheffler and colleagues (2019) found that disengaged coping strategies of venting, behavioral disengagement, and denial fully mediated the relationship of ACEs to increased psychiatric symptoms (depression, generalized anxiety, and panic disorder). Similarly, disengaged coping strategies of disengagement, substance use, and denial worsened mental problems (internalizing and externalizing problems) among those exposed to ACEs (Arslan, 2017). Moreover, negative coping strategies of denial, venting, substance, behavioral disengagement and self-blame increased alcohol and illicit drug use (Kalpidou et al., 2021). Conversely, another study indicated that positive coping partially mediated the negative consequences of ACEs on mental health outcomes (Su

et al., 2020). However, neither adaptive or support coping in the current study mediated the ACE and health outcome relationships.

In the current study, no coping variables mediated the relationship between ACE and physical health via BMI as a proxy for inflammation. However, in studies examining ACE and physical health, disengaged coping mediated such a relationship suggesting that ACE is associated with greater BMI via disengaged coping (Hager & Runtz, 2012; Sheffler et al., 2019). Although positive relationships with ACEs and BMI are established (e.g., Merrick et al., 2019), BMI was not associated with ACEs in the current study. This result may be due to the distribution of BMI, which was positively skewed. Further, since BMI increases with age (CDC, 2021b), a plausible rationale for why no association was observed between ACEs and BMI in the current study may be due to the young age of the study sample.

The current study and existing data indicate that the use of disengaged coping worsens health outcomes among persons reporting ACEs. However, the mechanisms by which those exposed to ACEs develop disengaged coping styles are understudied. It has been theorized that chronic and early exposure to ACE impairs neurological development leading to increased vigilance, threat perception, and reactivity (McLaughlin, 2016; Nusslock & Miller, 2016). Further exposure to ACEs can lead to long-term neurobiological alterations that heavily influence cognitive stress appraisal, attention and memory biases, and response to distress, which can trigger an immune response (McLaughlin, 2016; Nusslock & Miller, 2016). ACEs sensitize immune functioning leading to systemic inflammation, which dampens reward sensitivity and alters prefrontal cortex alterations that impact decision-making and executive function. Such changes may lead to disengaged coping behaviors (e.g., substance use), yielding poorer health outcomes which can further potentiate the effects of chronic systemic inflammation. Thus, it is crucial to include coping in examining the ACE and health outcome relationship in future work.

Future Research Implications

To date, this study is one of only five studies that examined the mediating role of coping in the ACE and health outcome relationship. However, studies that examined the mediating role of coping are not consistent in the coping instruments used. Currently, one study (Sheffler et al., 2019) used the COPE by Carver and colleagues (1989), another study developed and examined only two positive coping items (Su et al., 2020; Hager & Runtz, 2012) used the Coping Inventory for Stressful Situations (Endler & Parker, 1990), and three studies (including the present study; Arslan, 2017; Kalpidou et al., 2021) used the Brief COPE (Carver, 1997).

Using different coping measures results in inconsistencies in identifying coping styles (i.e., adaptive, support, and disengaged coping, problem- and emotion-focused, adaptive and maladaptive, active and avoidant), hindering comparisons across studies. It is recommended that future research be done using the Brief COPE, one of the most widely used coping instruments (Source blinded for review). Despite several postulated theoretical coping subscales within the Brief COPE, a recent systematic review of studies conducting factor analyses of the scale indicated that more parsimonious models exist and specific coping items "group" together, with two-factor solutions (e.g., approach and avoidant/ adaptive and maladaptive) being most identified (Source blinded for review). In future studies, parsimonious coping factors will facilitate and streamline comparisons by coping styles.

Clinical Implications

Substantive research has documented the insidious effects of ACEs on adverse health outcomes with very little focus on the plausible pathways in developing those outcomes. Findings from the current study illuminate the importance of disengaged coping in the ACEs and negative health outcome relationship. Thus, results suggest that interventions focusing on adaptive coping behaviors are needed to improve the health of persons exposed to ACEs. No coping intervention studies have been conducted that examine the ACE and health outcome relationship. However, coping interventions have been shown to improve coping and self-efficacy, while reducing anxiety, depression, and stress among persons with diabetes, persons with schizophrenia, and university students (Edraki et al., 2018; Gabrielli et al., 2021; Izquierdo et al., 2021). Although dispositional coping styles are habitual, new coping styles can be learned and adopted (Mayordomo-Rodríguez et al., 2015). Developing adaptive coping styles in young adulthood is critical as using such strategies may mitigate the progression of adverse health outcomes associated with ACE exposure.

Study Strengths and Limitations

The current study was novel and made essential contributions to the extant ACE body of knowledge. This study was the first to investigate the mediating role of coping in the ACE and health outcome relationship in young adults. Further, the current study is the first to investigate the mediating role of coping in the ACE and substance use relationship. Despite these strengths, the current study is not without limitations that should be considered when interpreting results.

The sample was comprised of Black and White young adults (18–34 years of age). As such, study findings may

not represent the broader, general population. Further, participants were recruited virtually due to the ongoing COVID-19 pandemic constraints, which may limit potential participants without access to technology. Future studies should address this limitation by using probability-based sampling approaches, recruiting in different venues, and examining other samples that ACEs may disproportionately impact (e.g., other racial minority groups, sexual and gender minorities). A cross-sectional design was used in the current study, increasing temporal ambiguity. Future work should consider a longitudinal approach to examine how coping mediates the relationship between ACE and later health outcomes. Another limitation potentially impacting current findings is recall bias, as measures of ACE are retrospective in nature. The extant literature has noted underreporting of ACEs (Mersky et al., 2013). Instrumentation may have also impacted study findings as self-report measures and data collection were conducted virtually through Qualtrics and Zoom. The environments in which participants completed self-report measures may have altered their responses. Lastly, the focus of the current study was to determine the mediating role of coping and did not address another potential confounder: resilience. There is beginning evidence to suggest that improving resilience may improve health outcomes among ACE-exposed persons (e.g., Morgan et al., 2022; Ortiz, 2019). Thus, future studies should consider including resilience as well as coping when examining the impact of ACEs on health outcomes.

Conclusion

To our knowledge, the current study is the first to examine the mediating role of coping in a sample of young adults. Findings revealed that only disengaged coping fully mediated the relationship between ACEs and negative substance use, smoking, and mental health outcomes in young adults. Disengaged or maladaptive coping may serve as a key pathway in developing adverse health outcomes among young adults exposed to ACEs. As such, interventions directed at developing adaptive coping styles may mitigate further development of adverse outcomes. Findings also support the need to incorporate coping as a mediating variable in future studies examining the relationship between ACE and health outcomes.

Author Contributions MAS contributed to the conception and design of the study and collected the data. All authors (MAS, RMP, SMR, TNT) contributed to analysis and interpretation, drafted and critically revised the manuscript, gave final approval, and agreed to be accountable for all aspects of work, ensuring integrity and accuracy.

Funding Statement This research was supported by grants from Sigma Theta Tau International – Lambda Chapter and Blue Cross Blue Shield of Michigan Foundation (3026.SAP).

Declarations

Conflict of Interest Marvin A. Solberg, Rosalind M. Peters, Stella M. Resko, and Thomas N. Templin declare no conflicts of interest with the research writing of this paper.

References

Adamson, S. J., Kay-Lambkin, F. J., Baker, A. L., Lewin, T. J., Thornton, L., Kelly, B. J., & Sellman, J. D. (2010). An improved brief measure of cannabis misuse: the Cannabis Use Disorders Identification Test-Revised (CUDIT-R). *Drug and Alcohol Dependence*, *110*(1–2), 137–143. https://doi.org/10.1016/j.drugalcdep.2010.02.017.

Aldwin, C. M., & Park, C. L. (2004). Coping and physical health outcomes: an overview. *Psychology and health* (19 vol., pp. 277–281). Taylor & Francis Group. https://doi.org/10.1080/08870440042000193514.

Andolina, D., Maran, D., Valzania, A., Conversi, D., & Puglisi-Allegra, S. (2013). Prefrontal/amygdalar system determines stress coping behavior through 5-HT/GABA connection. *Neuropsychopharmacology 38*(10), 2057. https://doi.org/10.1038/NPP.2013.107

Andresen, E. M., Malmgren, J. A., Carter, W. B., & Patrick, D. L. (1994). Screening for depression in well older adults: Evaluation of a short form of the CES-D. *American Journal of Preventive Medicine*, *10*(2), 77–84. http://www.ascopost.com/issues/february-25-2017/Arslan, G. (2017). Psychological maltreatment, coping strategies, and mental health problems: A brief and effective measure of psychological maltreatment in adolescents. *Child Abuse & Neglect*, *68*, 96–106. https://doi.org/10.1016/J.CHIABU.2017.03.023

Babor, T. F., Higgins-biddle, J. C., Saunders, J. B., & Monteiro, M. G. (2001). *The Alcohol Use Disorders Identification Test Guidelines for Primary Care (2nd ed.)*

Bellis, M. A., Hughes, K., Leckenby, N., Jones, L., Baban, A., Kachaeva, M., Povilaitis, R., Pudule, I., Qirjako, G., Ulukol, B., Raleva, M., & Terzic, N. (2014). Adverse childhood experiences and associations with health-harming behaviours in young adults: surveys in eight eastern european countries. *Bulletin of the World Health Organization*, *92*(9), 641–655. https://doi.org/10.2471/BLT.13.129247.

Carver, C. S. (1997). You want to measure coping but your protocol's too long: consider the brief COPE. *International Journal of Behavioral Medicine*, *4*(1), 92–100. https://doi.org/10.1207/s15327558ijbm0401_6.

Carver, C. S. (2014). Active Coping. In A. C. Michalos (Ed.), *Encyclopedia of Quality of Life and Well-Being Research* (pp. 209–209). Springer Netherlands. https://doi.org/10.1007/978-94-007-0753-5_100171

Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing Coping Strategies: A Theoretically Based Approach. In *Journal of Personality and Social Psychology* (Vol. 56, Issue 2).

Centers for Disease Control and Prevention (2021a). *About the CDC-Kaiser ACE Study*. https://www.cdc.gov/violenceprevention/aces/about.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fviolenceprevention%2Facestudy%2Fabout.html

Centers for Disease Control and Prevention (2021b). *Calculating BMI using the English System*. https://www.cdc.gov/nccdphp/dnpao/growthcharts/training/bmiage/page5_2.html

Centers for Disease Control and Prevention (2021c). *NHANES 2015–2016*. National Health and Nutrition Examination Survey.

https://wwwn.cdc.gov/nchs/nhanes/continuousnhanes/default.aspx?BeginYear=2015

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A Global measure of perceived stress. *Journal of Health and Social Behavior*, *24*(4), 385–396.

Cronholm, P. F., Forke, C. M., Wade, R., Bair-Merritt, M. H., Davis, M., Harkins-Schwarz, M., Pachter, L. M., & Fein, J. A. (2015). Adverse childhood experiences: expanding the concept of adversity. *American Journal of Preventive Medicine*, *49*(3), 354–361. https://doi.org/10.1016/j.amepre.2015.02.001.

Dijkstra, M. T. M., & Homan, A. C. (2016). Engaging in rather than disengaging from stress: effective coping and perceived control. *Frontiers in Psychology*, *7*(SEP), 1415. https://doi.org/10.3389/fpsyg.2016.01415.

Edraki, M., Rambod, M., & Molazem, Z. (2018). The effect of coping skills training on depression, anxiety, stress, and self-efficacy in adolescents with diabetes: a randomized control trial. *International Journal of Community Based Nursing and Midwifery*, *6*(4), 324–333.

Endler, N. S., & Parker, J. D. (1990). *Coping inventory for stressful situations manual*. Multi-Health Systems, Inc.

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: the adverse childhood experiences (ACE) study. *American Journal of Preventive Medicine*, *14*(4), 245–258. https://doi.org/10.1016/S0749-3797(98)00017-8.

Fogarty, A. W., Glancy, C., Jones, S., Lewis, S. A., McKeever, T. M., & Britton, J. R. (2008). A prospective study of weight change and systemic inflammation over 9 y. *The American Journal of Clinical Nutrition*, *87*(1), 30–35. https://doi.org/10.1093/AJCN/87.1.30.

Foulds, J., Veldheer, S., Yingst, J., Hrabovsky, S., Wilson, S. J., Nichols, T. T., & Eissenberg, T. (2015). Development of a questionnaire for assessing dependence on electronic cigarettes among a large sample of Ex-Smoking E-cigarette users. *Nicotine & Tobacco Research*, *17*(2), 186–192. https://doi.org/10.1093/ntr/ntu204.

Gabrielli, S., Rizzi, S., Bassi, G., Carbone, S., Maimone, R., Marchesoni, M., & Forti, S. (2021). Engagement and effectiveness of a healthy-coping intervention via chatbot for universit students during the COVID-19 pandemic: mixed methods proof-of-concept study. *Journal of Medical Internet Research mHealth and uHealth*, *9*(5), e27965. https://doi.org/10.2196/27965.

Hager, A. D., & Runtz, M. G. (2012). Physical and psychological maltreatment in childhood and later health problems in women: an exploratory investigation of the roles of perceived stress and coping strategies. *Child Abuse & Neglect*, *36*, 393–403. https://doi.org/10.1016/j.chiabu.2012.02.002.

Hauben, M., Hung, E., & Hsieh, W. Y. (2017). An exploratory factor analysis of the spontaneous reporting of severe cutaneous adverse reactions. *Therapeutic Advances in Drug Safety*, *8*(1), 4–16. https://doi.org/10.1177/2042098616670799.

Hooper, D., Coughlan, J., & Mullen, M. (2008). Structural equation modelling: guidelines for determining Model Fit. *The Electronic Journal of Business Research Methods*, *6*(1), 53–60. www.ejbrm.com.

Hughes, K., Bellis, M. A., Hardcastle, K. A., Sethi, D., Butchart, A., Mikton, C., Jones, L., & Dunne, M. P. (2017). *The effect of multiple adverse childhood experiences on health: a systematic review and meta-analysis*. www.thelancet.com/

IBM Documentation (2014). *KMO and Bartlett's Test*. https://www.ibm.com/docs/en/spss-statistics/23.0.0?topic=detection-kmo-bartletts-test

Kalmakis, K. A., & Chandler, G. E. (2014). Adverse childhood experiences: towards a clear conceptual meaning. *Journal of Advanced Nursing*, *70*(7), 1489–1501. https://doi.org/10.1111/jan.12329.

Kalpidou, M. M., Volungis, A. M., & Bates, C. (2021). Mediators between Adversity and Well-Being of College Students. *Journal of Adult Development*, *28*(4), 286–298. https://doi.org/10.1007/S10804-021-09372-6/FIGURES/2.

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). Guilford Publications.

Lazarus, R., & Folkman, S. (1984). *Stress, Appraisal, and coping*. Springer Publishing.

Lee, K., Pang, Y. C., Lee, J. A. L., & Melby, J. N. (2017). A study of adverse childhood experiences, coping strategies, work stress, and self-care in the Child Welfare Profession. *Human Service Organizations: Management Leadership & Governance*, *41*(4), 389–402. https://doi.org/10.1080/23303131.2017.1302898.

Mayordomo-Rodríguez, T., Meléndez-Moral, C., Viguer-Segui, J., P., & Sales-Galán, A. (2015). Coping strategies as predictors of well-being in Youth Adult. *Social Indicators Research*, *122*(2), 479–489. https://doi.org/10.1007/s11205-014-0689-4.

McLaughlin, K. A. (2016). Future Directions in Childhood Adversity and Youth Psychopathology. *Https://Doi-Org.Proxy.Cc.Uic.Edu/10.1080/15374416.2015.1110823*, 45(3), 361–382. https://doi.org/10.1080/15374416.2015.1110823

Melka, A., Chojenta, C., Holliday, E., & Loxton, D. (2019). Adverse childhood experiences and electronic cigarette use among young australian women. *Preventative Medicine*, *126*, 1–8. https://doi.org/10.1016/j.ypmed.2019.105759.

Merrick, M. T., Ford, D. C., Ports, K. A., Guinn, A. S., Chen, J., Klevens, J., Metzler, M., Jones, C. M., Simon, T. R., Daniel, V. M., Ottley, P., & Mercy, J. A. (2019). Vital Signs: estimated proportion of adult health problems attributable to adverse childhood experiences and implications for Prevention — 25 States, 2015–2017. *Morbidity and Mortality Weekly Report (MMWR)*, *68*(44), 999–1005. https://doi.org/10.15585/mmwr.mm6844e1.

Mersky, J. P., Choi, C., Lee, P., C. T., & Janczewski, C. E. (2021). Disparities in adverse childhood experiences by race/ethnicity, gender, and economic status: intersectional analysis of a nationally representative sample. *Child Abuse & Neglect*, *117*, 105066. https://doi.org/10.1016/J.CHIABU.2021.105066.

Mersky, J. P., Topitzes, J., & Reynolds, A. J. (2013). Impacts of adverse childhood experiences on health, mental health, and substance use in early adulthood: a cohort study of an urban, minority sample in the U.S. *Child Abuse and Neglect*, *37*(11), 917–925. https://doi.org/10.1016/j.chiabu.2013.07.011.

Mizrahi, R. (2018). What were you thinking? Brain Development in Young adults. *Psychiatry Information in Brief*, *15*(9), 1. https://doi.org/10.7191/pib.1129.

Morgan, C. A., Chang, Y., Choy, O., Tsai, M., & Hsieh, S. (2022). Adverse childhood experiences are associated with reduced psychological resilience in youth: a systematic review and meta-analysis. *Children*, *9*(1), 1–9. https://doi.org/10.3390/children9010027.

Nusslock, R., & Miller, G. E. (2016). Early-life adversity and physical and emotional health across the lifespan: A neuroimmune network hypothesis. In *Biological Psychiatry* (Vol. 80, Issue 1, pp. 23–32). Elsevier USA. https://doi.org/10.1016/j.biopsych.2015.05.017

Ortiz, R. (2019). Building resilience against the sequelae of adverse childhood experiences: rise up, change your life, and reform health care. *American Journal of Lifestyle Medicine*, *13*(9), 470–479. https://doi.org/10.1177/1559827619839997.

Park, E., Lee, J., & Han, J. (2021). The association between adverse childhood experiences and young adult outcomes: a scoping study. *Children and Youth Services Review*, *123*, 1–13. https://doi.org/10.1016/j.childyouth.2020.105916.

Petruccelli, K., Davis, J., & Berman, T. (2019). Adverse childhood experiences and associated health outcomes: a systematic review and meta-analysis. *Child Abuse and Neglect*, *97*, 104127. https://doi.org/10.1016/j.chiabu.2019.104127.

Sacks, V., & Murphey, D. (2018). *The prevalence of adverse childhood experiences, nationally, by state, and by race or ethnicity*. https://www.childtrends.org/publications/prevalence-adverse-childhood-experiences-nationally-state-race-ethnicity

Sesar, K., Šimić, N., & Barišić, M. (2010). Multi-type childhood abuse, strategies of coping, and psychological adaptations in young adults. *Croatian Medical Journal*, *51*(5), 406–416. https://doi.org/10.3325/cmj.2010.51.406.

Sheffler, J. L., Piazza, J. R., Quinn, J. M., Sachs-Ericsson, N. J., & Stanley, I. H. (2019). Adverse childhood experiences and coping strategies: identifying pathways to resiliency in adulthood. *Anxiety Stress & Coping: An International Journal*. https://doi.org/10.1080/10615806.2019.1638699.

Shin, S. H., Conley, D., Ksinan Jiskrova, G., & Wills, T. A. (2019). Adverse childhood Experiences and E-Cigarette Use during Young Adulthood. *The American Journal on Addictions*, *28*(4), 303–310. https://doi.org/10.1111/ajad.12890.

Smith, M. M., Saklofske, D. H., Keefer, K. V., & Tremblay, P. F. (2016). Coping strategies and psychological outcomes: the moderating Effects of Personal Resiliency. *The Journal of Psychology*, *150*(3), 318–332. https://doi.org/10.1080/00223980.2015.1036828.

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), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092.

Su, Y., D'Arcy, C., & Meng, X. (2020). Social Support and positive coping skills as Mediators buffering the impact of Childhood Maltreatment on Psychological Distress and positive Mental Health in Adulthood: analysis of a National Population-Based sample. *American Journal of Epidemiology*, *189*(5), 394–402. https://doi.org/10.1093/AJE/KWZ275.

Tabachnick, B. G., & Fidell, L. S. (2013). *Using Multivariate Statistics* (6th ed.). Pearson.

Taylor, S. E., & Stanton, A. L. (2007). Coping Resources, coping processes, and Mental Health. *Annual Review of Clinical Psychology*, *3*, 377–401. https://doi.org/10.1146/ANNUREV.CLINPSY.3.022806.091520.