

The Mediating Role of Emotion Dysregulation in Adverse Childhood

Experiences and Health Risk Behaviors

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Abstract

Adverse Childhood Experiences (ACEs) has been linked to mental and physical health difficulties. Adults with a history of ACEs are at a greater risk for health risk behaviors. Health risk behaviors include increased rates of substance use and risky sexual behaviors. It remains unclear in the literature which factors may increase the emergence of risky behaviors. Thus, the current study examined the role of emotion dysregulation as a potential mediator in the relationship between ACEs and health risk behaviors, specifically substance use and risky sexual behaviors. A sample of 351 college students completed online questionnaires pertaining to their history of childhood adversity, emotion regulation skills, substance use, and sexual activity. Preliminary analyses suggested positive correlations among ACEs, emotion regulation, and health risk behaviors. Mediation analyses with bootstrapping procedures indicated that emotion dysregulation was a significant mediator of the relationship between ACEs and health risk behaviors. The results suggest that emotion dysregulation associated with early childhood adversity may lead to health risk behaviors as maladaptive coping strategies, including substance use and risky sexual behavior. These findings have implications for both preventing early childhood adversity as well as focusing on strengthening emotion regulation in children and adults as a strategy to reduce the likelihood of health risk behaviors.

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The Mediating Role of Emotion Dysregulation in Adverse Childhood Experiences and Health Risk Behaviors

Overview

Adverse childhood experiences (ACEs) are potentially traumatic events that occur in childhood that may have negative, long-lasting effects on well-being and health (Boullier & Blair, 2018). ACEs include living in an unstable environment that may be harmful to developmental growth (e.g., witnessing domestic abuse, having a household member incarcerated), and childhood maltreatment (e.g., abuse and neglect) (Boullier & Blair, 2018). ACEs have important implications for mental health, physical health, and social functioning (Jones et al, 2016).

Adults exposed to childhood adversity often display an increase in health risk behaviors, such as substance use and risky sexual behaviors (Campbell, Walker, Egede., 2016). Health risk behaviors have important impacts psychologically, socially, and physically in young adults, and have been associated with significant morbidities, including depression, alcoholism, intimate partner violence, and ischemic heart disease (Downey, Gudmunson, Pang, & Lee, 2017).

One potential mediator between ACEs and health risk behaviors is emotion dysregulation (Espeleta, Brett, Ridings, Leavens, & Mullins, 2018). Individuals who score high on the ACEs scale often report difficulties in emotion regulation, such as identifying and managing emotions (Espeleta et al., 2018). Due to difficulties with managing their emotions, these individuals may resort to substance misuse and risky sex as regulatory strategies for coping with stress (Espeleta et al., 2018). Therefore, emotion regulation may potentially be a factor that helps to explain the association between substance use and risky sexual behavior in individuals who experienced ACEs. Limited research has focused on the specific role emotion regulation may have on health

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risk behaviors with individuals who have a history of ACEs. Thus, the current study examined the role of emotion dysregulation as a potential mediator of the relationship between ACEs and health risk behaviors, in particular substance misuse and risky sexual behaviors among emerging adults.

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Introduction

Adverse Childhood Experiences and Health Risk Behaviors

Adverse childhood experiences (ACEs) include any occurrence of maltreatment that is inflicted upon or witnessed by a child from a parent or another caregiver that is harmful or potentially harmful to the child, including neglect, psychological, physical, and sexual abuse (Jones et al, 2016). There are three primary domains in ACEs, including neglect (e.g., physical and/or emotional, including child not being fed, lack of warmth towards child), abuse (e.g., physical, psychological and/or sexual abuse), and household dysfunction (e.g., living with someone with substance abuse problems or mental illness, parental separation, a loss of a parent either from death or incarceration) (Boullier & Blair, 2018). The cumulative risk theory suggests an individual is more likely to face negative life outcomes when they are exposed to more adverse events (Garrido, Weiler, & Taussig, 2018). ACEs have been linked with negative mental and physical health outcomes later in life, including diabetes mellitus, ischemic heart disease, depressive symptoms, anxiety, and cancer (Wong, Choi, Chan, & Fong, 2017). Approximately 70 percent of adults in the United States report experiencing abuse, household dysfunction, or neglect during childhood (Cameron, Carroll, & Hamilton, 2018). In fact, recent reports of ACEs compared to past reports imply the prevalence of ACEs is increasing, suggesting a major health concern that requires further attention (Karatekin, 2018).

Although most of the research on ACEs has been conducted with samples of older adults, there is evidence that detrimental impacts of ACEs may be apparent in early or emerging adulthood. Notably, the majority of college students report having experienced at least one ACE, and many report multiple adverse exposures (Merians, Baker, Frazier, & Lust, 2019). In a study of 182 college students, mainly female and predominantly white with higher family income,

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students with high ACEs scores were found to be almost twice as likely to show mental deterioration within the course of one semester (i.e., meet screening criteria for anxiety, depression, and express suicidal ideation), than students with low ACE scores (Karatekin, 2018). Furthermore, students with two or more ACEs are more likely to meet criteria for anxiety and depressive disorders than students with just one ACE score (Karatekin, 2018).

ACEs have also been associated with higher rates of health risk behaviors (Espeleta et al., 2018), including excessive alcohol consumption, use of illicit drugs, and risky sexual practices. Health risk behaviors produce substantial risks for both society and the individual (Schwartz et al., 2010). These behaviors are linked with some of the leading causes of death in the United States (e.g. car accidents and overdoses) as well negative social behaviors that may pose a threat to society (e.g., property damage and cost of healthcare). The financial cost associated with risky-health behaviors linked to childhood maltreatment is more than \$210,000 per individual, which is similar to the costs of treating health problems like type 2 diabetes (Garrido et al, 2018). Previous research has supported the association between higher ACE scores with increased health risk behaviors including substance misuse (Shin, McDonald, & Conley, 2018) and risky sexual behaviors (Espeleta et al., 2018), with evidence to suggest that the prevalence of risky sexual behaviors increases as the ACE score increases (Negriff, Schneiderman, & Trickett, 2015). Although these behaviors may emerge during adolescence, they often become more hazardous and prevalent in early adulthood (Schwartz et al., 2010), and more research is needed to identify potential mechanisms that help to explain the association with ACEs.

Substance Misuse

Substance misuse, including alcohol, tobacco, and marijuana use, is prevalent in the United States (Fuentes & Hoffman, 2016; Phillips, K., Phillips, M., & Duck, 2018; Prochaska,

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2011). One of the most consumed substances in the US is alcohol (Fuertes & Hoffman, 2016), and notably, excessive alcohol consumption has been associated with significant social and/or health problems including car accidents, cardiac disease, and violence (sexual and/or physical). The DSM-5 projects that approximately 40% of the population has experienced at least one type of adverse alcohol-related event. College students are more prone to engage in binge drinking, or the consumption of 4 to 5 drinks in one setting, compared to other age groups (Diguiseppi et al., 2018; Fuertes & Hoffman, 2016), which is associated with significant risk for poisoning, accidental injury, and death. An alarming rate of 1,700 college students die every year due to accidental alcohol-related injuries (Fuertes & Hoffman, 2016).

Tobacco products are highly addictive and associated with considerable health risks. There are severe health consequences of tobacco use, including lung disease, cancer, and cardiovascular disease (Bandiera, Loukas, Wilkinson, & Perry, 2016; Prochaska, 2011). In addition, tobacco smokers with mental illness tend to die, on average, 25 years sooner than the overall population in America (Prochaska, 2011). However, it is unclear if depressed individuals smoke as a maladaptive coping strategy or if there may be a familial predisposition (Bandiera et al., 2016). There is evidence that the highly addictive nature of tobacco makes stopping use extremely difficult. A study of 337 smokers recruited from inpatient psychiatry units found that although 82% attempted to quit smoking tobacco, only 42% reported quitting in the previous year (Prochaska, 2011). Thus, early initiation of tobacco use may lead to significant exposure over the life course, increasing the risk for negative health consequences (Brinkman, Epstein, Auinger, Tamm, & Froehlich, 2015).

Marijuana usage tends to spike during early adulthood and is especially common among college students (Phillips et al., 2011). Approximately 30% of college students reported

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marijuana use within the past year, compared with 10% of the general population (Pearson et al., 2018). College students who use marijuana report greater depressive symptoms than students who are non-users (Bravo et al., 2019; Phillips et al., 2011). Undergraduates with problematic marijuana usage tend to report affect dysregulation (Phillips et al., 2011). Research suggests that individuals may use marijuana as a coping method to alleviate depressive symptoms, which has been found to increase marijuana-related problems, such as ruminative thinking (Bravo et al., 2019). However, it is unclear what factors increase an individual's vulnerability to using marijuana.

Risky Sexual Behaviors

Risky sexual behaviors include early sexual intercourse, sex with multiple partners, unprotected sex, and intercourse under the influence of alcohol or drugs (Yang, 2019). Risky sexual behaviors increase the risk of sexually transmitted infection and unwanted pregnancy (Hillis, Anda, Felitti, Nordenberg, & Marchbanks, 2000; Yang, 2019). College students have an elevated risk of engaging in risky sexual behaviors, having the highest prevalence rates among individuals ages 15-24 (Kilwein, Kern, & Looby, 2017). For example, college students report having more sexual partners than same-age peers that are not enrolled in college (Kilwein et al., 2017). A study conducted in a Lusaka, Zambia college reported 72.2% of the participating college students engaged in at least one form of risky sexual behavior (Yang, 2019).

ACEs Relationship to Health Risk Behaviors

There is evidence that health risk behaviors, such as substance misuse and risky sexual behavior, may be maladaptive coping strategies to cope with psychological distress in the environment (Espeleta et al., 2018; Morris, Silk, Steinberg, Myers, & Robinson, 2007).

Adversity in childhood has been associated with the disruption of psychological, biological, and

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neurological processes associated with the stress response systems (Green et al., 2011; Wei, Qiu, Du, & Luo, 2011; Winzeler et al., 2017). Changes in stress response systems may be a result of continual or long-lasting exposure to adversity and trauma (Ginty, Masters, Nelson, Kaye, & Conklin, 2017; Winzeler et al., 2017). This process may lead to increased emotional arousal and sensitivity to negative emotional stimuli in the environment (Wei et al., 2011), increasing the likelihood of engaging in health risk behaviors.

Emotion Regulation

Emotion regulation is one's ability to identify emotions, monitor emotions, and respond to emotions depending on the environment (DeSteno, Gross, & Kubzansky, 2013; Poole, Dobson, & Pusch, 2018). It is a type of self-control, that allows people to effectively function when faced with situations that prompt strong emotional responses (Pollock, McCabe, Southard, & Zeigler-Hill, 2016). Emotion regulation is an important developmental milestone that reflects a child's ability to successfully adapt to their environment in a socially acceptable and adaptive manner (Morris et al, 2007). Importantly, difficulties in emotion regulation that emerge during childhood often persist into adulthood (DeSteno et al, 2013). Individuals who have experienced childhood adversity, such as ACES, are more likely to demonstrate emotion dysregulation.

Research has suggested that emotion dysregulation contributes to the development and maintenance of health risk behaviors, such as problematic drinking (Aurora & Klanecky, 2016; Weiss, Tull, Anestis, & Gratz, 2013), and is associated with greater prevalence of negative psychosocial outcomes including, anxiety, interpersonal difficulties, bipolar disorder, and posttraumatic stress disorder (Espeleta et al., 2018; Van Rheezen & Rossell, 2014).

Emotion Regulation as a Potential Mediator

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Emotion regulation has been found to mediate associations between types of abuse or maltreatment and negative behavioral outcomes (Langevin, Hébert, & Cossette, 2015; Noll, Haralson, Butler, & Shenk, 2011; Rudenstine, Espinosa, McGee, & Routhier, 2019). More specifically, a study found that emotion dysregulation mediated the relationship between childhood maltreatment and risky sex in female teens (Noll et al, 2011). Emotion regulation has also been found to mediate the relationship between child sexual abuse and internalized behavior problems in preschoolers (Langevin et al 2015), as well as the relationship between ACEs and psychological distress in adulthood (Rudenstine et al, 2019). Thus, lack of emotion regulation, or emotion dysregulation, is a promising mediating factor that may help explain the association between childhood adversity and health risk behaviors.

Importantly, emotion regulation can be taught through modeling, making it a good, modifiable skill to target for intervention. A study of an intervention targeting emotion regulation skills with adults with ACEs found that individuals improved their overall well-being (Cameron et al., 2018). The results showed that young adults had greater improvements in well-being than older adults, emphasizing the importance of intervention with emotional regulation skills at a younger age (Cameron et al., 2018).

Current Study

The current study examined the mediating effects of emotion dysregulation on the association between adverse childhood experiences and health risk behaviors in a sample of college students. It was hypothesized that higher ACE scores would be associated with greater health risk behaviors. To better understand the role of emotion dysregulation in health risk behaviors, a test of mediation was evaluated. It was hypothesized that emotion dysregulation will mediate the relationship between ACEs and health risk behaviors, such that higher ACE scores

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would be associated with greater emotion dysregulation, which in turn would be associated with greater health risk behaviors.

Methodology

Study Design and Procedure

Data were taken from a larger, cross-sectional study of adversity among college students. Participants enrolled in the study through the Psychology Department Research Participation System (SONA) system, and data were collected via anonymous online Qualtrics questionnaires. All participants provided electronic consent to participate in the study, which was approved by the University's Institutional Review Board.

Participants

Data were collected from a total of 636 college students. Analyses were restricted to those participants with complete data on all variables, resulting in a total of 351 participants for the current study. In order to participate in the study, students had to be at least 18 years of age and fluent in English. Participants completed the questionnaires in approximately 60 to 120 minutes and received 2 course credits to compensate them for their time. See Table 1 for demographic information.

Measures

Demographics. Participants completed questions assessing age, sex, ethnicity, and class standing.

Adverse Childhood Experiences. The Adverse Childhood Experiences Questionnaire – Short Form (ACE-SF; Felitti et al., 1998) is a 10-item measure that assesses exposure to early childhood adversity. Participants indicate either yes or no to these adverse exposures in

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childhood. Each “yes” is counted as one point, and all points are added to create a total score.

Higher scores indicate greater exposure to adversity in childhood.

Emotion Dysregulation. The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a 36-item self-report questionnaire assesses multidimensional aspects of emotion regulation and dysregulation. The scale yields a total sum score; higher scores indicating greater emotion dysregulation. The measure also yields six sub-scales, (1) non-acceptance of emotional responses (Non-acceptance); (2) difficulties engaging in goal directed behavior (Goals); (3) impulse control difficulties (Impulse); (4) lack of emotional awareness (Awareness); (5) limited access to emotion regulation strategies (Strategies); and (6) lack of emotional clarity (Clarity).

Total Health Risk Behaviors. The Student Drug Use Questionnaire (Asbridge & Langille, 2013) was used to assess students’ drug, tobacco, and alcohol use. The scale assessed how many times an individual used drugs, tobacco, and alcohol during the past 12 months. Example items include, “Been drunk or very high from drinking alcohol”, “Smoked cigarettes or used smokeless tobacco”, “Used crack or cocaine in any other form, or heroin”, “Used marijuana (grass, pot, weed) or hashish (hash)”. The scale ranged from “0 = never” to “6 = 4+ times.” In addition, to assess risky sexual behaviors, 10 questions were asked. Example items include, “The last time you had sex, did you drink alcohol or use drugs before you had sex?” and “The last time you had sex, did you or your partner use a condom or other latex barrier?” Participants indicate either yes or no to these experiences. Each “yes” is counted as one point, and all points are added to create a total score. Drug, tobacco, and alcohol use totals were combined with risky sexual behavior totals to create a total health risk behavior score. Higher scores indicate greater engagement in risky health behaviors.

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Overview of Analyses

Bivariate correlations between variables of interest were conducted, and a mediation model was tested using PROCESS for SPSS Version 3.00 (Hayes, 2012; 2018; Preacher & Hayes, 2004) to determine whether emotion dysregulation mediated the relationship between cumulative ACEs and health risk behaviors. Analyses incorporated bootstrapping procedures set at 5,000 resampling draws. Bias-corrected bootstrap confidence intervals for indirect effects were used (Hayes, 2018). Within the model, age and sex were entered as covariates.

Results

Preliminary Statistics

The final sample of 351 participants consisted of primarily of Caucasian (74%) and female (78%) students with ages ranging from 18 to 49 ($M = 20.2$, $SD = 3.15$). Participants reported cumulative ACE scores ranging from 0 to 10, with 57% of our sample reporting experiencing at least one ACE. “Were your parents ever separated or divorced?” and “Was a household member depressed or mentally ill or did a household member attempt suicide?” were the most commonly reported ACEs in the present sample, with approximately 42% of our sample experiencing each. Prevalence rates for the remaining ACEs include childhood abuse (26%), childhood neglect (21%), and household dysfunction (49%). Bivariate correlation analyses suggested that total ACE score was positively correlated with emotion dysregulation and total risky behaviors. In addition, emotion dysregulation was positively correlated with total risky behavior. See Table 2 for the bivariate correlation results between all analysis variables.

Primary Analyses

Primary analyses examining the simple mediation, *Adverse childhood experiences* → *emotion dysregulation* → *risky health behaviors*, were conducted using PROCESS for SPSS

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Version 3.00 (Preacher & Hayes, 2004; Hayes, 2012; 2018). Significance testing utilized 95% confidence intervals yielded from 5,000 bootstrapped regression resampling draws with replacement to examine the direct and indirect effects of emotion dysregulation. Simple mediation results (see Figure 1 and Table 3) revealed significant direct effects for *adverse childhood experiences* → *emotion dysregulation* ($a = 2.17$, 95% CI = 1.45 to 2.88) and *emotion dysregulation* → *risky health behaviors* ($b = 0.10$, 95% CI = 0.05 to 0.16). The direct effect of adverse childhood experiences on risky health behaviors was not statistically significant ($c' = 0.27$, 95% CI = -0.12 to 0.66). Analyses also revealed a significant indirect effect via emotion dysregulation, *adverse childhood experiences* → *emotion dysregulation* → *health risk behaviors* ($ab = 0.22$, 95% CI = 0.008 to .039).

Discussion

The current study evaluated the potential role emotion dysregulation has on the relationship between ACES and health risk behaviors among young adults. Research has shown that individuals who experience adversity in childhood are at a greater risk for health risk behaviors (e.g. problematic substance use, risky sexual activity), that often persist into adulthood. However, the literature is ambiguous of the mechanisms that drive this association.

The results demonstrated that there was an indirect relationship between ACES, emotion dysregulation, and health risk behaviors, indicating that ACES may lead to problems in regulating emotions, which may in turn may be associated with more health risk behaviors, like drinking, consuming drugs, and engaging in unsafe sexual activity. Consistent with Espeleta and colleagues' (2018) findings, the results of the current study support the idea that college students who experienced adversity in childhood may experience high levels of emotion dysregulation and engage in maladaptive behaviors as a coping strategy for dealing with stress, contributing to

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the increase in health risk behaviors, like problematic substance use and risky sexual behaviors. Children who experiences adverse events are more likely to experience emotion dysregulation, which may be due to an absence of appropriate modeling of emotion coping skills and/or feedback, which leads to underdeveloped emotion regulation skills (e.g. identifying and regulating strong emotions), especially in stressful environments and situations. The lack of healthy emotion regulations skills may lead children with ACEs to adopt maladaptive behaviors to cope with stressful events. As a result, individuals with higher ACE scores are more likely to engage in health risk behaviors, like drinking excessively, illegal substance use, and risky sexual behaviors.

Clinical Implications

The findings of the current study have important clinical implication for individuals who have experienced ACEs. Results showed that individuals with emotion dysregulation are at an increased risk for health risk behaviors, which can have devastating consequences for future health and well-being. Thus, to help reduce or prevent risky health behaviors among college students, it may be beneficial to provide psychoeducation that helps them understand how childhood adversity and emotion dysregulation impacts their health risk behaviors. It may be helpful to assess for emotion regulation skills among young adults who have a history of ACEs, so that they have a better understanding of their risk for negative health outcomes associated with maladaptive coping strategies, like substance use and risky sexual behavior. For those at high risk, integrating evidence-based skills in treatment may help address problems in emotion dysregulation that may reduce the use of risky health behaviors as coping strategies.

Furthermore, on a broader societal level, it may be beneficial to promote emotion regulation skills and strategies during early childhood to help prevent emotion dysregulation in

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adulthood and reduce the risk for substance misuse and risky sexual behavior. Teaching young children to identify, evaluate, and modulate their emotions is useful for the development of emotion regulation skills (Espeleta et al., 2018). Positive feedback and healthy emotion coping modeling from caretakers can help build and strengthen these skills, reducing the risk for later maladaptive behaviors (Espeleta et al., 2018).

Limitations and Future Research

The current study had several limitations. The data were limited to a convenience sample of college students from a single university, the majority of which were female and White, thus limiting the generalizability of the findings. Another limitation is that the population surveyed had low ACE scores, as 63% reported zero or 1 ACE, and 38% reported 2 or more ACES. Therefore, the current sample may not have had sufficiently variability in ACEs to show a direct relationship to health risk behaviors. Finally, the current study only used two surveys that assessed for health risk behaviors, and there were very few questions focused on risky sexual behavior, limiting the data available to evaluate. Additional studies should be conducted with diverse samples and samples with greater variability in both ACE scores and health risk behaviors.

Overall, this study focused on emotion dysregulation as a mediating factor in the relationship between ACEs and health risk behaviors among young adult college students. The results suggest that emotion dysregulation associated with early childhood adversity may lead to health risk behaviors as maladaptive coping strategies, including substance use and risky sexual behavior. These findings have implications for both preventing early childhood adversity as well as focusing on strengthening emotion regulation in children and adults as a strategy to reduce the likelihood of health risk behaviors.

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MEDIATING ROLE OF EMOTION DYSREGULATION

Table 1*Participant Demographics (N=351)*

Variable	N	Percentage
Sex		
Male	79	23%
Female	272	78%
Race		
Caucasian	258	74%
Native American or Alaska Native	17	5%
Hispanic/Latino	6	2%
African American	30	9%
Asian	11	3%
Biracial	13	4%
Other	14	4%
Class standing		
Freshman	154	44%
Sophomore	79	23%
Junior	52	15%
Senior	61	17%
Other	5	1%
ACEs Total Scores		
0 -1 ACEs	220	63%
2-3 ACEs	55	16%
4 + ACEs	76	22%
Health risk specific items		
	<i>M (SD)</i>	Range
Substance use	7.8 (9.3)	0 - 65
Risky sexual behaviors	4.6 (3.6)	0 - 12

Note. ACEs = Adverse Childhood Experiences.

MEDIATING ROLE OF EMOTION DYSREGULATION

Table 2*Bivariate Correlations Among Study Variables.*

	1.	2.	3.	4.
1. ACEs	-			
2. Emotion Dysregulation	.30**	-		
3. Total Risky Behavior	.14*	.22**	-	
4. Age	-.12*	.01	-.03	-
5. Sex	-.04	-.04	.05	.21**

Note. * $p < 0.05$, ** $p < 0.01$. ACEs = Adverse Childhood Experiences.

Table 3*Model Coefficients for Mediation Analysis.*

	<i>B (SE)</i>	<i>95% CI</i>
<i>Direct Paths</i>		
ACEs → Risky Total Behavior	.27 (.20)	[-.12, .66]
ACEs → Emotion Dysregulation	2.17* (.36)	[1.45, 2.88]
Emotion Dysregulation → Total Health Risk Behavior	.10* (.03)	[.05, .16]
<i>Covariates</i>		
Age → Total Health Risk Behavior	-.00* (.00)	[-.00, .00]
Sex → Total Health Risk Behavior	1.23 (1.41)	[-1.54, 4.00]
<i>Indirect Path (ab)</i>		
ACEs → Emotion Dysregulation → Total Health Risk Behavior	.22 (.08)	[.008, .39]

Note. * $p < 0.05$. Unstandardized path coefficients are reported. CI = Confidence Interval. ACEs = Adverse Childhood Experiences.

MEDIATING ROLE OF EMOTION DYSREGULATION

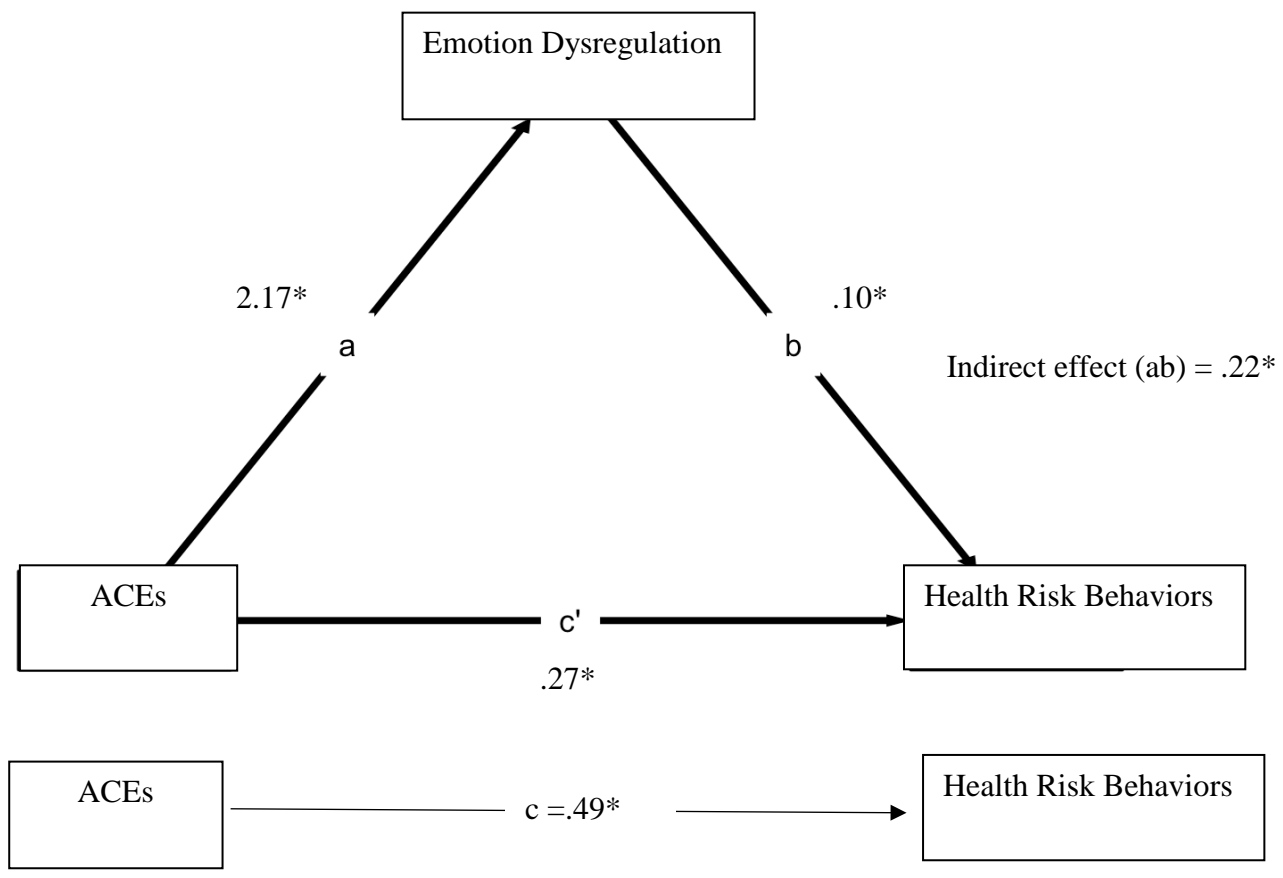


Figure 1. Emotion dysregulation mediating the association between ACEs and Health Risk Behaviors.

ACEs = Adverse Childhood Experiences.