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Association Between Adverse Childhood Experiences, Resilience And Mental Health Among College Students In The El Paso Texas Border Region

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ASSOCIATION BETWEEN ADVERSE CHILDHOOD EXPERIENCES, RESILIENCE AND MENTAL HEALTH AMONG COLLEGE STUDENTS IN THE EL PASO TEXAS BORDER REGION

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by

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Abstract

Purpose: The purpose of this study is to explore the relationship between adverse childhood experiences (ACEs), mental health and resilience among adults living in the United States - Mexico Border region. ***Background:*** Numerous studies have investigated the negative impact of ACEs on adult mental health, but the concept of resilience as a protective factor for mental health has limited consideration in ACE treatment interventions. The proposed study addresses this gap in knowledge by investigating relations between ACEs, resilience, and mental health in the understudied U.S – Mexico Border population. ***Method:*** An online survey was administered to 221 university students to assess the relationship between ACEs, mental distress and resilience. Using hierarchical linear regression, three models were tested. First, including demographics, second including ACEs and low resilience, followed by the interaction of ACEs and low resilience. ***Results:*** Analyses indicate that ACEs were associated with mental distress (B = 1.02, 95% CI 0.37 - 1.68, $p < 0.01$) and low resilience was associated with mental distress (B = 5.37, 95% CI 3.15 - 7.59, $p < .01$). The ACEs x low resilience interaction term was also related to mental distress (B = 1.32, 95% CI 0.17 - 2.47, $p = 0.03$), indicating that ACEs had a larger association with mental distress among respondents with low resilience. ***Conclusions:*** Findings highlight the importance of resilience in reducing mental distress directly and in reducing the influence of ACEs on mental health. Interventions promoting resilience may be effective in reducing mental distress, especially among individuals with a history of adverse childhood experiences.

Keywords: Adverse Childhood Experiences (ACE), Mental Distress, Resilience, Stressful life events, Trauma

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1. Introduction:

This study examines the relationship between adverse childhood experiences (ACEs), mental distress and resilience. ACEs, mental distress and resilience were evaluated in an adult sample recruited from the United States – Mexico border population of El Paso Texas, a unique region where mental health issues such as substance addiction, depression and family violence are prevalent (Healthy Border., 2020).

1.1. Statement of Problem:

ACEs have been associated with the leading causes of death in the United States, such as diabetes (OR = 1·52, CI = 1. 23 – 1.89), heart disease (OR = 2.07, CI = 1.66 – 2.59), cancer (OR = 2.31, CI = 1.82 – 2.95) and chronic lower respiratory disease (OR = 3. 05, CI = 2. 47 – 3.77) (Hughes et al., 2017; Murphy et al., 2017; Merrick et al., 2017; Felitti et al., 1998). A strong relationship between ACEs and different biological, behavioral, and mental health issues has also been found (Purewal et al., 2016; Felitti & Anda., 2009; Logan – Greene et al., 2014; Felitti et al., 1998). Individuals exposed to ACEs present higher rates of anxiety, depression, and suicide attempts, among other mental health disorders (Karatekin., 2018; Rosinski, Weiss, & Clatch., 2018).

Mental health disorders have been associated with long-term disability, dependency and mortality (Prince et al., 2016). However, only one out of three adults with mental health problems are referred and treated for mental illness (Prochaska et al., 2012). The average delay between first mental illness symptoms and treatment is 11 years (Wang et al., 2004). In 2018, only 43% of adults in the United States with a mental illness received treatment (NAMI., 2019).

There is a gap in the provision of mental health care for vulnerable Hispanic populations (Villalobos & Bridges, 2018; Venta et al., 2018). The Behavioral Risk Factor Surveillance

System reports that in El Paso, Texas, 23.5% have reported mental distress for more than four consecutive days and 22.8% are unable to access health services (Healthy Paso del Norte, 2019).

Resilience is a protective factor that helps individuals overcome the adversity faced and the effects of traumatic events (Venta et al., 2018; Hamby et al., 2018; Ungar., 2013). Yet little empirical work investigates the relationship between mental health and resilience (Roldan – Merino., 2016). Further, ACEs are understudied in the border region, as there is no literature to our knowledge exploring ACE's in the U.S.-Mexico border region. The negative mental health consequences caused by ACE's are not addressed nor treated. Early recognition of childhood trauma and appropriate interventions that target resilience development could potentially play an important role in the prevention of mental health disorders and chronic disease throughout a life span (Logan-Greene et al., 2014).

ACE, mental health distress and resilience are concepts that have been studied separately, but few studies have investigated the relationship among the three in a population of Hispanics (for exceptions see Bellis et al., 2017; Logan Greene et al., 2014). Understanding resilience as it relates to ACEs and mental health can contribute to the development of trauma informed interventions targeting resilience as a protective and modifiable risk factor to help promote mental health, prevent chronic disease and thus alleviate the effects of ACEs. Such work is particularly important in the U.S.-Mexico border region, as ethnic minorities face health disparities due to discrimination, social oppression and collective trauma (Estrada., 2009; Stanton-Salazar, & Spina., 2000). Thus, trauma focused interventions could be a powerful tool for minority individuals, families and communities to prevent and treat the negative health effects of childhood adversity (Logan – Green et al., 2014; Purewal et al., 2016).

2. Literature Review/Background & Significance:

2.1. Adverse Childhood Experiences (ACE):

Adverse Childhood Experiences (ACE) include psychological, physical and sexual abuse along with household dysfunction which includes domestic violence, divorce, parental incarceration and substance abuse (Felitti et al., 1998). ACEs are associated with several health issues, including ischemic heart disease (Dong et al, 2004), chronic obstructive pulmonary disease (Anda et al, 2008), cancer (Brown, Thacker, & Cohen, 2013) and sexually transmitted infections (Newcomb et al., 2003). Additionally, women with higher ACE scores are at greater risk of having a miscarriage or stillbirth (Anda et al, 2008).

One explanation for the impact ACEs have on health is through neurodevelopmental changes (Brown, Thacker, & Cohen, 2013; Navalta et al., 2018). A child exposed to toxic stress may experience unusual wear and tear on their neurophysiological regulation state (Sciaraffa, Zeanah, & Zeanah., 2018; Logan – Greene et al., 2014). The child's vulnerability to developing biological, psychological, behavioral and mental health issues in adulthood has then increased, specifically because they are at crucial stages of development (Johnson et al., 2013).

ACE's are not only directly associated with health issues but may also indirectly impact health by encouraging known risk behaviors that lead to disease (Anda et al., 2008). For example, there is a strong relationship between childhood trauma and smoking behavior, which helps to explain the association between ACE's and cancer as a result of risk engagement (Brown, Thacker, & Cohen, 2013). Additionally, Young-Wolff and colleagues (2019) found a link between ACEs and substance use among HIV positive individuals (Young-Wolff et al., 2019). Chang, Jiang, Mkandarwire, and Shen (2019) found that increased ACEs scores increased risk

of drinking behavior. Musa et al., (2018) found increased odds of early sex initiation, dating violence along with alcohol and drug abuse among respondents with higher ACE scores.

The prevalence and rates of ACEs varies by group; however, a dose-response relationship was found between ACE's and the leading causes of death in the United States (Felitti et al, 1998; Edwards et al, 2003). At least six in ten people in the general population have been exposed to at least one type of ACE (Almuneef et al., 2017). ACE prevalence recorded by 23 U.S. States using the Behavioral Risk Factor Surveillance System from 2011 – 2014 was 15.8% for exposure to four or more ACEs, and 45.7% for exposure to one or more ACEs (Merrick et al., 2018).

2.2. Mental Health and Mental Distress

Mental health is defined as the state of wellbeing where an individual is able to cope effectively with normal stresses, work productively and contribute to their own community while realizing their own potential (WHO., 2014). In contrast to mental health, mental distress represents suffering, which presents as both symptoms and diagnoses with a range of severity that can have lifelong impacts on health and disease risk (Hammarström., 2016; Prince et al., 2016). For example, individuals with mental health disorders are at greater risk for HIV, tuberculosis, hypertension, myocardial infarction, diabetes and malaria (Prince et al., 2016).

Traumatic experiences during childhood have been associated with the development of all psychiatric disorders (Utzinger at al., 2016). For example, childhood abuse and neglect are a risk factor for the development of various mental health disorders. The odds for an abused and neglected child to developing lifetime PTSD where 1.75 times higher in comparison to a child who had not been exposed to abuse and neglect (95% CI 1.3 – 2.3) (Widom et al., 1999). Bruijnen and colleagues (2019) found a significant correlation between social anxiety symptoms and childhood trauma ($r = 0.42$, $p < 0.001$). Elkins et al., (2019) studied the association between

ACEs and major mental health outcomes, finding higher ACEs was associated with higher odds of having major depression (OR = 1.33, CI 1.28 – 1.38, $p < .01$). Additionally, Agorastos et al., (2014) found that both having single (OR: 2.2, 95% CI: 1.3 - 3.8) and multiple (OR: 2.1, 95% CI: 1.2 - 3.5) childhood trauma where a risk factor to the development of depression.

Mental health conditions such as schizophrenia, bipolar disorder, and major depressive disorders increase the likelihood of death (Merker et al., 2017). One in five adults in the United States experience mental illness with one in 25 adults experience severe mental illness (NAMI., 2018). Additionally, 8.1% of adults experience at least one depressive disorder while 18.1% of adults have experienced anxiety, PTSD or OCD disorder (NAMI., 2018). Poole and colleagues (2003) found a dose-response relationship between ACE scores and depressive disorders, noting a lifetime prevalence of depressive disorders of 23% among individuals experiencing one or more ACEs.

2.3. Resilience

Resilience refers to positive adaptation when facing significant adversity (Lutha & Cicchetti., 2000). Resilient individuals present characteristics of optimism, tenacity, strong coping mechanisms and active problem solving (Beautel., 2017). Resilience allows for coping processes to employ a protective strategy after experiencing an adverse event (Forbes et al., 2018). Protective factors such as resilience are associated with positive development under stress (Ungar & Liebenberg., 2011; Spencer-Hwang et al., 2018). Self-esteem and emotion regulation are classified as the internal traits of resilience whereas social environment and family history are classified as external factors of resilience (Forbes et al., 2018).

The ability of an individual to overcome adversity or successfully manage hardship is of great importance to the overall health of the individual (Bonanno., 2004). The development of

resilience is crucial for survivors to overcome the lifelong consequences of childhood adversity (Bellis et al., 2017). Resilience supports individuals who have been exposed to adverse life events (Bonanno., 2004) by providing the strength to aid in adaptation and recovery after adversity (Dias & Cadime., 2015).

Research has begun to explore the biological explanation of resilience and its neurobiological factors that contribute to stress caused diseases. For example, resilience is associated with increased connectivity between the versal and dorsal prefrontal cortex, which may provide a protective a pathway against life adversities (Shrivastava and Desousa, 2016). Resilience may also reduce corticotropin-releasing hormone (CRH), a hormone released by the Hypothalamus-pituitary-adrenal (HPA) axis when experiencing toxic stress in childhood (Feder et al., 2009).

2.4. Impact of resilience on the relationship between ACEs and mental health:

Resilience is the capacity of individuals to navigate through social, psychological, physical and cultural resources that support their wellbeing, along with regulating the resources available in meaningful ways (Sciaraffa et al., 2018; Ungar & Liebenberg., 2011). Individuals with high reported resilience are more likely to recover from adverse experiences (Bellis et al., 2017; Logan Greene et al., 2014). Specifically, previous research found that the association between ACEs and adult mental distress was substantially lower among individuals who always had a trusted adult available as a child (Bellis et al., 2017). Further, the association between ACEs and poor mental health was lower among individuals with the resilience resources of adequate sleep, social support, and life satisfaction (Logan – Greene et al., 2014). Thus, resilience may moderate the relationship between ACEs and mental distress.

2.5. El Paso Texas Border Region

2.5.1. Health Outcomes affecting the El Paso Border population

The US-Mexico border region encompasses unique political, social and demographic characteristics (Healthy Border, 2020). The region is predominately Hispanic, an understudied minority (Newcomb et al., 2003). Research has found that there an increased risk of violence childhood trauma among minorities (Austin et al., 2016). Major mental health issues in the border region include depression, addiction, and violence (Healthy Border 2020, 2010). These issues may be related to family dysfunction, disability, poverty, along with lack of social support and education (Healthy Border 2020, 2010).

High rates of poverty and limited access to health services may inhibit improvements in health and well-being among minority populations (Van Cleave et al., 2017). Elkins and colleagues (2019) found that for Hispanic adolescents, the relationship of ACEs and chronic disease is stronger in comparison to non – Hispanic adolescents. There is a gap in the provision of mental health care for vulnerable Hispanic populations creating barriers to quality of life for minorities (Villalobos & Bridges, 2018; Venta et al., 2018).

2.6. Summary of Literature

Extensive research reveals how all aspects of ACEs including sexual, psychological and physical forms of abuse, neglect and household dysfunction are associated with mental and physical health issues. Even though the association between ACEs and resilience has gained interest, studies estimating their effect on adult mental health are limited (Beutel et al., 2017). There is gap in literature analyzing the relationship between ACE's, mental health and the role of resilience. Even though extensive literature links ACEs with mental health, it is unclear how the resilience of individuals exposed to trauma may alter the connection between ACEs and

mental health. Furthermore, to date there is no research exploring ACEs and resilience in relation to mental health in the United States – Mexico Border region.

3. The Present Study

3.1. Goals and Purpose of the Study:

The goal of this study is to examine relations between ACEs, mental health and resilience in a sample of adults recruited from the University of Texas at El Paso.

3.2. Study aims and hypotheses:

Based on previous research, our conceptual model theorizes how ACEs prevent individuals from having optimal health, and how resilience can play a protective role against the development of poor mental health.

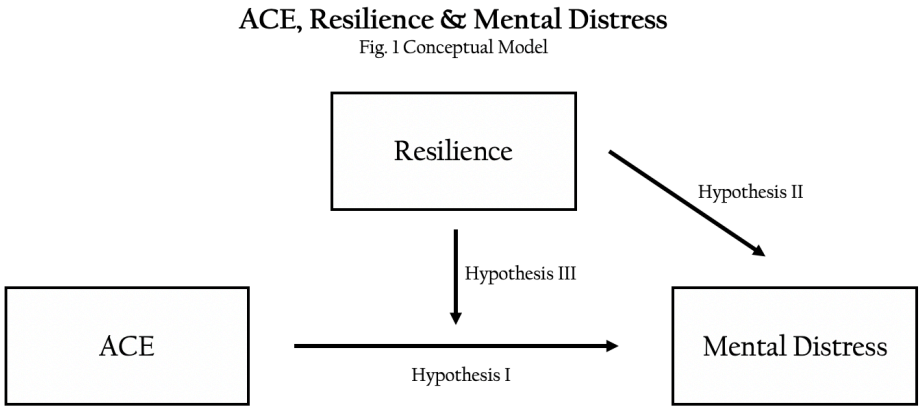

Figure 1: Conceptual Framework

The aim of the study is then to test this conceptual model based on the following hypotheses:

1. ACEs are positively related to mental distress
2. Resilience is negatively associated with mental distress
3. The positive relation between ACEs and mental distress only exists in the lower resilience population.

4. Methods:

4.1. IRB Approval and Ethics Statement:

This study was reviewed and approved by the University of Texas at El Paso Institutional Review Board on March 12th, 2019.

4.2. Study design:

A quantitative cross – sectional study was the selected design for this study. A survey was assembled with scales that measured each of the three main constructs, along with sociodemographic characteristics and past year threatening events. Scales were selected based on an extensive literature search to find widely used measures whose validity and reliability had been tested to provide confidence in the interpretation of the scores.

4.3. Sample Population/study participants:

Participants are English and Spanish speaking students from the University of Texas at El Paso Texas, an institution with an 80% Hispanic population (UTEP CIERP, 2018). A total of 221 college students answered the survey. Inclusion criteria required for participants to be current students and be at least 18 years of age.

4.4. Procedures for Data Collection:

An anonymous electronic survey was administered to students, the survey was projected to be no more than 15 minutes long. Anonymity was ensured by a participant ID classification, generated at submission, each participant received a $10 incentive after survey completion. Several recruitment methods were employed, including three undergraduate classroom announcements along with two visits to the Union, four visits to the library and four visits to the student food court with students from all degree programs including undergraduate and graduate.

4.5. Measures

4.5.1. Demographic:

The demographic section assessed age, biological gender, gender identification, Hispanic or Latino origin, race/ethnicity, employment level, income, marital status, place of birth and education status.

4.5.2. Adverse Childhood Experiences (ACE) Questionnaire:

The ACE questionnaire is a 10-item scale developed by researchers from the Kaiser Permanente's San Diego Health Appraisal Clinic and the CDC (Felitti et al., 1998). The questionnaire assessed childhood adversity and includes assessments of household dysfunction, physical, sexual and emotional abuse (Felitti et al., 1998). A total ACE score is obtained by the added points from each "yes" response to the questions in the instrument. The instrument demonstrated adequate internal consistency in this study ($\alpha = .71$).

4.5.3. Connor - Davidson Resilience Scale (CD-RISC 10):

The scale measures resilience as the ability to thrive in the face of adversity, assessing self-esteem strength along with humor, problem solving, successfully coping with stress, and adaptability to change (Connor and Davidson., 2003). The CD – Resilience scale is considered one of the best scales to measure resilience because of its validity and reliability on different countries and languages (Duong & Hurst, 2016; Bali & Sharma., 2017; Beutel et al., 2017; Capanna et al., 2014; Govender et al., 2017). This scale has been translated in Spanish and shown good internal consistency ($\alpha = 0.84$) (Munévar et al., 2015) (Soler Sánchez et al., 2016). The CD-RISC is a 10 item Likert scale, with answer options "Not True at all", "Rarely True", "Sometimes True", "Often True" and "True nearly, all the time". In this study it had good internal consistency ($\alpha = .86$).

4.5.4. Kessler Psychological Distress Scale (K10):

The Kessler Psychological Distress Scale (K10) is a 10-item questionnaire measuring psychological distress based on questions regarding symptoms of anxiety and depression (Prochaska et al., 2012). The K10 is a widely used and well validated scale that assesses the psychological distress among clinical and general populations (Cronbach alpha = .88) (Easton et al., 2017). The K10 scale has a five-level response scale, "All of the time", "Most of the time", "Some of the time", "A little of the time" and "None of the time" with a range of a low 10 to a high 50 (Kessler et al., 2003). The scale demonstrated high reliability in this study ($\alpha = .93$).

4.5.5. List of Threatening Experiences (LTE) Questionnaire:

The List of Threatening Experiences (LTE) scale is a 12-item scale developed by Motrico and colleagues (2013) with high sensitivity and reliability (Kappa range = 0.61– 0.87). Each item depicts a life event that has been identified as inducing stressful psychological experiences. Each yes response to a LTE accounted for a value of 1, with scores ranging from 0 – 12. Internal consistency was modest, which is typical of count measures ($\alpha = .60$).

4.6. Statistical Analyses:

4.6.1. Power and Effect Size Calculations:

We conducted an a priori power and effect size simulations in order to estimate the number of participants needed to detect statistical significance. We estimated statistical power using the statistics table (Cohen., 1998). To detect a population correlation of 0.2 with a power of .8 and a p – value of 0.05, we calculated a needed sample size of 220.

4.6.2. Data Analysis:

In order to test all three hypotheses, we used hierarchical linear regression, with mental distress as the dependent variable. In the first model, we entered the demographic

characteristics and past year threatening events, which served as covariates in our model. In the second model we tested the first and second hypotheses by adding ACEs and resilience to the model. In the third model we tested the third hypotheses by adding the ACEs x resilience interaction term to the model. All analyses were conducted using IBM SPSS Statistics 25.

5. Results

5.1. Sample Demographics:

A total of 221 participants completed the survey, with all participants completing all survey items under investigation. Respondents were 67% female, with 73% born in the United States, and 78% of Hispanic descent. With regard to income, 80% of participants made less than $20,000, 13% made between $20,000-$40,000, 5% made between $40,000-$60,000, and 2% made more than $60,000. Only 5% of the participants were married and 70% of participants were employed. Among the college student sample, all participants had a high school diploma or GED, while 19.8% had a bachelor's degree, 1.8% had a master's degree, and 1.4% had a doctorate degree.

Table 1: Demographic Characteristics

Characteristics		**N**	**%**	**Mean**	**SD**
Gender	Female	147	66.5	1.67	0.473
	Male	74	33.5		
Place of Birth	Not U.S. Born	62	28.1	0.72	0.45
	U.S. Born	159	71.9		
Ethnicity	Non-Hispanic	48	21.7	0.78	0.413
	Hispanic	173	78.3		
Employment	Not Employed	29	13.1	1.56	1.608
	Employed	154	69.7		
	No Response	38	17.2		
Income	Less than 20000	175	79.2	1.3	0.711
	20000 to 40000	28	12.7		
	40000 to 60 000	11	5		
	60000 to 70000	1	0.5		
	70000 or more	3	1.4		
Marital Status	Married	12	5.4	1.95	0.227
	Not Married	209	94.6		

Education	High school graduate	31	14	3.13	0.715
	Some college	141	63.8		
	Bachelor's Degree	42	19		
	Master Degree	4	1.8		
	Doctorate Degree	3	1.4		

Step 1 of the hierarchical regression model predicting mental distress entered these sociodemographic covariates, along with past year threating events. The only significant sociodemographic characteristic was being U.S. born, which was associated with higher mental distress (B = 2.75, [0.01, 5.40], p = 0.05). Past year threatening events also had a significant and positive association with mental distress (B = 1.87, [1.16, 2.64], p < .01). All covariates together accounted for 15.2% of the variance in mental distress.

5.2. Hypothesis tests

5.2.1. Hypothesis 1:" ACE's are positively related to mental distress"

Our first hypothesis was tested in model 2. ACEs were positively associated with mental distress, consistent with our first hypothesis (B = 1.02, [0.37, 1.68], p < .01). An increase of one standard deviation in ACEs, predicted a 0.21 standard deviation increase in mental distress. Model 2 included ACEs and low resilience, accounting for 26.4% of the variance in mental distress, as compared to 15.2% in model 1, which just had the covariates.

5.2.2. Hypothesis 2: "Resilience is negatively associated with mental distress"

Consistent with our second hypothesis, mental distress was associated with low resilience (B = 5.37 [3.14, 7.60], p < .01). The model predicted .29 standard deviation increase in mental distress for respondents with low resilience (CI = [0.17, 0.41], p < .01).

5.2.3. Hypothesis 3: "The positive relation between ACEs and mental distress only exists in the lower resilience population"

As illustrated by Figure 2, the results from our third model were also consistent with our third hypothesis; the ACEs x Low Resilience interaction term was significantly and positively associated with mental distress (B = 1.32, [0.17, 2.47], p = 0.03). Thus, among low resilience participants (but not high resilience participants), a one standard deviation increases in ACEs predicted a .23 standard deviation increase in mental distress. Further, the relation between ACEs and mental distress independent of resilience status decreased from B=1.02 ([0.37, 1.68], p < .01) in Model 2 to a non-significant value of B = .48 ([-0.32, 1.28], p = 0.23) in Model 3, due to the addition of the ACEs x Low Resilience interaction term. The third and final model accounted for 28.2% of the variance of mental distress (R^2 = .28), relative to 26.4% of the variance in model 2.

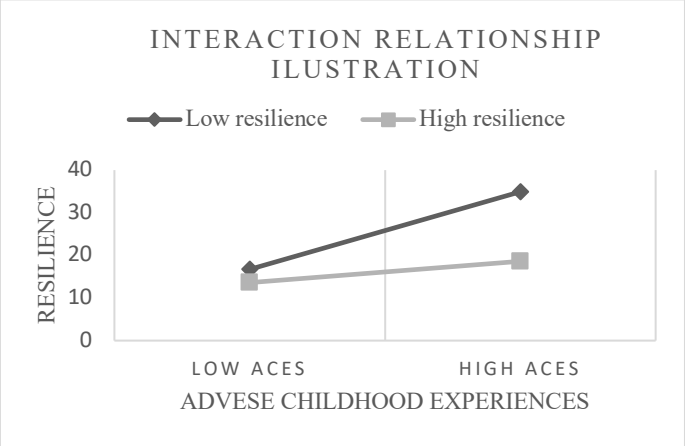

Figure 2:
Interaction Relationship: Adverse Childhood Experiences (ACEs) and Resilience

Table 2: Regression models predicting Mental Distress with Demographic Characteristics, Past Year Threatening Events (LTE), Adverse Childhood Experiences (ACEs), Low Resilience, and ACEs x Resilience

	Model 1					Model 2					Model 3				
	B	95% CI	**β**	95% CI	Sig.	**B**	95% CI	**β**	95% CI	Sig.	**B**	95% CI	**β**	95% CI	Sig.
Intercept	**14.02**	[2.74, 29.46]			**0.08**	7.75	[-6.86, 22.37]			0.30	10.80	[-3.92, 25.51]			0.15
Gender [1]	1.00	[-1.48, 3.48]	0.05	[-0.08, 0.18]	0.43	0.88	[-1.44, 3.20]	0.05	[-0.08, 0.17]	0.46	0.51	[-1.81, 2.83]	0.03	[-0.09, 0.15]	0.67
Place of Birth [2]	**2.75**	[0.1, 5.40]	0.13	[0.01, 0.27]	**0.04**	**3.55**	[1.05, 6.05]	0.17	[0.05, 0.30]	**0.01**	**3.81**	[1.32, 6.29]	0.19	[0.07, 0.31]	**<0.01**
Ethnicity [3]	-0.18	[-3.09, 2.74]	-0.01	[-0.14, 0.12]	0.91	-0.21	[-2.94, 2.52]	-0.01	[-0.13, 0.11]	0.88	-0.25	[-2.95, 2.46]	-0.01	[-0.13, 0.11]	0.86
Employment [4]	-0.55	[-1.29, 0.20]	-0.09	[-0.23, 0.04]	0.15	-0.41	[-1.11, 0.29]	-0.07	[-0.19, 0.05]	0.25	-0.37	[-1.06, 0.32]	-0.06	[-0.19, 0.06]	0.29
Income [5]	0.04	[-1.73, 1.79]	0.00	[-0.13, 0.14]	0.97	0.13	[-1.53, 1.80]	0.01	[-0.12, 0.14]	0.88	0.09	[-1.56, 1.74]	0.01	[-0.12, 0.14]	0.92
Marital Status [6]	0.59	[-5.33, 6.50]	0.02	[-0.13, 0.16]	0.85	1.92	[-3.64, 7.48]	0.05	[-0.09, 0.19]	0.50	1.27	[-4.27, 6.80]	0.03	[-0.11, 0.17]	0.65
Education [7]	1.04	[-0.77, 2.86]	0.08	[-0.06, 0.22]	0.26	1.02	[-0.68, 2.72]	0.08	[-0.05, 0.21]	0.24	0.94	[-0.75, 2.63]	0.07	[-0.06, 0.21]	0.27
Past Year Threatening Events	**1.87**	[1.16, 2.59]	0.34	[0.21, 0.47]	**<0.01**	**1.29**	[0.55, 2.03]	0.23	[0.1, 0.37]	**<0.01**	**1.19**	[0.45, 1.93]	0.21	[0.08, 0.35]	**<0.01**
Adverse Childhood Experiences (ACEs)						**1.02**	[0.37, 1.68]	0.21	[0.08, 0.35]	**<0.01**	0.48	[-0.32, 1.28]	0.10	[-0.07, 0.27]	0.23
Low Resilience						**5.37**	[3.15, 7.59]	0.29	[0.17, 0.41]	**<0.01**	**3.11**	[0.16, 6.07]	0.17	[0.01, 0.33]	**0.04**
ACEs x Low Resilience											**1.32**	[0.17, 2.47]	0.22	[0.03, 0.41]	**0.03**

Note: [1] Male =1, Female 2; [2] Not - U.S. Born = 0, U.S. Born = 1; [3] Non - Hispanic = 0, Hispanic = 1; [4] Not Employed = 0, Employed = 1; [5] 20,000 or less = 1, 20,000 - 40,000 = 2, 40,000 - 60,000 = 3, 60,000 - 70,000 = 4, 70,000 or more = 5; [6] Not Married = 0, Married = 1; [7] No High School = 1, High School = 2, Some College = 3, Bachelors = 4, Masters = 5, Doctorate = 6

6. Discussion

6.1. Review of Findings

This study investigated three core hypotheses, which were each supported by our findings. Specifically, ACEs and resilience were related to mental distress, with resilience moderating the relation between ACEs and mental distress. These findings highlight the importance of cultivating resilience to mitigate the influence of ACEs on mental distress. We consider the implications of each of the three core hypotheses in more detail here.

Our first hypothesis, that ACEs are positively associated with mental distress, was supported by our data and previous research (Felitti et al., 1998; Easton., 2017; Manyema, Norris, & Richter., 2018; Crouch et al., 2017; Martín-Blanco et al., 2016; Logan – Greene et al., 2014; Crouch et al., 2017; Bellis et al., 2017). The association between ACEs and mental distress may follow from neurophysiological dysregulations created by ACEs, which operate as stressors that dysregulate a child's development. As a consequence, adverse experiences create cognitive, social, physical, behavioral and mental challenges linked to chronic diseases and risk behaviors (Gilbert et al., 2015; Felitti., 1998). Based on this finding it is not only important to prevent ACEs but also to help people heal the effects of trauma as research demonstrates that the impact of ACEs on adult mental health are severe and long-lasting (Felitti et al., 1998).

Our second hypothesis, that mental distress is associated with low resilience, was also supported by our findings. Consistent with previous research, resilience plays a protective role in mental health. Literature suggests that resilience can help people overcome the effects of life adversities and regulate mental health symptoms, thereby promoting psychological endurance (Rutten et al., 2013; Banyard and Grych., 2017). Thus, higher rates of resilience have been associated with less disability, better self-reported health, emotional equilibrium, and improved

quality of life (Robottom et al., 2011). Due to the role that resilience plays in overcoming adversity, promoting resilience can help improve mental health and thus alleviate the effects of trauma, allowing for a better quality of life after adversity.

The third hypothesis, that the relation between ACEs and mental distress only exists in the lower resilience population, was also supported. These findings are consistent with previous research (Bellis et al., 2017; Logan Greene et al., 2014) but unique in that resilience is defined more broadly in the current study. The current study utilized a self-rated resilience scale with reliable psychometric properties that allowed participants to select their own degree of agreement with each resilience item. Our findings highlight the importance of resilience in mitigating the severe consequences of ACEs on health and well-being. Given the prevalence of ACEs in our society, the cultivation of resilience may provide substantial health benefits. The basis of this finding lies in early life experiences, which set the path for adult mental health, with resilience helping people cope with early life adversity (as illustrated in Fig.1).

In comparison to previous ACE studies, our study worked with a sample of predominantly Hispanic (78%) college students of which 80% were low-income status. Participants reported relatively high rates of ACES, with 16% reporting exposure to four or more ACEs and 67% reporting at least one ACE. In comparison, the Felitti et al. (1998) landmark ACE study with 8,056 predominately Caucasian (79%) college graduates (43%), had 52% reporting at least one ACE, with 6.2% reporting more four or more ACEs. Similarly, Bellis and colleagues (2017) had a sample of 7,047 participants (85% Caucasian) and 10% of their sample had four or more ACEs. Gilbert and colleagues (2015) presented a large sample size of 53,998 in the District of Columbia (80% Caucasian, 38% college graduates), 12.7% reported to having more than 4 ACEs.

6.2. Strengths and limitations

Our study demonstrated several strengths. First, this study was conducted on an a priori basis, with hypotheses developed first, followed by a power analysis, data collection and planned statistical tests. Second, all participants completed the entire survey, which avoided problems with bias from missing data. Third, the survey utilized established measures with known psychometric properties. The scales measuring ACEs, mental distress (Prochaska et al., 2012; Easton et al., 2017) and resilience (Soler – Sanchez et al., 2013; Riveros Munevar et al., 2015; Duong et al., 2017; Roy et al., 2011) have been used extensively and have established reliability and validity. Our focus on a predominantly Hispanic, low-income population is also a strength as previous work on ACEs has largely been conducted with Caucasian populations.

One important limitation of this study is that, due to the cross-sectional nature of our data collection, we were not able to infer causation. Future longitudinal research that randomly assigns participants to a resilience promoting intervention or control condition can more rigorously test a causal model of resilience moderating the relation between ACEs and mental distress. A second limitation arises from the complexity of resilience as a construct, which has been defined in different ways and may vary according to culture and environment (Ungar & Liebenberg., 2011; Ungar., 2013; Rutten et al., 2013). Nevertheless, resilience is thought to be a universal construct and our operationalization is consistent with leading definitions (Ungar., 2013; Stanton-Salazar & Urso Spina, 2000). Finally, a third limitation of the study is the uncertainty of generalizability to other regions due to the unique characteristics of this study's population.

6.3. Future Implications

Study findings suggest a need for interventions that develop resilience among individuals exposed to ACEs. One promising example is the program 2Gen Thrive, which prevents stress and promotes resilience for at-risk low-income families by improving caregiver ability to respond to a child's development including their emotional and behavioral needs (Woods-Jaeger et al., 2018). Further development and testing is needed to identify evidence-based interventions with long-term benefits.

Policies that protect children and prevent abuse are also needed to reduce the incidence of ACEs. Conditional cash-transfer programs, where parents receive financial support on the condition, they participate in programs designed to benefit their children, have been successful in several contexts (Gross et al., 2011). Another promising approach to preventing child abuse and neglect is the CDC's Veto Violence initiative, which provides prevention tools, trainings and resources for ACE prevention (CDC., 2019; Burke Harris et al., 2016). To enhance monitoring and early detection, there is a need for service providers across settings to assess and address ACEs in terms of mental health. Trainings for physicians, educators, and the community on detecting and addressing ACEs may help in this regard.

Further research is needed to better understand the relationship between resilience and childhood trauma, particularly the physiological changes caused by trauma and the protective role that resilience plays on an individual's biology. For example, resilience is believed to be associated with the functioning of the hypothalamus pituitary adrenal (HPA) axis and genes associated with HPA functioning (Feder et al., 2009). With better understanding of the biologically modifiable nature of resilience, we can develop more effective therapeutic interventions that enhance resilience and prevent mental disorders (Shrivastava & Desousa., 2016)

7. Conclusion

This study identifies resilience as a moderator of the relation between ACEs and mental health. Given the prevalence of ACEs as a public health concern associated with poor mental health (Felitti and De Anda., 2009), unemployment (Artazcoz et al., 2004), substance abuse (Fleming et al., 2018) and early death (Felitti et al., 1998), resilience has important implications for prevention and health promotion. This study provides the empirical rationale for a call to action to promote resiliency, given its centrality in establishing a healthy future for children and adults exposed to adversity.

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Vita

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